California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

Thursday, December 16, 2010

and

Friday, December 17, 2010

LOCATION:
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

This facility is accessible by public transit. For transit information, call (916) 321-BUSS, website: http://www.sacrt.com
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TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING GO TO: http://www.arb.ca.gov/lispub/comm/bclist.php

December 16, 2010
9:00 a.m.

DISCUSSION ITEMS:
Note: The following agenda items may be heard in a different order at the Board meeting.

Agenda Item #

10-11-1: Public Hearing to Consider the Adoption of a Proposed California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulation, Including Compliance Offset Protocols

Staff will present to the Board a proposed regulation to implement a California Greenhouse Gas Emissions Cap-and-Trade Program, including compliance offset protocols. The proposed regulation would establish the framework and requirements for the program.

10-11-2: Public Hearing to Consider Amendments to the Regulation for Mandatory Reporting of Greenhouse Gas Emissions

Staff is proposing amendments to the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions. The proposed amendments would align most California greenhouse gas reporting requirements with the federal greenhouse gas reporting requirements adopted by the United States Environmental Protection Agency, and will add specific provisions to support the Air Resources Board's proposed Cap-and-Trade regulation.

December 17, 2010
8:30 a.m.
(Spanish Interpretation Services Available 12/17 Only)

Agenda Item #

10-11-3: Public Hearing to Consider the Adoption of Proposed Amendments to the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants From In-Use On-Road Diesel-Fueled Vehicles, the Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure, and the Regulation to Control Emissions From In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks at Ports and Intermodal Rail Yard Facilities

Notice of Public Hearing to Consider Proposed Amendments to the Regulations for In-Use Off-Road Diesel-Fueled Fleets and Off-Road Large Spark Ignition Engine Fleet Requirements

Staff is proposing amendments to five regulations - the Regulation for In-Use On-Road Diesel Vehicles (Truck and Bus regulation), the Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation (Tractor-Trailer GHG regulation), the Regulation for In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks (Drayage Truck regulation), the In-Use Off-Road Diesel Fueled Fleets (Off-Road regulation), and the Large Spark-Ignition (LSI) fleet regulation.

In order to implement the directives given by the Board in April 2010, staff is proposing amendments to the Truck and Bus regulation and Off-Road regulation to provide relief to fleets adversely affected by the economy, and take into account the fact that emissions are lower than previously predicted. Both regulations will be considered together to identify an equitable proposal to reduce the compliance costs of both regulations, while still providing the necessary emission reductions to meet the Board's State Implementation Plan commitments and protect public health.

The proposed amendments to the Truck and Bus regulation will provide economic relief for fleets by eliminating requirements for trucks with a gross vehicle weight rating less than 26,001 pounds, and by easing the compliance schedule for heavier trucks. The proposed amendments to the Off-Road regulation will delay the initial compliance date, significantly reduce annual requirements, and provide a path to compliance without any required retrofits. The proposed amendments to both regulations will substantially simplify the regulations while retaining flexibility for fleets, and will give credit to fleets that have already taken actions to comply with the regulations. The overall effect of the proposed amendments will be to significantly lower the costs of the regulations while still maintaining progress toward clean air.

Staff will also propose amendments to the Drayage Truck regulation to add flexibility to fleets' compliance schedules, mitigate the use of noncompliant trucks outside port and rail properties, and to provide for a smooth transition to the Truck and Bus regulation. The proposed amendments to the Tractor-Trailer GHG regulation will add flexibility to fleets' compliance schedules and reporting requirements while still meeting the GHG emissions reduction goals of the regulation. The amendments also address requirements for storage trailers and refrigerated van trailers.

Finally, staff will propose amendments to the LSI regulation that make several minor changes and clarifications, including extending the limited hours of use provisions and broadening compliance extension flexibility.

CLOSED SESSION – LITIGATION

The Board will hold a closed session, as authorized by Government Code section 11126(e), to confer with, and receive advice from, its legal counsel regarding the following pending or potential litigation:

Pacific Merchant Shipping Association v. Goldstene, U.S. District Court (E.D. Cal Fresno), Case No. 2:09-CV-01151-MCE-EFB.

American Trucking Associations, et al. v. U.S. Environmental Protection Agency, et al., U.S. Court of Appeals, District of Columbia Circuit, Case No. 09-1090.

POET, LLC, et al. v. Goldstene, et al., Superior Court of California (Fresno County), Case No. 09CECG04850.

Rocky Mountain Farmers Union, et al. v. Goldstene, U.S. District Court (E.D. Cal. Fresno), Case No. 1:09-cv-02234-LJO-DLB.

National Petrochemical & Refiners Association, et al. v. Goldstene, et al., U.S. District Court (E.D. Cal. Fresno) Case No. 1:10-cv-00163-AWI-GSA.

Association of Irritated Residents, et al. v. California Air Resources Board, Superior Court of California (San Francisco County), Case No. CPF-09-509562.

OPPORTUNITY FOR MEMBERS OF THE BOARD TO COMMENT ON MATTERS OF INTEREST

Board members may identify matters they would like to have noticed for consideration at future meetings and comment on topics of interest; no formal action on these topics will be taken without further notice.

OPEN SESSION TO PROVIDE AN OPPORTUNITY FOR MEMBERS OF THE PUBLIC TO ADDRESS THE BOARD ON SUBJECT MATTERS WITHIN THE JURISDICTION OF THE BOARD

Although no formal Board action may be taken, the Board is allowing an opportunity to interested members of the public to address the Board on items of interest that are within the Board's jurisdiction, but do not specifically appear on the agenda. Each person will be allowed a maximum of three minutes to ensure that everyone has a chance to speak.

TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING GO TO:

http://www.arb.ca.gov/lispub/comm/bclist.php

IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT THE CLERK OF THE BOARD:
OFFICE: (916) 322-5594
1001 I Street, Floor 23, Sacramento, California 95814
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SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at (916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia;
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma;
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

SMOKING IS NOT PERMITTED AT MEETINGS OF THE CALIFORNIA AIR RESOURCES BOARD

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

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December 17, 2010 at 8:30 a.m.

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10-11-3	**Public Hearing to Consider the Adoption of Proposed Amendments to the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and other Criteria Pollutants From In-Use On-Road Diesel-Fueled Vehicles, the Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure, and the Regulation to Control Emissions From In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks at Ports and Intermodal Rail Yard Facilities**	**1-268**
	Public Hearing to Consider Proposed Amendments to the regulations for In-Use Off-Road Diesel-Fueled Fleets and Off-Road Large Spark Ignition Engine Fleet Requirements	**269-698**

TITLES 13 AND 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER THE ADOPTION OF PROPOSED AMENDMENTS TO THE REGULATION TO REDUCE EMISSIONS OF DIESEL PARTICULATE MATTER, OXIDES OF NITROGEN AND OTHER CRITERIA POLLUTANTS FROM IN-USE ON-ROAD DIESEL-FUELED VEHICLES, THE HEAVY-DUTY VEHICLE GREENHOUSE GAS EMISSION REDUCTION MEASURE, AND THE REGULATION TO CONTROL EMISSIONS FROM IN-USE ON-ROAD DIESEL-FUELED HEAVY-DUTY DRAYAGE TRUCKS AT PORTS AND INTERMODAL RAIL YARD FACILITIES

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider the adoption of amendments to the "Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles (Truck and Bus regulation), title 13, California Code of Regulations (Cal. Code Regs.), section 2025; the Heavy-Duty Vehicle Greenhouse Gas (GHG) Emission Reduction Measure (Tractor-Trailer GHG regulation), title 17, Cal. Code Regs., sections 95301 to 95307, 95309, and 95311; and the regulation for In-Use On-Road Heavy-Duty Diesel-Fueled Drayage Trucks at Ports and Intermodal Rail Yard Facilities (Drayage Truck regulation), title 13, Cal. Code Regs., section 2027. This notice summarizes the specific amendments being proposed. The staff report (Initial Statement of Reasons) presents the proposed amendments and information supporting the amendments of the regulations in greater detail.

DATE: December 16, 2010

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

This item may be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., December 16, 2010, and may continue at 8:30 a.m., December 17, 2010. This item may not be considered until December 17, 2010. Please consult the agenda for the hearing, which will be available at least ten days before December 16, 2010, to determine the day on which this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

A. Sections Affected

Proposed amendments to California Code of Regulations., title 13, section 2025, Truck and Bus regulation; California Code of Regulations., title 17, sections 95301, 95302, 95303, 95304, 95305, 95306, 95307, 95309, and 95311 Tractor-Trailer GHG regulation; and California Code of Regulations., title 13, section 2027, Drayage Truck regulation.

B. Background:

1. Introduction

The amendments to the Truck and Bus regulation are being proposed to provide heavy-duty truck and bus fleets with additional flexibility in response to a recent analysis that shows that vehicle activity and emissions are below the levels estimated when the Truck and Bus regulation was initially adopted. Amendments to the Truck and Bus regulation are further being proposed to align the regulation with amendments being proposed to the Drayage Truck regulation that address concerns about localized exposure in communities near ports and intermodal rail yards. Staff is also proposing to amend the existing Tractor-Trailer GHG regulation to provide affected fleets with additional flexibility in meeting the requirements, to ease their burden of compliance, and in some cases to reduce compliance costs, with minimal impact on the GHG benefits as initially approved.

2. Truck and Bus Regulation

On December 11, 2008, the Board approved the Truck and Bus regulation to reduce emissions of diesel particulate matter (diesel PM), oxides of nitrogen (NOx), and other criteria pollutants from nearly one million in-use diesel trucks and buses that operate in California. The reductions were adopted to meet State and federal air quality standards. The regulation, as adopted, supported the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, which the Board adopted on September 30, 2000. The regulation, when implemented, would require the installation of exhaust retrofits to reduce emissions from existing engines, and accelerate the introduction of cleaner engines into fleets that operate in California.

The Truck and Bus regulation was approved by Resolution 08-43, which among other things directed staff to monitor the economy and report to the Board in December 2009 on the impact of the recession on emissions and affected fleets. At the December 2009 Board Hearing, staff presented the results of an analysis that showed that vehicle activity and emissions were below the levels estimated when the regulation was developed and that 2014 emission goals could now be met with fewer emission reductions from heavy-duty vehicles. The Board then determined that additional flexibility could be provided for fleets adversely affected by the economy and directed staff to propose amendments to the regulation that take into account the impacts of the economy on emissions and provide relief to affected fleets. In April 2010, the Board further directed staff to consider the impact of the recession and emission inventory

changes from both on-road and off-road diesel vehicles, and to provide regulatory relief to fleets affected by the Truck and Bus regulation and/or the In-Use Off-Road Diesel Vehicle regulation such that any appropriate economic relief could be targeted most cost effectively between the two regulations, and staff could ensure the combined emissions benefits achieved by the two regulations would continue to meet state implementation plan (SIP) requirements for the combined SIP categories. Staff will be proposing amendments to the Off-Road regulation at the December 16 and 17, 2020 Board Hearing when it considers amendments to the Truck and Bus regulation.[1]

In considering changes to the Truck and Bus regulation staff is also proposing changes to the requirements of the Drayage Truck regulation to address many of the same issues directed by the board and to better align the requirements of the two regulations.

Finally, in December 2008, by Resolution 08-43, the Board approved amendments to bring two-engine sweepers under the Truck and Bus regulation.

Applicability

The Truck and Bus regulation, as originally adopted, applies to any person, business, or federal government agency that owns, operates, or sells, heavy-duty diesel-fueled vehicles with a manufacturer's gross vehicle weight rating (GVWR) greater than 14,000 pounds, two-engine sweepers, yard trucks with on-road or off-road engines and diesel-fueled shuttle vehicles of any GVWR that have a capacity of ten or more passengers, and routinely drive an average of ten trips per day to or from airport terminals, marine terminals, and rail-based stations. Drayage trucks and utility-owned vehicles are respectively subject to the Truck and Bus regulation beginning January 1, 2017 and January 1, 2021. The regulation applies to vehicles that operate in the State whether or not the vehicle is registered in California. The regulation does not apply to various heavy-duty vehicles, including military tactical support vehicles, authorized emergency vehicles, personal-use motor homes, and personal-use vehicles with pick-up beds, and vehicles subject to the Mobile Cargo Handling Equipment regulation, title 13, Cal. Code Regs., section 2479, as well as vehicles covered under other ARB regulations (see title 13, Cal. Code Regs., section 2025(c).

Fleet Requirements

The regulation, as originally adopted, requires owners to upgrade their fleets to meet specific PM and NOx performance standards defined as best available control technology or BACT. The BACT standard for PM is an engine equipped with the highest level verified diesel emission control strategy (VDECS[2]) for PM (also referred to as a PM filter) or an engine originally equipped with a diesel particulate filter by the

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[1] Notice of Public Hearing to Consider Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and Off-Road Large Spark Ignition Engine Fleet Requirements. December 16, 2010.

[2] A retrofit device that has been verified under ARB's Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines, title 13, Cal. Code Regs., sections 2700 et seq.

engine manufacturer. The BACT standard for NOx is an engine newly manufactured in 2010 or later or a 2010 emissions equivalent engine.

Fleets could meet the annual requirements by retrofitting vehicles with a VDECS that would achieve PM or NOx reductions or both as required, replacing vehicles with newer, cleaner ones, or replacing existing engines with cleaner engines. Fleets could also retire older vehicles, or operate higher emitting vehicles less often, designating them as low-use vehicles.

Starting January 1, 2011, fleets are required to install PM filters for certain engine model years and to begin accelerating engine or vehicle replacement starting January 1, 2013. The adopted regulation anticipates that by 2014, half of all vehicles in the fleet would have 2010 model year (MY) or newer engines and the remainder of the fleet would have engines equipped with PM filters. After 2014, fleets are required to phase-in additional 2010 MY or newer engines so that by 2023 all engines would have 2010 or later MY engines or be retrofitted to achieve equivalent emission reductions.

Each year fleets must demonstrate compliance by meeting one of the regulation's three compliance options:

1. Comply with a BACT schedule that prescribes which vehicles must be equipped with VDECS or replaced based on engine MY; or
2. Meet a BACT percent limit option that sets the minimum number of PM filters and the minimum number of 2010 or equivalent engines in the fleet each year; or
3. Meet specified fleet average emission rate targets.

The regulation includes a number of special provisions that delay some or all of the requirements for certain fleets and vehicle uses. These provisions are available for small fleets, low-use vehicles, agricultural vehicles, vehicles operating exclusively in designated NOx exempt areas, school buses, motor coaches, and unique vehicles. The regulation also provides for manufacturer delays, vehicle retirement credits, hybrid vehicle credits, specialty agricultural vehicles, and VDECS safety exemptions.

Rationale for Amendments

Staff is proposing to amend the Truck and Bus regulation to implement the Board's directives to provide additional flexibility for fleets that have been adversely affected by the economic recession, while taking into account that emissions are lower than expected due to reduced activity as a result of the recession.

3. Drayage Truck Regulation

In December 2007, in Resolution 07-58, ARB approved the Drayage Truck regulation to reduce emissions from on-road heavy duty diesel-fueled drayage trucks – described as trucks that predominantly transport containers, bulk, and break-bulk goods to and from ports and intermodal rail yards. The regulation is applicable to owners and operators of Class 8 tractors having a GVWR greater than 33,000 pounds that operate at California

ports and intermodal rail yards. Staff initially estimated that there would be approximately 25,000 tractors in frequent or semi-frequent port and intermodal rail yard drayage service subject to the regulation. The Board adopted additional amendments to the regulation in 2008 (Resolution 08-43), in which it imposed additional requirements on 2004-2006 MY drayage trucks.

Existing Requirements

The requirements of the regulation are being implemented in two phases: Phase 1 and Phase 2. In Phase 1, by December 31, 2009, all drayage trucks with a 1994 to 2003 MY engine are required to be retrofitted with a level 3 VDECS for PM or be equipped with a 2004 MY or newer engine. 2004 through 2006 MY drayage trucks must be equipped with a level 3 VDECS for PM by January 1, 2011 and 2012, respectively. Additionally, drayage trucks must register with the ARB's Drayage Truck Registry (DTR) before entering California's ports and intermodal rail yard facilities. In Phase 2, all drayage trucks are required to meet or exceed California or federal 2007 MY heavy duty diesel engine emissions standards by December 31, 2013.

Staff is proposing to amend the Drayage Truck regulation in conjunction with proposed amendments to the Truck and Bus regulation to align the two regulations and to address concerns about localized exposure in communities near ports and intermodal rail yards.

4. Tractor-Trailer GHG Regulation

On December 11, 2008, the Board approved the existing Heavy-Duty Vehicle GHG Emission Reduction (Tractor-Trailer GHG) regulation. This regulation reduces GHG emissions from 53-foot or longer box-type trailers and the tractors that haul such trailers by requiring them to utilize technologies that would result in improved fuel efficiency, such as low-rolling resistance tires and aerodynamic technologies (for example, side skirts, gap fairings, and rear trailer fairings). The Tractor-Trailer GHG regulation is one of the measures identified in ARB's Scoping Plan to reduce GHG emissions and contributes towards meeting the GHG emission reduction goals of Assembly Bill 32 (Global Warming Solutions Act of 2006).

Applicability

The Tractor-Trailer GHG regulation applies to 53-foot or longer dry-van and refrigerated-van trailers (hereinafter collectively referred to as box-type trailers) and the tractors that pull them on California highways. The regulation applies primarily to affected tractor and trailer owners who are responsible for replacing or retrofitting their affected vehicles. In addition, drivers, motor carriers, California-based brokers and California-based shippers that operate or use affected tractors and trailers also share responsibility for compliance with the regulation. The regulation applies to both California and out-of-state registered tractors and trailers that operate in California. The regulation does not apply to box-type trailers shorter than 53 feet in length; refuse trailers, chassis trailers, drop frame trailers, curtain side trailers, livestock trailers, emergency vehicles, or military tactical vehicles.

Existing Requirements

The Tractor-Trailer GHG regulation requires new and existing long-haul tractors pulling 53-foot or longer box-type trailers and 53-foot or longer box-type trailers pulled by these tractors to be United States Environmental Protection Agency (U.S. EPA) SmartWay[3] (SmartWay) certified or retrofitted with SmartWay verified aerodynamic technologies and low-rolling resistance tires when they operate on California highways.

Fleets with pre-2011 MY trailers have the option of retrofitting their affected trailers over several years by following one of two compliance schedules based on fleet size. The regulation also includes a special provision for 2003 to 2008 MY refrigerated van trailers to delay compliance until 2017 to 2019 depending on trailer MY.

Since the technologies required by the regulation offer the most efficient improvements at highway speeds, the regulation includes provisions to exempt local-haul trailers, local-haul tractors and short-haul tractors and the trailers they pull from some or all of the requirements.

Rationale for Amendments

Staff believes many fleets were not aware of the Tractor-Trailer GHG regulation and may have missed the July 1, 2010 deadline to participate in the optional large fleet phase-in compliance plan for trailers. Staff is therefore proposing amendments to provide fleets another opportunity to opt-in to the phase-in compliance option. Staff is also proposing additional amendments to provide fleets with additional flexibility in meeting the requirements of this regulation, such as by providing flexibility in complying with existing fleet reporting requirements, and including temporary, short-term exemptions for specific circumstances, such as those associated with storage trailers, transfers of ownership, and moving local-haul trailers. These amendments will provide affected tractors, trailers, and fleets additional flexibility to ease their burden of compliance; and in some cases reduce compliance costs, with minimal impact on the GHG benefits associated with the original regulation.

C. Proposed Amendments to the Truck and Bus Regulation

Staff is proposing substantial changes to the requirements of the Truck and Bus regulation to meet the Board's directive to provide regulatory relief to affected fleets. Staff is also making changes to simplify certain reporting requirements and to improve enforceability. The following describes the amendments proposed by staff.

[3] The U.S. EPA SmartWay Partnership Program is a federal voluntary program designed to improve the environmental performance associated with the ground freight delivery system in the United States. The Partnership develops guidelines and verifies fuel efficiency improving technologies such as tractor and trailer aerodynamic equipment and low rolling resistance tires, and certifies fuel efficient tractors and trailers that incorporate these technologies.

1. New Compliance Requirement for Lighter Vehicles

Staff is proposing a new provision (section 2025(f) in the proposed amended regulation) that would exempt about 150,000 vehicles with a GVWR less than 26,001 pounds from the PM BACT requirements. Starting January 1, 2015, and continuing each year thereafter until 2020, engines with model years that are 20 years old or older would need to be replaced with a 2010 MY engine or equivalent. Then, from 2020 to 2023, all remaining pre-2010 MY engines would be required to be 2010 MY engine equivalent according to the schedule specified in section 2025(f) of the proposed amended regulation.

2. New BACT Compliance Schedule for Heavier Vehicles

Staff is proposing to amend the BACT compliance schedule of section 2025(f) of the existing regulation. The revised schedule (section 2025(g) in the proposed amended regulation) would require vehicles, with a GVWR greater than 26,000 pounds (heavier vehicles) with 1998 to 2006 MY engines, to meet PM BACT between January 1, 2012 and January 1, 2014. Fleets would need to replace heavier vehicles having pre-1998 MY engines with a 2010 MY engine or equivalent engines between January 1, 2015 and January 1, 2017. Any heavier vehicle that meets PM BACT prior to January 1, 2014 would be exempt from meeting the 2010 MY emission equivalent requirement until January 1, 2020. From January 1, 2020 to January 1, 2023 all pre-2010 engines would be required to be phased out of service.

Staff will also propose a provision to accommodate those fleets that have already taken compliance actions based on the BACT schedule in section 2025(f) of the existing regulation.

3. Phase-In Option for Small Fleets

Staff proposes to replace the existing optional provision for small fleets (section 2025(i) in the existing regulation) with a new optional phase-in provision for small fleets that have one to three vehicles subject to the regulation. The new provision in section 2025(h) would allow small fleets to report starting January 31, 2012 and would make the heavier vehicles exempt from the regulation's PM BACT requirements until January 1, 2014 and the 2010 engine or equivalent emissions requirements until January 1, 2020. One vehicle in the small fleet would need to meet PM BACT by January 1, 2014, two vehicles by January 1, 2015, and three vehicles by January 1, 2016. Beginning January 1, 2020, all vehicles in the fleet would need to comply with the 2010 engine or equivalent emissions according to the proposed BACT compliance schedule of section 2025(g).

4. Phase-In Option for Large Fleets

Staff is proposing a new compliance option in section 2025(i) to provide additional compliance flexibility for fleets with four or more vehicles subject to the regulation. With this option, the heavier vehicles in the fleet would need to comply with PM BACT by bringing 30 percent of the heavier vehicles into compliance by January 1, 2012, 60 percent by January 1, 2013, and 90 percent by January 1, 2014. By

January 1, 2016, the remaining vehicles in the fleet would need to comply according to the proposed PM and 2010 engine or equivalent BACT compliance schedule of section 2025(g). Fleets utilizing this provision would need to report required fleet information for all vehicles starting January 31, 2012. Staff is also proposing to allow fleets with drayage trucks and non-drayage trucks to include all of their vehicles in the phase-in option when determining compliance. This change to the Truck and Bus regulation would not modify any of the requirements of the Drayage Truck regulation (title 13, CCR, section 2027). This phase-in option would expire on January 1, 2017.

5. Relief for Fleets that have Reduced their Fleet Size

Staff is proposing a provision in section 2025(i)(4) of the proposed amended Truck and Bus regulation that offers relief to fleets that have reduced their fleet size compared to their fleet size on October 1, 2006 (this is their "2006 baseline"). This provision would replace the retired vehicle credit of section 2025(k) of the existing regulation. It would only be available for heavier vehicles and only to fleets that have opted into the phase-in option. Until January 1, 2016, a fleet would be able to reduce its requirement for a compliance year by the same percentage that the fleet has downsized from the 2006 baseline fleet. For determining this credit, the fleet would be allowed to exclude existing vehicles that will not operate in the appropriate compliance year. The provision would expire January 1, 2016. Staff is also proposing a new definition of the baseline fleet (2006 baseline fleet) in section 2025(d)(1) of the proposed amended regulation to replace the definition of the 2008 baseline fleet associated with the retired vehicle credit of the existing regulation. The baseline date would be changed from July 1, 2008 to October 1, 2006 and the definition for the 2006 baseline would not include a mileage requirement for California registered vehicles but would require out-of-state fleet vehicles to have been driven at least 1,000 miles in California during 2006 to be eligible to receive the credit. Similar relief will be provided for school buses.

6. Credits

Staff is proposing to amend the credits for early installation of VDECS and for the purchase of hybrid vehicles, alternative-fueled vehicles, and heavy-duty pilot ignition vehicles (sections 2025(p)(1)(E), (p)(8), and (9) in the existing regulation) These sections would be replaced in the proposed amended regulation with section 2025(j). For each vehicle that had the highest level VDECS for PM installed by July 1, 2011, and for each fuel efficient hybrid vehicle, alternative fueled vehicle, or heavy-duty pilot ignition engine added to the fleet, the fleet could treat another vehicle as compliant until January 1, 2017. The fleet would be required to report information about the vehicle receiving the credit and the vehicle to be treated as compliant. Similar flexibility would be provided for school buses.

In addition, the Board may consider additional amendments to provide fleets with flexibility to take credit for actions to reduce emissions between the off-road regulation and the on-road regulation.

7. School Bus Requirements

Staff is proposing to amend the school bus provision (section 2025(j) of the existing regulation (renumbered as section 2025(k) in the proposed amended regulation) to exempt school buses with a GVWR less than 26,001 pounds. Staff' is also proposing a one-year delay before school buses with a GVWR over 26,000 pounds must meet PM BACT. The BACT compliance schedule of the existing regulation will be replaced by a phase-in schedule that requires the fleet to bring 33 percent of the school buses in the fleet into compliance with PM BACT by January 1, 2012, 66 percent by January 1, 2013, and 100 percent by January 1, 2014. The changes would better align the requirements with the amendments being made for other vehicles subject to the regulation.

8. Drayage Trucks

Staff is proposing to amend the requirements for drayage trucks now located in section 2025(e)(4) of the existing regulation. The amendments proposed in section 2025(l) of the proposed amended regulation would allow a fleet owner to include all of their drayage trucks in the fleet for the purpose of complying with the Truck and Bus regulation's proposed phase-in option for large fleets. This option is allowed only if all of the owner's drayage trucks are included in the Truck and Bus regulation fleet. In addition, the initial date that drayage trucks are required to comply with the Truck and Bus regulation has been changed from January 1, 2021 to January 1, 2017. The proposed amendments to the drayage truck provision in section 2025(l) do not modify any of the requirements of the Drayage Truck regulation (title 13, CCR, section 2027).

9. Two-Engine Sweepers

Staff is proposing to amend section 2025(n)(3) regarding the labeling requirements for two-engine sweepers. Staff proposes to require labeling of all two-engine sweepers with Tier 0 auxiliary engines regardless of the compliance option selected. The current language limits the requirement to only those two-engine sweepers that comply with the BACT percentage limits or fleet averaging option of the existing regulation.

10. Agricultural Vehicles

Staff is proposing to amend section 2025(r)(6) to extend the initial reporting deadline for agricultural vehicles to March 31, 2011 and to amend section 2025(m)(2) to extend the initial compliance date to January 1, 2012 for vehicles in the agricultural fleet that do not qualify for the agricultural vehicle provisions. Staff is also proposing to amend the definition of an agricultural vehicle in section 2025(d)(5) (section 2025(d)(6) of the proposed amended regulation), to clarify the types of vehicles and usage that would qualify a vehicle as an agricultural vehicle. Also, the specialty vehicle designation now limited to feed trucks or mixer-feed trucks in section 2025(d)(69) of the existing regulation would be amended in section 2025(d)(53) of the proposed amended regulation to extend the designation to all livestock feed trucks. Staff is also proposing to amend section 2025(m)(2) so that it no longer identifies specific compliance options available to agricultural fleets, in effect allowing them to use the regulation's special provisions and exemptions for their vehicles that do not qualify for the agricultural

vehicle provisions. In addition, staff is proposing to amend sections 2025(m)(6) and (m)(7) to clarify the restrictions on fleets seeking to replace limited-mileage and low-mileage agricultural vehicles and still maintain the vehicle designation.

11. Log Truck Requirements

Staff is proposing a new optional phase-in schedule in section 2025(m)(9) for log trucks and to add a definition for "log truck" in section 2025(d)(40) of the proposed amended regulation. With this option, fleet owners would not be required to install PM retrofits, but instead would be required to phase in 2010 MY emissions equivalent engines at the rate of 10 percent of the log truck fleet per year from January 1, 2014 to January 1, 2023. The proposal would not allow the total number of log trucks using the log truck provision to increase from one year to the next. The total number of log trucks and qualifying agricultural vehicles could not exceed the number of vehicles in the fleet as of January 1, 2009.

12. Definition of Low-Use Vehicle

Staff is proposing to replace the definition of a low-use vehicle in section (d)(47) of the existing regulation with a new definition in section (d)(43) of the proposed amended regulation. The proposed definition would specify when mileage or hours of operation are to be used in determining whether the vehicle qualifies as low use. Under the proposal, a vehicle without power take off (PTO) would be a low-use vehicle if the propulsion engine will be operated in California for fewer than 1,000 miles in any compliance year. For a vehicle with PTO designed to perform work while the vehicle is stationary, the vehicle would meet the low-use definition if the propulsion engine is operated in California for fewer than 1000 miles and less than 100 hours in any compliance year.

13. Reporting Requirements for Fleets with Low-Use Vehicles

Staff is proposing to amend the reporting requirement of section 2025(r)(2) to allow a fleet owner to report only the low-use vehicles in the fleet if these are the only vehicles in the fleet for which reporting is required and all other vehicles in the fleet are meeting the requirements of the BACT compliance schedule.

14. Exemption for Vehicles Unable to Upgrade

Staff is proposing to add an exemption in section 2025(p)(1) for vehicles unable to upgrade to a 2010 MY emissions equivalent engine. The fleet owner would be able to apply to the Executive Officer for a one year exemption from the requirement if by January 1, 2014, a used vehicle or suitable cab and chassis that performs a similar function with a 2010 equivalent emissions engine is not available and the highest level VDECS for PM is not available to be installed by 2014.

15. Operation in NOx Exempt Areas

Staff is proposing to amend the section 2025(p)(1)(B), which currently applies to vehicles operated in certain counties defined as NOx exempt areas. The amendments

would provide that vehicles operating exclusively in NOx exempt areas to continue to be exempt from any vehicle replacement requirements until 2021 but would remain subject to meeting PM BACT on the same schedule as other fleets.

16. Deleted Provisions

Staff is proposing to delete the provisions listed below from the existing regulation. The BACT percentage limits option and the Fleet averaging option would no longer be needed because the proposed new compliance options for lighter and heavier vehicles and the new phase-in options add more flexibility and have reduced requirements. The other provisions would no longer be needed since the proposed new or amended requirements do not require accelerated vehicle replacements and provide additional flexibility for fleets to keep older vehicles in the fleet longer.

- BACT Percentage Limits option – section 2025(g),
- Fleet Averaging option – section 2025(h),
- Exemption for cab-over-engine truck tractors - section 2025(p)(2),
- Provision for unique vehicles – section 2025(p)(3),
- NOx mileage exempt vehicles - section 2025(p)(1)(A),
- Requirements for motorcoaches – section 2025(l).

17. Other Amendments

Staff is proposing amendments to section 2025(d), to modify existing definitions and to define new terms that are associated with the amendments outlined above. Staff is also proposing to modify other sections to clarify existing requirements and improve enforceability of the regulation and streamlining reporting and recordkeeping. These include proposed changes to the exemption for vehicles operating with a three day pass (moved from section 2025(p)(5) of the existing regulation to section 2025(p)(3) of the proposed amended regulation), and the proposed addition in section 2025(o)(2)(B) to clarify the requirements for fleets that change their status.

In addition to the above, the Board may consider amending the Truck and Bus regulation to cover other two-engine vehicles, as appropriate, for reasons similar to its past decision to include two-engine sweepers within the regulation's scope.

D. Proposed Amendments to the Drayage Truck Regulation

Staff is proposing to amend the Drayage Truck regulation to align its requirements with those of the Truck and Bus regulation and to mitigate the effects of dray-off activities[4] occurring outside ports and rail yards. The proposed amended regulation will facilitate the transition to one statewide truck and bus regulation. Key elements of the proposed amendments include: eliminating the Phase 2 compliance requirement that all trucks in port and intermodal rail yard service meet or exceed 2007 MY engine standards in

[4] Dray-off is the activity in which cargo destined for or originating from ports or rail yards are delivered or picked up outside or in the proximity of port or intermodal rail yard facilities by non-compliant vehicles that circumvent the drayage truck regulation.

2014, requiring that Class 7 vehicles (GVWR greater than 26,000 pounds but less than 33,001 pounds) be retrofitted with a PM filter by 2014 and sunsetting the Drayage Truck regulation at the end of 2016, at which time, drayage trucks will become subject to the requirements of the Truck and Bus regulation. The Board may consider other amendments to the Drayage Regulation that it determines necessary to ensure alignment with the proposed amendments to the Truck and Bus regulation.

1. Eliminating Phase 2 Requirements

Staff is proposing to allow 1994-2006 MY engines retrofitted with level 3 VDECS to continue to operate at port and intermodal rail yards after January 1, 2014 by eliminating the current Phase 2 requirement in section 2027(d)(2) that requires drayage trucks meet or exceed California or federal 2007 MY engine emissions standards by that date. Eliminating this Phase 2 requirement would allow trucks that are retrofitted with a level 3 VDECS to continue operating at the ports and intermodal rail yard facilities until the Truck and Bus regulation mandates modernization. These proposed amendments would effectively align the Drayage Truck regulation's compliance timelines with those of the Truck and Bus regulation and would provide relief and compliance flexibility to drayage truck owners.

2. Mitigating Dray-Off Activity

Staff is proposing several amendments to prevent drayage trucks from exchanging cargo with dirty trucks near port or rail facilities. This is practice is commonly referred to as 'dray-off'. Operators who engage in dray-off are circumventing regulatory requirements and adversely impacting the air quality of the surrounding communities. Staff is proposing the following changes in the Drayage truck regulation to prevent dray-off.

- Expand the definition of a 'drayage truck' in section 2027(c)(15) to include trucks engaging in drayage activities outside of port and rail yard facilities.
- Modify section 2027(b)(1) to expand the applicability of the regulation to drayage truck owners and operators operating off of port or intermodal rail yard properties and their dispatching motor carriers.
- Modify the definition of 'Drayage Truck Operator' in section 2027(c)(17) to include drivers operating vehicles off of port or intermodal rail facilities.
- Modify the definition of 'Motor Carrier' in section 2027(c)(33) to include motor carriers dispatching drayage trucks to locations off of port or intermodal rail facilities to pick-up or deliver goods that are destined for or that originated from ports or intermodal rail facilities.
- Add section 2027(d)(4)(A)(2) to require drayage truck operators to identify and provide documentation as to the origin and destination of the cargo and intermodal equipment upon request.
- Modify section 2027(d)(5)(A)(2) to require motor carriers to dispatch only compliant drayage trucks to locations off of port or intermodal rail facilities.
- Modify section 2027(d)(5)(A)(5) to clarify that motor carriers are only required to keep dispatch records of drayage trucks that enter port or intermodal rail yard properties.

- Modify section 2027(e)(1)(C) to clarify that only drayage trucks entering port or intermodal rail yard properties are required to register in the Drayage Truck Registry as operated by the Air Resources Board.

The proposed amendments would allow enforcement personnel to cite noncompliant drayage trucks outside of port and rail yard properties. Motor Carriers responsible for dispatching drayage trucks that engage in dray-off would also be held accountable under the amendments. In addition, the amendments would also level the playing field between noncompliant drayage truck owners and owners of drayage trucks that have invested significant funds modernizing their fleets.

3. Including Class 7 Trucks and a New Phase 2 PM Requirement

Staff is proposing amendments to the Drayage Truck regulation to include Class 7 trucks and require that they operate with a level 3 VDECS for PM by 2014. The existing Truck and Bus regulation, (Cal. Code Regs.), section 2025, already requires all Class 7 trucks statewide (with few exceptions) to operate with a MY 2004 or newer engine equipped with a level 3 VDECS by January 1, 2014. Although, staff is proposing to amend the Truck and Bus regulation to allow certain Class 7 trucks to extend their operations until 2017 without additional PM controls, the proposed amendments would not apply to Class 7 drayage trucks. The amendments to the Drayage Truck regulation would ensure that all drayage trucks operate with PM controls in the near-term and also eliminate the increasingly common practice of operating older and dirtier Class 7 trucks at the ports and rail yards instead of emission compliant Class 8 drayage trucks. To accomplish this goal, staff is proposing to: 1) expand the definition of a 'drayage truck' in section 2027(c)(15) to include trucks with a GVWR greater than 26,000 pounds, 2) modify the definition of 'heavy-duty' in section 2027(c)(26) to greater than 26,000 pounds, 3) add a new Phase 2 requirement in section 2027(d)(2) for trucks with a GVWR greater than 26,000 pounds to operate with a level 3 VDECS by January 1, 2014, and 4) add clarifying language that Phase 1 requirements in section 2027(d)(1) only apply to trucks with a GVWR greater than 33,000 pounds.

4. Sunsetting of Drayage Truck Regulation

To complete the transition to one statewide rule for all diesel-fueled trucks, staff is proposing modifications to the applicability in section 2027(b) and the addition of a new section 2027(j) that formally sunset the Drayage Truck regulation on December 31, 2016. Starting January 1, 2017, all drayage truck owners and operators would be subject to the requirements of the Truck and Bus Rule. Compliant trucks would be able to continue to operate until 2020.

E. Proposed Amendments to the Tractor-Trailer GHG Regulation

Staff is proposing the following amendments to the Tractor-Trailer GHG regulation.

1. Optional Second Compliance Schedule for Large Fleets

Staff proposes to modify section 95307 to provide large fleet owners another optional compliance phase-in schedule. This amendment would provide large fleets one

additional year to register with ARB, but would have an accelerated phase-in schedule that has the same final compliance deadline as the current large fleet phase-in option. Specifically, fleets that choose this second option would have a reporting deadline on July 1, 2011 and phase-in beginning with 20 percent in 2011, 40 percent in 2012, 60 percent in 2013, 80 percent in 2014, and 100 percent in 2016.

2. Additional Reporting Flexibility

Staff proposes to add new section 95307(f), to provide trailer fleet owners that participate in an optional compliance phase-in schedule additional flexibility regarding compliance plan reporting requirements. Such owners would be allowed to report which trailers in their fleets were brought into compliance at the end of each year, as opposed to identifying their entire phase-in schedule in a one-time multi-year plan, as required by the current regulation. However, trailer fleet owners would still be allowed to submit a one-time, multi-year compliance plan for their fleet should they so choose. Section 95307(f) would also require trailer fleet owners to specify the specific method by which they will bring each trailer into compliance; either retrofitting the trailer with aerodynamic technologies or removing the trailer from the owner's fleet. In addition, trailer fleet owners would need to report each trailer identified in the compliance plan that is re-designated as a local-haul or storage trailer.

3. Exemption of Storage Trailers

Staff proposes to modify subsection 95305(e) to add an exemption for 53-foot or longer box-type storage trailers that are used exclusively for storage of items at a single location. Specifically, staff proposes exempting storage trailers from the aerodynamic technology and low rolling resistance tire requirements of the regulation provided that such storage trailers travel empty of freight while on California highways.

Staff is also proposing that owners of storage trailers can apply for a "Relocation Pass" 95305(f) which, if approved by the Executive Officer, would allow a storage trailer to travel during a specified period, not exceeding three consecutive days, to a new storage location while loaded with freight. To qualify for the storage trailer exemption, trailer fleet owners would need to first register their storage trailers with ARB.

4. Trailer Aerodynamic Equipment Compliance Delay

Staff is proposing to add new section 95305 (i), to provide a compliance delay for dry-van or refrigerated van trailers that are configured such that no SmartWay verified aerodynamic technologies can be effectively installed on them. The delay would provide a one year extension from the trailer's applicable compliance date or from the conformance threshold deadline for trailers participating in optional fleet compliance schedules. Trailer owners would need to seek and obtain Executive Officer approval of such compliance delays, and would need to renew requests on an annual basis. However, once SmartWay verified technologies become available for a trailer configuration, that trailer would not be eligible for the proposed compliance delay.

5. Delayed Compliance for 2009 Model Year Refrigerated Van Trailers

Staff is proposing to modify section 95303(b) to include 2009 MY refrigerated van trailers (equipped with 2003 MY or newer TRUs) in the delayed compliance provision currently available to 2003 through 2008 MY refrigerated van trailers (equipped with 2003 and newer MY TRUs). As with all trailers included in the refrigerated fleet extended compliance provision, 2009 MY refrigerated van trailers would have until the end of 2019 to be brought into compliance with the regulation.

6. Allowances for Modifications to Aerodynamic Equipment

Staff is proposing to modify the trailer requirements applicable to 2011 and newer dry-van trailers (section 95303(b)(1)), 2011 and newer refrigerated van trailers (section 95303(b)(2)), and to 2010 or prior MY dry-van and refrigerated van trailers (section 95303(b)(3)), to allow such trailers to also be equipped with SmartWay Verified technologies that have been modified in any manner from the SmartWay Verified configuration. Only modifications that are required to enable a particular SmartWay technology to be installed on a trailer are allowed, and are subject to advance review and approval by the Executive Officer. The Executive Officer will base his or her determination upon any information submitted that demonstrates the proposed modifications would not significantly increase the aerodynamic drag of the SmartWay Verified configuration, and on good engineering judgment.

7. Short Term Exemption for Transporting Empty Local-Haul and Storage Trailers

Staff is proposing to modify sections 95305(c)(1)(B) and 95305(e)(1)(A) to allow exempted local-haul and storage trailers to travel on California highways outside of their base area or away from their current storage location, as long as these trailers are transported empty of freight. This proposal would allow an exempt local-haul trailer to move outside its local-haul area while still maintaining its exempt status, and would allow an exempt storage trailer to travel to another storage location while still maintaining its exempt status. These exemptions would not require reporting to ARB.

8. Relocation Pass for Exempt Local-haul Trailers and Exempt Storage Trailers Carrying Freight

Staff is proposing to add a provision in section 95305(f) that would allow an owner to obtain a relocation pass to allow an exempt local-haul trailer to travel outside its local-haul area while still maintaining its exempt status, and would also allow an exempt storage trailer to travel to another storage location while still maintaining its exempt status. The relocation pass could also be used to transport a local-haul or storage trailer to or from a location outside of California, without having to install the required aerodynamic technologies. The relocation pass would only be necessary when transporting freight in the trailer. Up to four relocation passes per year per trailer could be issued, with each pass not to exceed three consecutive days. Reporting requirements would apply. The proposed amendments would provide fleet operators additional flexibility to comply with the regulation.

9. Limited Three-Day Exemption for Tractors

Staff is proposing to add a provision in section 95305(h) that would allow tractor owners to request and obtain a temporary exemption pass from the regulation, not to exceed three consecutive days, for affected tractors and the trailers they pull to travel on California highways. Only one pass would be issued to an owner per year. Furthermore, only one tractor per fleet, sharing U.S. Department of Transportation (USDOT), motor carrier, or International Registration Plan (IRP) numbers, could be granted one pass per year. In other words, if a fleet is made up of multiple owners, only one pass could be issued to a tractor in that fleet, regardless of the number of owners in that fleet. To ensure the limited use and availability of this exemption, staff proposes to sunset this provision on January 1, 2015.

10. Transfer of Ownership Pass for Trailers

Staff is proposing to include a provision in section 95305(g), to allow sellers of affected trailers to obtain a temporary exemption for trailers that have been sold and are being transported from the seller's location to the buyer's location. This Transfer of Ownership pass would allow sellers of affected trailers to obtain a temporary exemption during the transfer of ownership period, either not to exceed three consecutive days, or for an alternate time period as determined by the Executive Officer.

11. Delaying Low Rolling Resistance Tire Requirements for Pre-2011 Model Year Tractors and Trailers

The current regulation requires pre-2011 MY tractors to use SmartWay verified tires by January 1, 2012, and pre-2011 MY trailers to use SmartWay verified tires by either January 1, 2013, or by the deadlines specified in the optional large or small fleet compliance schedules. Staff is proposing to amend sections 95303(a)(3) and 95303(b)(3) to provide pre-2011 MY tractors and trailers additional time to be equipped with SmartWay verified low rolling resistance tires. Pre-2011 MY tractors would have an additional year to be equipped with SmartWay verified tires, and pre-2011 MY trailers would be allowed up to four additional years to be equipped with SmartWay verified tires. No similar extensions would be allowed for MY 2003 through 2009 refrigerated-van trailers equipped with 2003 or subsequent MY transport refrigeration units (these trailers would still be required to convert their tires to SmartWay tires between January 1, 2018 and January 1, 2020).

12. Exemption for Open Shoulder Drive Tires

The current regulation requires 2011 and subsequent MY tractors to use SmartWay verified tires by January 1, 2010. Staff is aware that some regional-haul fleets must use open shoulder drive tires to negotiate roads in inclement weather. Currently, staff is aware of only three open shoulder drive tire models that are U.S. EPA SmartWay verified models. Therefore, staff is proposing to include a limited term exemption in section 95305(j) for 2011 or subsequent MY tractors using open-shoulder drive tires. This exemption would sunset on January 1, 2013.

13. Disclosure Language and Recordkeeping

The current regulation requires any person residing in California that sells or leases an affected tractor or trailer to notify the buyer or lessee, in writing, that the tractor/trailer may be subject to the Tractor-Trailer GHG regulation. Staff is proposing to clarify, in section 95303(i), that only California-licensed vehicle dealers selling affected tractors or trailers are responsible for providing specified disclosure language, and in sections 95302(a)(42), that lessors of affected tractors and trailers are responsible for providing specified disclosure language. Staff is also proposing to relocate the "Disclosure of Regulation Applicability" requirement presently located in section 95301(d) to new section 95303(i). Staff is further proposing to add a requirement that identified sellers or lessors must maintain a record of the written disclosure for three years after the sale or lease in new section 95311.

14. Other Amendments

Staff is proposing amendments to section 95302, to modify existing definitions and to define new terms that are associated with the amendments outlined above. Staff is also proposing to modify section 95303 (c)(2) to require the driver of an affected tractor trailer to provide specified information to authorized enforcement personnel if he or she is driving an exempt drayage tractor; or a tractor-trailer operating under a relocation pass, transfer of ownership pass, or non-compliant tractor pass. Staff also proposes to modify section 95303(c)(3) to require drivers to allow enforcement personnel to directly view the inside of the trailer upon request. This provision would allow enforcement personnel to verify that a trailer is empty or hauling freight.

COMPARABLE FEDERAL REGULATIONS

Section 209(a) of the federal Clean Air Act (CAA) preempts states from adopting emission standards for new motor vehicles and engines. However, section CAA 209(b) provides that the Administrator of the U.S. Environmental Protection Agency (U.S. EPA) shall grant California a waiver of preemption, unless certain specified findings can be made. The regulations proposed for amendment do not establish emission standards for new motor vehicles and engines, and thus no issue of federal preemption exists. Additionally, U.S. EPA does not have authority to adopt in-use emission standards relating to the control of in-use motor vehicles, and thus there are no federal regulations comparable to the Truck and Bus regulation, the Tractor-Trailer GHG regulation, or the Drayage Truck regulation to reduce emissions from in-use on-road diesel vehicles that operate in California.

CAA section 209(e)(2) allows California, upon obtaining authorization from U.S. EPA, to adopt and enforce emission standards and other requirements related to the control of emissions for new and in-use off-road engines not expressly preempted (i.e., as set forth in CAA section 209(e)(1), new off-road engines under 175 hp used in farm and construction equipment and vehicles and new locomotives and locomotive engines). The Truck and Bus regulation has requirements for off-road engines used in yard-goats and two engine street sweepers, and to the extent that the amendments to the regulation require authorization, ARB will request that U.S. EPA grant such

authorization. U.S. EPA does not have authority to adopt in-use regulations for off-road engines, and thus there are no federal regulations comparable to the California adopted regulatory provisions affecting off-road engines used in sweepers and yard goats.

There are also no comparable mandatory federal regulations to control GHG emissions from on-road heavy-duty vehicles. However, as described above, the U.S. EPA has a voluntary program, the U.S. EPA SmartWay Partnership Program, which is a collaboration between EPA and the freight sector designed to improve energy efficiency, reduce greenhouse gas and air pollutant emissions, and improve energy security.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory actions, which describes the basis of the proposed actions, and includes a summary of the economic and environmental impacts of the proposed amendments. The Staff Report is entitled: "Proposed Amendments to the Truck and Bus Regulation, the Drayage Truck Regulation and the Tractor-Trailer Greenhouse Gas Regulation."

Copies of the ISOR and the full text of the proposed regulatory language, in underline and strikeout format to allow for comparison with the existing regulations, may be accessed on the ARB's website listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing on December 16, 2010.

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact person in this notice, or may be accessed on the ARB's website listed below.

Inquiries concerning the substance of the proposed amendments to the Truck and Bus regulation may be directed to the designated agency contact persons, Ms. Beth White, Manager of the On-Road Compliance Assistance Section, at (916) 324-1704, or Ms. Gloria Lindner, Air Resources Engineer, at (916) 323-2803.

Inquiries concerning the proposed amendments to the Drayage Truck regulation should be directed to the designated agency contact person; Mr. Mike Sutherland, Manager of the Project Support Section, at (916) 445-4236 or be directed to the Drayage Truck Regulation phone line at (888) 247-4821.

Inquiries concerning the substance of the proposed amendments to the Tractor-Trailer GHG regulation should be directed to the designated agency contact persons, Ms. Dassi Pintar, Air Pollution Specialist, at (626) 575-7007, or Mr. Alex Santos, Staff Air Pollution Specialist, at (626) 575-6682.

Further, the agency representative and designated back-up contact persons, to whom nonsubstantive inquiries concerning the proposed administrative action may be directed, are Ms. Lori Andreoni, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-4011, or Ms. Trini Balcazar, Regulations Coordinator, (916) 445-9564. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the ISOR, and all subsequent regulatory documents, including the FSOR, when completed, are available on ARB's website for this rulemaking at http://www.arb.ca.gov/regact/2010/truckbus10/truckbus10.htm

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulation are presented below.

1. Costs to State Government and Local Agencies

Pursuant to Government Code section 11346.5(a)(5), the Executive Officer has determined that the proposed regulatory action would not create any costs to or mandates on any local agency or school district that are reimbursable by the State pursuant to Government Code, title 2, division 4, part 7 (commencing with section 17500).

Pursuant to Government Code sections 11346.5(a)(6), the Executive Officer has determined, based on estimates prepared in accordance with instruction adopted by the Department of Finance, that the amendments to the Truck and Bus, Drayage Truck, and Tractor-Trailer regulations would not create additional costs to any State agency or to any local agency or school district, whether or not reimbursable by the State pursuant to Government Code, title 2, division 4, part 7 (commencing with section 17500), create other nondiscretionary costs on local agencies, and affect costs or savings in federal funding to the State.

As stated, the proposed regulatory action would not increase costs for school districts and may result in savings. The proposed amendments to the school bus requirements of the Truck and Bus regulation provide school districts an opportunity to delay their initial compliance costs, without increasing the total cost of the regulation. As a result, there may be a decrease in cost as compliance costs are deferred to later years using later year dollars (i.e., the present value of their compliance costs will be lower).

2. Effect on Businesses and Private Persons

The determinations of the Board's Executive Officer, pursuant to Government Code section 11346.5(a)(9), concerning the costs or savings necessarily incurred by representative private persons and businesses in reasonable compliance with the proposed amendments to the regulations are presented below.

a) Truck and Bus Regulation

The proposed amendments represent major changes to the Truck and Bus regulation and provide substantial economic relief. The amendments to the regulation would exempt about 150,000 trucks with a gross vehicle weight rating less than 26,001 pounds from meeting the PM filter requirements. Staff estimates this change would eliminate most, if not all, of the costs for about 75,000 companies. The amended regulation would reduce annual requirements for fleets most affected by the recession.

The estimated costs of the amended Truck and Bus regulation in the next five years would be about 60 percent lower than the existing regulation, and the costs for the next 15 years would be about 60 percent lower. Average costs for local businesses outside the transportation sector would be reduced by about 70 percent. The amendments would eliminate costs of the existing regulation for thousands of small businesses.

Pursuant to Government Code section 11346.5(a)(7)(C), the Executive Officer has made an initial determination that the proposed regulatory action would affect businesses that aid in the making, distribution, cleaning, and maintenance of VDECS. Because the proposed amendments provide options to delay compliance with the PM requirements, the demand for PM retrofits in the near term may be substantially lower than originally anticipated. For some VDECS manufacturers and associated businesses that have invested capital based on original predictions of demand, there could be a delay in recovery of their capital investment. However, proposed incentive provisions are intended to encourage early retrofitting and could help mitigate potential impacts on retrofit businesses.

For the foregoing reasons, the Executive Officer has determined, pursuant to California Code of Regulations, title 1, section 4, that the proposed regulatory action would affect small businesses.

b) Drayage Truck Regulation

The Executive Officer has further determined, pursuant to California Code of Regulations, title 1, section 4, that the proposed amendments to the Drayage Truck regulation would affect small businesses. The Proposed amendments are expected to reduce the cost of compliance for most businesses by extending the compliance timeline for retrofitted trucks, eliminating costs associated with the Phase 2 requirements to upgrade to 2007 MY engines by 2014, and ending recordkeeping and reporting requirements after the Drayage Truck Regulation sunsets at the end of 2016.

c) Tractor-Trailer GHG Regulation

The proposed amendments to the Tractor-Trailer GHG regulation would provide greater flexibility for affected businesses and reduce the burden of compliance with the existing requirements. The proposed second phase-in option would enable some large fleets that opt into this plan to spread the cost of compliance over 5 years, between 2012 and 2016, rather than meeting the requirements fully by January 1, 2013. Also, exemption of storage trailers and the provisions for temporary passes for relocation, transfer of

ownership and for noncompliant tractors would enable fleets to move their trailers on California highways without having to retrofit their vehicles with equipment they might not otherwise need in to use. Delayed compliance of 2009 MY refrigerated-van trailers would reduce the burden of compliance on fleets faced with meeting multiple regulations at the same time. It would also reduce the burden of compliance during the early years of the regulation providing more time for the economy to recover. Extending the deadline for use of SmartWay verified low rolling resistance tires in order to provide additional time for fleets to continue using existing retreaded tires on their existing trailers until 2017 to allow U.S. EPA to develop specifications for SmartWay retreaded tires would also result in cost savings.

d) Reporting Requirements

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the Truck and Bus, Drayage Truck, and Tractor-Trailer GHG regulations that apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

3. Effect on State Economy

Pursuant to Government Code section 11346.5(a)(8), the Executive Officer has made an initial determination that the proposed regulatory actions covering all three of the affected regulations would not have a significant Statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states. In accordance with Government Code sections 11346.5(a)(10) and 11346.3(b), the Executive Officer has further determined that the proposed regulatory actions will decrease the elimination of jobs within the State of California, and decrease the elimination of existing businesses within the State of California.

The amendments to the Truck and Bus regulation and the Drayage Truck regulation would reduce the compliance obligations for most fleets and businesses affected by the regulations in the next five years. The deferral and new credits included in the amendments would provide more time for the economy to recover and would reduce the total investments required of businesses to comply.

These modifications could have a negative economic impact on retrofit manufacturers and installers and firms that provide repowers because they would likely receive fewer orders in the next two years. However, the proposed modifications intended to encourage early retrofitting would still significantly increase demand for retrofit jobs and businesses. An assessment of the economic impacts of the proposed regulatory action and its effect on California businesses can be found in the Staff Report.

The Executive Officer has made an initial determination that the proposed amendments to the Tractor-Trailer GHG regulation would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons. In accordance with Government Code section 11346.3, the Executive Officer

has determined that the proposed regulatory action would not affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California

4. Consideration of Alternatives

Before taking final action on the proposed regulatory actions, the Board must determine that no reasonable alternative considered by the Board, or that has otherwise been identified and brought to the attention of the Board, would be more effective in carrying out the purpose for which the action is proposed, or would be as effective and less burdensome to affected private persons than the proposed action. Alternatives that staff considered are discussed in the Staff Report.

SUBMITTAL OF COMMENTS

Interested members of the public may present comments relating to the proposed amendments orally or in writing at the meeting, and comments may be submitted by postal mail or by electronic submittal before the meeting. The public comment period for this regulatory action will begin on November 1, 2010. To be considered by the Board, written comments, not physically submitted at the meeting, must be submitted on or after November 1, 2010 and received **no later than 12:00 noon on** December 15, 2010, and must be addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Please note that the webpage provided above for electronic submittal is for comments on the following on-road and off-road regulations:

- Truck and Bus
- Drayage Truck
- Tractor-Trailer GHG
- Off-Road
- Large Spark Ignition

To ensure that all comments are properly considered and responded to, please identify in the subject heading of each comment letter the regulation(s) for which comments are being submitted.

Please note that under the California Public Records Act (Government Code §6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and any other search engines.

The Board requests, but does not require, that 20 copies of any written statement be submitted and that all written statements be filed at least ten days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The Board encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

STATUTORY AUTHORITY AND REFERENCES

1. Truck and Bus Regulation

This regulatory action is proposed under that authority granted in Health and Safety Code, sections 39002, 39003, 39500, 39600, 39601, 39602, 39602.5, 39650, 39656, 39658, 39659, 39665, 39666, 39667, 39674, 39675, 40000, 41511, 41752, 41754, 41755, 42400, 42400.1, 42400.2, and 42402.2, 42410, 43000, 43000.5, 43013, 43016, 43018, 43018.2, 43023, 43600. This action is proposed to implement, interpret, or make specific Health and Safety Code sections 39600, 39601, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 40000, 41511, 41752, 41754, 41755, 42400, 42400.1, 42400.2, and 42402.2, 42410, 43013, 43016, 43018, 43023, and 43600

2. Drayage Truck Regulation

This regulatory action is proposed under the authority granted in Health and Safety Code sections 39002, 39003, 39500, 39600, 39601, 39602, 39602.5, 39650, 39656, 39658, 39659, 39665, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, and 42402.2, 42410, 43013, 43016, 43018, 43018.2, 43023, and 43701. This action is proposed to implement, interpret, or make specific Health and Safety Code sections 39600, 39601, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, and 42402.2, 42410, 43013, 43016, 43018, 43023, and 43600.

3. Tractor Trailer GHG Regulation

This regulatory action is proposed under the authority granted in Health and Safety Code sections 38510, 38560, 38560.5, 39600, and 39601. This action is proposed to implement, interpret and make specific Health and Safety Code sections 38560, 38560.5, 38580, and 39600.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice, and that the regulatory language as modified could result from the proposed regulatory action; in such event, the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990.

At the Board meeting, the Board may direct staff to develop additional modifications to the regulation to be considered at a later Board hearing. If directed to do so, ARB will prepare a separate notice of proposed rulemaking that will be published not less than 45 days before the scheduled hearing date.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at 916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

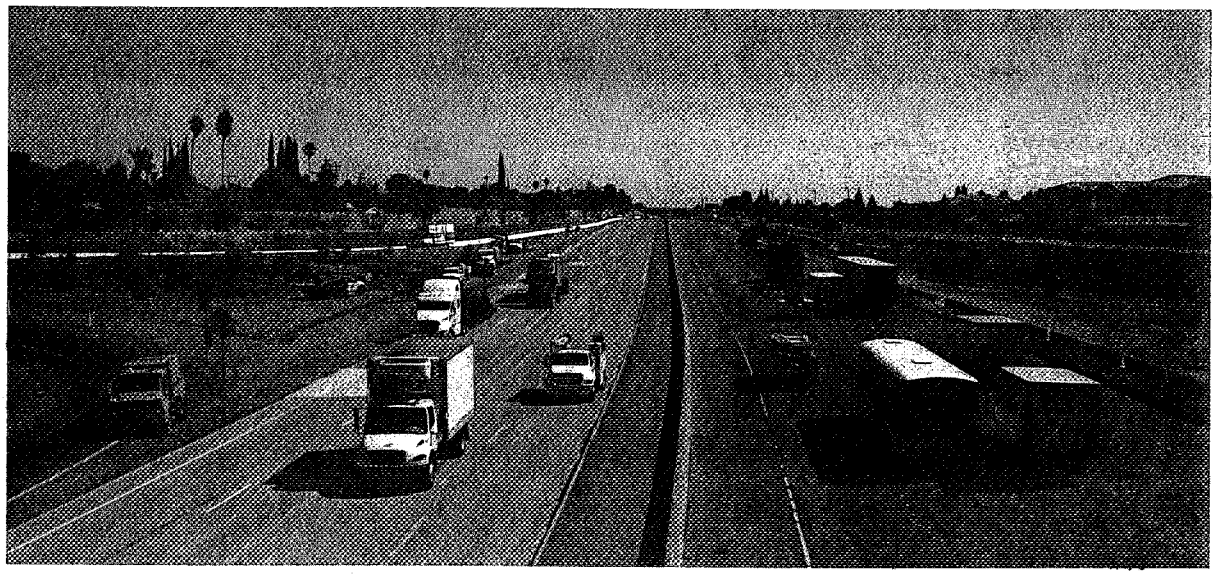
James N. Goldstene
Executive Officer

Date: October 19, 2010

California Environmental Protection Agency
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

PROPOSED AMENDMENTS TO THE TRUCK AND BUS REGULATION, THE DRAYAGE TRUCK REGULATION AND THE TRACTOR-TRAILER GREENHOUSE GAS REGULATION



Mobile Source Control Division
Heavy-Duty Diesel Implementation Branch

October 2010

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider

ADOPTION OF THE PROPOSED AMENDMENTS TO THE TRUCK AND BUS REGULATION, THE DRAYAGE TRUCK REGULATION AND THE TRACTOR-TRAILER GREENHOUSE GAS REGULATION

To be considered by the Air Resources Board at a two-day meeting of the Board that will commence December 16, 2010, and may continue to December 17, 2010, at

California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, CA 95814

State of California
AIR RESOURCES BOARD

ADOPTION OF THE PROPOSED AMENDMENTS TO THE TRUCK AND BUS REGULATION, THE DRAYAGE TRUCK REGULATION AND THE TRACTOR-TRAILER GREENHOUSE GAS REGULATION

This report has been prepared by the Mobile Source Control Division staff of the Air Resources Board with the assistance and support from the following divisions: Planning and Technical Support, Stationary Source, and Research. In addition, we would like to acknowledge the assistance and cooperation that we have received from many individuals and organizations.

Publication does not signify that the contents reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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LIST OF ACRONYMS

AB	Assembly Bill
ARB	Air Resources Board
ATCM	Airborne Toxic Control Measure
BACT	Best Available Control Technology
BC	Black Carbon
BOE	Board of Equalization
CAA	Clean Air Act
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CO_2	Carbon Dioxide
EJ	Environmental Justice
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GVWR	Gross Vehicle Weight Rating
GWP	Global Warming Potential
HP	Horsepower
HSC	Health and Safety Code
IFTA	International Fuel Tax Agreement
IPCC	Intergovernmental Panel on Climate Change
MMTCO2-e	Million Metric Tons Carbon Dioxide-Equivalents
NAAQS	National Ambient Air Quality Standard
NOx	Oxides of Nitrogen
PM	Particulate Matter
PM2.5	Particles up to 2.5 microns in diameter
RD	Research Department
SIP	State Implementation Plan
TAC	Toxic Air Contaminants
TPD	Tons per Day
TRAC	Truck Regulations Advisory Committee
U.S. EPA	United States Environmental Protection Agency
VDECS	Verified Diesel Emission Control Strategy
VMT	Vehicular Miles Traveled

EXECUTIVE SUMMARY

California faces many air quality challenges, whether they be meeting federal air quality standards, reducing premature mortality, addressing localized risk, or reducing greenhouse gas emissions. The Air Resources Board (ARB or Board) has put into place a series of comprehensive regulations and programs to meet these challenges. While nearly all diesel engines in the state are included in this program, trucks and buses represent the largest share of emissions and vehicles. As a result, California's program targeting emission reductions from the nearly one million existing diesel trucks and buses that operate on California roads each year is arguably the most important component of ARB's program to reduce emissions from diesel vehicles. These include the Truck and Bus regulation that reduces exhaust emissions from most heavy-duty diesel vehicles, the Drayage Truck regulation that reduces exhaust emissions from larger tractors that enter ports and intermodal rail yards and the Tractor-Trailer Greenhouse Gas regulation that reduces greenhouse gas emissions from long-haul tractor trailer combinations. This comprehensive program is intended to significantly reduce emissions from existing diesel vehicles throughout the state through a mix of exhaust and vehicle retrofits and vehicle turnover, so that by 2023, California has the cleanest, most efficient diesel fleet in the world.

The need to reduce emissions from trucks continues to be significant. These vehicles are a major source of emissions. They contribute substantially to violations of the ambient air quality standards for both fine particulate matter (PM2.5) and ozone. They also contribute to localized health risk associated with exposure to diesel particulate matter and to premature deaths associated with exposure to ambient fine particulate matter in the air.

California and the nation have been in an economic recession that was not anticipated when these diesel truck regulations were approved by the Board in 2007 and 2008. The recession has had a significant impact on companies that rely on diesel engines – whether it is trucking and transportation businesses, construction companies, or airlines. Overall, businesses' revenues and employment are down, and this has reduced many fleets' ability to make the investments needed to comply.

While the current recession has been economically devastating to businesses throughout the state, it has also caused an overall reduction in both on-road and off-road diesel vehicle activity and emissions through reductions in the number of truck trips and vehicle miles traveled as well as in reductions in the number of pieces of construction equipment working on projects. Emissions are lower today because of the recession than what we had previously assumed. Reduced emissions have provided ARB an opportunity to go back and adjust the regulations targeting diesel trucks and buses to account for reduced emissions that are occurring from less business activity.

Over the long term, the regulations are still critically important to ensuring that California meets both its short-term and long-term air quality obligations and health based goals.

Considering this, in April 2010, the Board directed staff to update the emissions inventories from trucks and off-road equipment to reflect the impact of the recession on emissions. The Board further directed staff to develop amendments to the Truck and Bus and Off-Road diesel vehicle regulations that would provide economic relief to fleets while continuing to meet the Board's air quality goals and obligations. The Board's direction included the following principles for staff to consider in proposing amendments:

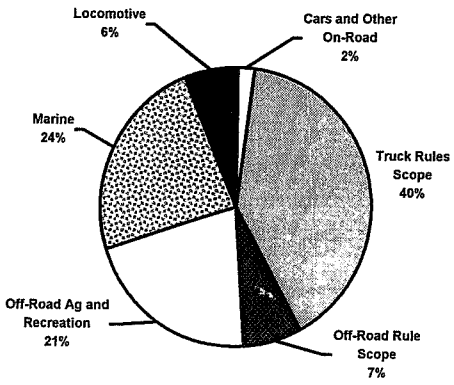
- Continue progress toward cleaner air
- Maintain public health benefits
- Meet State Implementation (SIP) commitments
- Provide incentives to achieve greenhouse gas reductions
- Improve cost effectiveness
- Lower peak year costs
- Consider cumulative impact of both regulations
- Provide most economic relief to fleets hardest hit by recession
- Ensure emission reductions as economy recovers
- Support clean technologies

To support development of the proposed amendments, staff updated the emissions inventory for trucks to assess the impact of the economic recession on emissions and to integrate new information. Through staff's assessment, it was determined that the recession has had a major impact on reducing emissions. Overall, 2010 truck and bus emissions are on average more than 20 percent lower because of the recession than we had estimated in 2008.

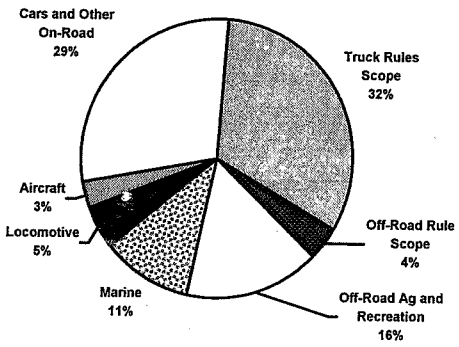
A similar assessment was made for off-road vehicles and can be found in the Initial Statement of Reasons for Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and Off-Road Large Spark Ignition Engine Fleet Requirements (ARB, 2010b). In that assessment, staff found that the recession has reduced activity and emissions in the construction sector by more than 50 percent.

Despite these changes to the emissions inventories, heavy-duty trucks and buses continue to be the largest contributor to emissions in California, both in 2010 and 2020, as shown in Figure E-1 and Figure E-2. In addition, reducing emissions is necessary to reduce premature deaths associated with exposure to fine PM (PM2.5) and near-source exposure to diesel PM.

Figure E-1: Truck Contribution to 2010 Statewide Mobile Source Emissions (Particulate Matter and NOx Without Regulations)

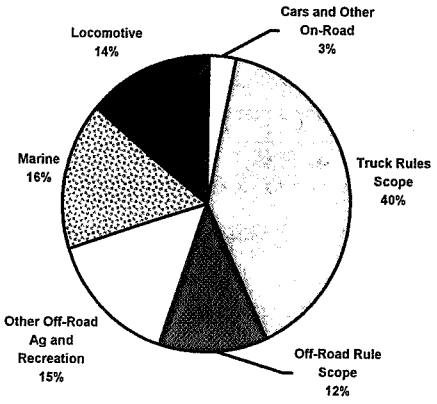


PM Emissions

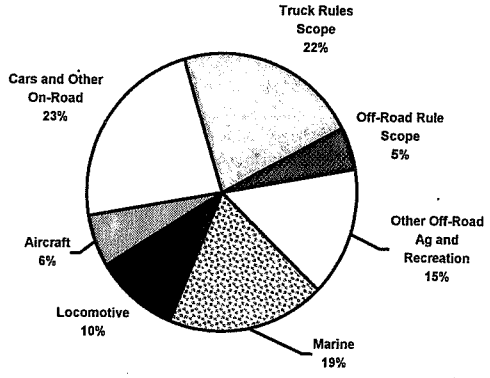


NOx Emissions

Figure E-2: Truck Contribution to 2020 Statewide Mobile Source Emissions (Particulate Matter and NOx Without Regulations)



PM Emissions



NOx Emissions

The SIP is California's roadmap towards achieving federal clean air standards by the applicable deadlines. To assess progress towards meeting the emission reduction obligations in the SIP, staff evaluated how much lower emissions would be from the revised inventory and the recession than were anticipated at the time the regulations were adopted. Any excess emission reductions achieved are referred to as an emission margin. The margin defines how much economic relief could be provided under the regulations while still meeting the legal emission reduction requirements of the SIP. To allow for a comparison of different pollutants (PM and NOx), the margin is calculated, by air basin, in NOx equivalent emissions. Table E-1 shows the emission margin for the South Coast and San Joaquin Valley air basin for 2014, which is the attainment date for these two air basins to meet federal PM2.5 standards. Based on this analysis, it is feasible to significantly reduce the economic impact on affected fleets while meeting SIP obligations.

Table E-1: Emissions Are Less Than the 2014 SIP Target
Existing Truck and Off-Road Regulations, Including Recession

Air Basin	Equivalent Tons of NOx Below Combined SIP Target
South Coast	62
San Joaquin Valley	40

The U.S. EPA has recently concluded, based on the published and peer reviewed scientific literature, that long-term exposure to PM2.5 is causally associated with premature mortality. A causal relationship means it has the highest scientific level of certainty. The U.S. EPA also found that premature deaths caused by PM2.5 occur at levels well below the Federal air quality standard for PM2.5. The U.S. EPA estimates that about 63,000 to 80,000 premature deaths each year in the U.S. are related to PM2.5. ARB staff used the EPA methodology to estimate that long-term exposure to PM2.5 from all sources in California results in 9,200 premature deaths annually and that reducing emissions to meet the Federal standard would reduce premature deaths by 2,700 annually. Reducing PM emissions below the Federal standard would reduce the number of premature deaths even further.

After holding three workshops about the Truck and Bus regulation, one focused on school bus requirements, and 16 statewide workshops to discuss proposed amendments in conjunction with amendments to the Off-Road regulation in 2010, staff has developed a comprehensive set of amendments covering both regulations that would:

- Provide economic relief for affected on-road and off-road fleets while substantially reducing compliance costs;
- Achieve the emissions reductions needed to meet SIP commitments to attain federal air quality standards;
- Continue to reduce localized risk, and;
- Continue to reduce the impacts of diesel emissions on premature mortality.

The proposed amendments to the Truck and Bus regulation would exempt about 150,000 lighter trucks with a gross vehicle weight rating less than 26,001 pounds (most of which are operated exclusively in California) from having to meet the PM filter requirements. Instead, beginning in 2015, these lighter trucks would be required to be modernized (replaced), but not until the trucks are 20 years old or older.

For larger, heavier trucks with 1998 to 2006 model year engines, the requirements would be changed such that these trucks would only be required to have PM filters installed from 2012 to 2014. They would then be able to operate at least another 8 years (instead of 4 years, as provided with the current regulation) before needing to be replaced with a truck meeting the 2010 model year emissions standard or be retrofit

to have equivalent emissions. The remaining heavier trucks with 1997 and older engines would be replaced when 20 years old or older starting in 2015.

Overall, by 2023 all trucks all trucks operating in California would need to have 2010 model year or newer engines, or equivalent emissions. The proposed amendments also simplify the regulation while retaining flexibility for fleets to determine which vehicles to retrofit or modernize. The regulation would continue to have provisions, such as reduced fleet size credits that would now expire in 2016 rather than in 2014 under the current regulation, which should reduce the annual compliance requirements for fleets most affected by the recession. For example, if a fleet has 20 percent fewer trucks operating than it did in 2006, then no action would be required for 20 percent of its remaining trucks until 2016. A fleet that has 40 percent fewer trucks would have no action required for 40 percent of its remaining trucks until 2016. The regulation also continues to provide incentives for the early retrofit of existing trucks in order to achieve early emission reductions.

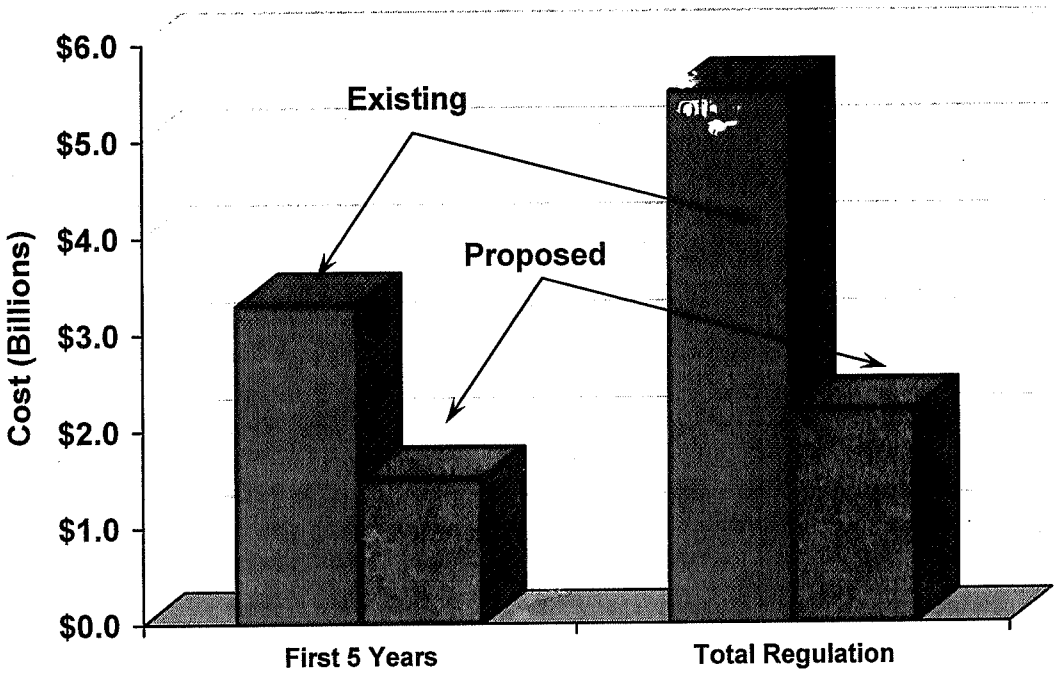
The Drayage Truck regulation would eliminate the 2014 requirement to modernize all trucks visiting ports or intermodal rail yards to 2007 model year engines or newer, and would instead align this requirement with the Truck and Bus regulation. Drayage trucks with PM filters would now comply until 2020 rather than having to upgrade the truck again by 2014. The proposed amendments would also include changes to prevent trucks from circumventing the regulation by exchanging drayage cargo with dirty trucks outside the port or rail facilities, a practice commonly known as "dray-off."

The proposed amendments to the Tractor-Trailer GHG regulation would provide fleets a new option to begin the phase-in of the trailer retrofit requirements by extending the reporting period another year, extend the deadline for using low rolling resistance tires for existing trucks and trailers and would make other changes that provide more flexibility for fleets to comply. The Tractor-Trailer GHG regulation currently allows owners of large fleets of 2010 and previous model year trailers to phase-in compliance from 2010 through 2015. In order to participate in this large fleet compliance schedule, an owner was required to submit to ARB a compliance plan by July 1, 2010. The proposed amendment would establish a second large fleet compliance schedule allowing owners of these trailers to phase-in compliance from 2011 through 2015. To participate in this second phase-in schedule an owner would be required to submit a compliance plan by July 1, 2011. The proposed amendments would delay the low rolling resistance tires requirements for 2010 and previous model year trailers from January 1, 2011 to January 1, 2017. In addition, the compliance date for retrofitting 2010 and previous model year tractors with low rolling resistance tires would be extended from January 1, 2012 to January 1, 2013.

The proposed amendments to the Truck and Bus regulation would provide substantial economic relief to all affected fleets. The proposed amendments would eliminate the PM filter requirements for lighter trucks and, for the next decade, would only require modernization of engines that are 20 years old or older.

Overall, the estimated compliance costs of the Truck and Bus regulation over the next five years would be reduced by 50 percent and would be reduced by about 60 percent over the life of the regulation. Figure E-3 shows how the average costs of the regulation would decline compared to the original estimates for the current regulation.

Figure E-3: Cost of Proposed Truck and Bus Regulation Down Substantially



Similarly, aligning the requirements of the Drayage Truck regulation with the proposed amendments to the Truck and Bus regulation would lower costs for drayage truck operators by extending the useful life of their already retrofitted trucks an additional six years and by eliminating the requirement to modernize to a truck with a 2007 model year engine or newer by 2014.

Parallel amendments to the Tractor-Trailer GHG regulation would improve compliance flexibility and would not result in significant changes in compliance costs.

Overall, the regulations would continue to provide significant emissions reductions that are necessary to meet California's air quality obligations and goals. The proposed amendments would reduce the emissions margin to zero in the San Joaquin Valley and to 5 tons/day in the South Coast. Because the combined margin for trucks and buses and off-road equipment is minimized, maximum relief is provided while still meeting SIP legal obligations.

In addition, the truck regulations would continue to provide significant health benefits by reducing premature mortality from PM2.5 exposure and localized risk from diesel PM. Staff estimates that 3,500 premature deaths (2,700 to 4,400 with a 95 percent

confidence interval) would be avoided by implementation of the amended truck regulations from 2010 to 2025. This estimate is based on United States Environmental Protection Agency's (U.S. EPA) new risk assessment methodology (U.S. EPA, 2010), and includes the most recent air quality data available (2006 to 2008) and the latest emissions inventory estimates. Staff also expects localized risk to be reduced commensurate with the expected diesel particulate matter (PM) emission reductions.

I. INTRODUCTION

This Staff Report: Initial Statement of Reasons (Staff Report) supports the proposed amendments to the following regulations:

- Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants, from In-Use Heavy-Duty Diesel-Fueled Vehicles. (Truck and Bus regulation), title 13, California Code of Regulations (Cal. Code Regs.), section 2025;
- Regulation for In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks (Drayage Truck regulation), title 13, Cal. Code Regs., section 2027; and
- The Heavy-Duty Vehicle Greenhouse Gas (GHG) Emission Reduction Measure, (Tractor-Trailer GHG regulation), title 17, Cal. Code Regs., sections 95301 to 95307, 95309, and 95311.

The Staff Report describes the proposed amendments and the rationale for each amendment. It also presents staff's analysis of impacts associated with the implementation of the proposed amendments, including costs, and economic and environmental impacts. The proposed text of each regulation and appendices with supplementary information are addenda to the staff report. The text of the regulations is set forth in the proposed regulation orders in Appendix A for the Truck and Bus regulation, Appendix B for the Drayage Truck regulation, and Appendix C for the Tractor-Trailer GHG regulation.

A. Background

The Truck and Bus regulation was approved by the Air Resources Board (ARB or Board) on December 12, 2008, to reduce emissions of diesel particulate matter (PM), oxides of nitrogen (NOx), and other criteria pollutants from about one million in-use diesel trucks and buses that operate in California. The regulation became effective in January 2010 and requires trucks and buses to meet PM filter requirements starting January 1, 2011, and NOx reduction requirements starting January 1, 2013. The emissions reductions will be achieved through the installation of verified diesel emission control strategies (VDECS[1] or PM filter) on existing engines, by replacing vehicles with newer ones having cleaner engines or repowering vehicles with newer, cleaner engines. The reductions are necessary to meet State and federal air quality standards, to reduce premature deaths attributable to exposure to fine particulate matter (PM2.5) emissions and to reduce exposure to diesel PM in support of the Diesel Risk Reduction Plan adopted by the Board on September 30, 2000 (ARB, 2000).

The Drayage Truck regulation, approved by the Board In December 2007, reduces emissions from diesel-fueled drayage trucks, which are used to transport containers,

[1] A retrofit device that has been verified under ARB's Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines, title 13, CCR, sections 2700 et seq.

bulk, and break-bulk goods to and from ports and intermodal rail yards. The regulation became effective in December of 2008, by requiring drayage trucks to meet emission requirement beginning January 1, 2010.

The existing Tractor-Trailer GHG regulation was approved by the Board on December 12, 2008. The purpose of this regulation is to reduce GHG emissions from new and existing 53-foot or longer box-type trailers and the tractors that haul such trailers by requiring them to utilize technologies that would result in improved fuel efficiency, such as low rolling resistance tires and aerodynamic technologies such as side skirts, gap fairings, and rear trailer fairings. The regulation became effective and enforceable beginning January 1, 2010. The Tractor-Trailer GHG regulation is one of the measures identified in ARB's Scoping Plan (ARB, 2008a) to reduce GHG emissions and contributes towards meeting the GHG emission reduction goals of Assembly Bill 32 – the Global Warming Solutions Act of 2006 (AB 32) (Núñez, 2006).

B. Regulatory Authority

1. Truck and Bus and Drayage Truck Regulations

ARB has been granted both general and specific authority under the Health and Safety Code (HSC) to adopt the proposed regulation. HSC sections 39600 (General Powers), 39601 (Standards, Definitions, Rules and Measures), and 39602.5 (Adoption of Rules and Regulations) confer on ARB, the general authority and obligation to adopt rules and measures necessary to execute the Board's powers and duties imposed by State law and to attain federal national ambient air quality standards in all areas by applicable attainment dates. HSC sections 43013 and 43018(a) provide broad authority to achieve the maximum feasible and cost-effective emission reductions from all mobile source categories, including both new and in-use on-road and off-road diesel engines used in motor vehicles.

Additionally, California's Air Toxics Program, established under California law by AB 1807 (stats. 1983, ch. 1047, the Tanner Act) and set forth in the HSC sections 39650 through 39675, mandates that ARB identify and control air toxics emissions in California. Following the identification of a substance as a TAC, HSC section 39665 requires ARB, with the participation of the local air pollution control and air quality management districts (districts), and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance. Based upon the findings of the report, ARB is vested with authority under sections 39666 and 39667 to adopt and enforce airborne toxic control measures (ATCM) that will respectively achieve emission reductions using best available control technology (BACT) for nonvehicular and vehicular sources, the latter of which includes in-use on-road heavy-duty vehicles.

Section 209(a) of the federal Clean Air Act (CAA) preempts states from adopting emission standards for new motor vehicles and engines. However, section CAA 209(b) provides that the Administrator of the U.S. Environmental Protection Agency (U.S. EPA) shall grant California a waiver of preemption, unless the administrator can make certain

specified findings. Neither the adopted regulations nor the proposed amendments establish emission standards for new motor vehicles and engines, and thus no issue of federal preemption exists. Additionally, U.S. EPA does not have authority to adopt in-use regulations for motor vehicles, and thus there are no federal regulations comparable to the Truck and Bus, Tractor-Trailer GHG, and Drayage Truck regulations.

CAA section 209(e)(2) allows California, upon obtaining authorization from U.S. EPA, to adopt and enforce emission standards and other requirements related to the control of emissions for new and in-use off-road engines not expressly preempted (i.e., as set forth in CAA section 209(e)(1), new off-road engines under 175 hp used in farm and construction equipment and vehicles and new locomotives and locomotive engines). The Truck and Bus regulation has requirements for off-road engines used in yard-goats and two engine street sweepers, and to the extent that the amended regulation and amendments to other existing ARB off-road regulations require authorization, ARB will request that U.S. EPA grant such authorization. U.S. EPA does not have authority to adopt in-use regulations for off-road engines, and thus there are no federal regulations comparable to the California adopted regulatory provisions affecting off-road engines used in two engine street sweepers and yard goats.

2. Tractor-Trailer GHG Regulation

In 2006, AB 32 was signed into law, creating a comprehensive, multi-year program to reduce GHG emissions in California (Núñez, 2006). It calls for the reduction of GHG emissions to 1990 levels by the year 2020, a reduction of about 25 percent. In addition, the Governor issued an Executive Order directing the establishment of state GHG targets to reduce GHG emissions to 80 percent below 1990 levels by 2050. The 2020 goal establishes an aggressive, but achievable, mid-term target, while the 2050 goal represents the level the scientific community believes must be reached in order to stabilize the climate.

To swiftly address GHG reductions in the near-term, one requirement of AB 32 directed ARB to identify a list of early action measures that could be adopted by the Board by January 1, 2011. In 2007, the Board identified 44 such early action measures including potential regulations affecting motor vehicles, fuels, refrigerant in cars, and many other sources, including nine "discrete" early action measures, which would be adopted and enforceable by January 1, 2010 (ARB, 2007). The Tractor-Trailer GHG regulation is one of these discrete early action measures.

C. Rationale for the Proposed Amendments

The Truck and Bus regulation was approved on December 12, 2008 via Resolution 08-43, in which the Board directed staff to provide informational updates at Board meetings in January 2009 and December 2009. At the December 2009 meeting, staff reported on the impact of the recession on emissions and the vehicles affected by the regulation. Based on staff's analysis showing that vehicle activity and emissions are both below the levels estimated when the regulation was developed, the Board determined that additional flexibility could be provided for fleets adversely affected by

the economy, and directed staff to propose amendments to the regulation that take into account the impacts of the economy on emissions and affected vehicles.

In April 2010, the Board directed staff to update the emissions inventories from on-road heavy-duty vehicles and off-road equipment to reflect the impact of the recession on emissions. The Board further directed staff to develop amendments to the Truck and Bus and Off-Road diesel regulations together that would provide economic relief to both on-road and off-road fleets while continuing to meet the Board's air quality goals and obligations. The Board's direction included the following principles (Table I-1) for staff to consider in proposing amendments:

Table I-1: Ten Guiding Principles

1.	Continue progress toward cleaner air
2.	Maintain public health benefits
3.	Meet SIP commitments
4.	Incentivize greenhouse gas reductions
5.	Improve cost effectiveness
6.	Lower peak year costs
7.	Consider cumulative impact of both regulations
8.	Provide most relief to fleets hardest hit by recession
9.	Ensure emission reductions as economy recovers
10.	Support clean technologies

The Board's directives have prompted the proposed amendments discussed in this Staff Report.

Staff's proposed amendments meet these guidelines by making substantial amendments to provide economic relief to fleets while assuring that emissions benefits are preserved. The proposed amendments to the Truck and Bus regulation would exempt about 150,000 lighter trucks with a gross vehicle weight rating less than 26,001 pounds (most of which are operated exclusively in California) from having to meet the PM filter requirements. PM filters include filters that are part of the manufacturers' original equipment and those that are installed afterwards (PM retrofit). The amendments would not replace any truck less than 20 years old (about 97 percent of trucks) until 2020 and would extend the use of a PM retrofit from four years to eight years before any modernization requirements would apply. By 2023 all trucks would still need to have a 2010 or newer engine or equivalent. The proposed amendments would also substantially simplify the regulation while retaining flexibility for fleets to determine which vehicles to retrofit or modernize. The regulation would continue to have provisions, such as reduced fleet size credits, that would reduce the annual compliance requirements for fleets most affected by the recession and offer incentives for fleets to take early compliance action.

Staff is proposing several amendments to the Drayage Truck regulation to align the requirements with the proposed amendments to the Truck and Bus regulation. The

goals of the changes are to provide economic relief to drayage truck owners and to prevent drayage trucks from exchanging cargo with dirty trucks near port or rail facilities commonly known as "dray off". The changes would also ensure PM exposure reduction goals for communities located near port and rail yards continue to be met.

Staff is proposing to amend the Tractor-Trailer GHG regulation to provide affected fleets with additional flexibility in meeting the requirements with minimal impact on the GHG benefits as initially approved.

D. Stakeholder Participation

Staff conducted a number of statewide workshops and meetings to solicit comments from affected stakeholders regarding the proposed amendments to the Truck and Bus, Tractor-Trailer GHG, and Drayage Truck regulations, and to discuss updates to the emissions inventories and other information. These efforts are described further below.

1. Public Workshops

Since January 2010, staff held 19 public workshops statewide to discuss proposed amendments to the three regulations and changes to the emission inventories. In addition, one workshop was held that focused only on the school bus requirements of the Truck and Bus regulation. For the workshops held in Central Valley, live video feed was also provided to locations in Modesto and Bakersfield. The August 31 to September 8, 2010 workshop series also provided stakeholders an opportunity to discuss the revised report, "Estimate of premature deaths associated with fine particle pollution (PM2.5) in California using a U.S. Environmental Protection Agency Methodology," which was released by ARB on August 31, 2010 (ARB, 2010a). Table I-2 shows the dates, locations, and the primary discussion topics of the workshops.

Table I-2: Public Workshop Dates and Locations

Workshop Dates	Locations	Truck and Bus	Drayage Truck	Emissions Inventory	Tractor Trailer GHG
January 20, 2010	El Monte	X			
January 25, 2010	Sacramento (webcast)	X			
January 26, 2010	Central Valley	X			
May 6, 2010	Sacramento (webcast)	X		X	
May 12, 2010	El Monte	X		X	
May 18, 2010	Central Valley	X		X	
June 23, 2010	Central Valley	X			X
June 28, 2010	Sacramento (webcast)	X			X
July 1, 2010	El Monte	X			X
July 6, 2010	San Diego	X			X
July 28, 2010	Sacramento	X*			
August 31, 2010	El Monte			X**	
September 1, 2010*	San Diego			X**	
September 3, 2010*	Central Valley			X**	
September 7, 2010*	Sacramento (webcast)			X**	
September 8, 2010*	Oakland			X**	
September 30, 2010	Sacramento (webcast)	X	X		X
October 4, 2010	El Monte	X	X		X
October 5, 2010	San Diego	X	X		X
October 12, 2010	Central Valley	X	X		X

* Discussed only school bus provisions

** PM2.5 Mortality Report (ARB, 2010a) was discussed

2. Other Meetings

In addition to the workshops noted above, staff also met with a number of companies and association representatives about proposed amendments and emission inventory changes for the Truck and Bus regulation and the Drayage Truck regulations. Staff met with individuals and representatives of the following industries:

- street-sweepers,
- motor coaches and buses,
- log trucks,
- construction,
- agriculture,
- environmental organizations,
- trucking associations,
- school district representatives,

- school transportation associations, and
- ports, harbors, and marine interests.

Staff also held meetings to discuss the proposed amendments to the Tractor-Trailer GHG regulation with representatives from the following interests:

- tire industry representatives,
- aerodynamic equipment manufacturers,
- trailer manufacturers,
- trucking associations (including Canada),
- individual fleets,
- Cascade Sierra Solutions,
- Rubber Manufacturers Association, and
- U.S. EPA Smartway program.

A more complete list of specific companies and associations with which staff met is provided in Appendix H.

3. Outreach Efforts

Staff is implementing a comprehensive outreach plan to assist and educate fleets on actions needed to comply with the regulations, and the financial incentive programs that are available. The plan includes developing outreach activities with input from industry representatives, distributing information through dealers and other state and local agencies, conducting training seminars and presentations throughout the State, along with communicating through traditional media and utilizing e-mail listservers. Staff will continue the successful implementation of the TruckStop website and the toll free phone number, 866-6DIESEL. These tools allow fleets to get information and answers to their questions directly regarding a variety of regulations that affect trucks. Staff formed the Truck Regulations Advisory Committee (TRAC) to facilitate communication with affected stakeholders and obtain feedback on the implementation of the regulations. Subcommittees were also formed to address issues that affect outreach, small businesses, reporting, and specific source category implementation issues. ARB staff established informational networks used by vehicle and equipment dealers, local air districts, and state agencies such as the Department of Motor Vehicles and the California Highway Patrol to distribute informational materials about the regulations. In addition, since the beginning of 2009, staff has provided training and presentations on the requirements of the regulations at more than 200 events, as outlined in Appendix H.

After the Board meeting, staff will continue its outreach efforts with an updated plan to inform fleets about any regulatory changes. Staff will also inform fleets of any new or expanded incentive funding opportunities the proposed amendments might provide. Education efforts will include training seminars, public workshops, and individual meetings with stakeholders throughout the State and continuation of the 866-6DIESEL toll free phone number. Staff will also continue to work with industry representatives and associations on additional ways to educate varied stakeholders on the amendments to the regulations through TRAC.

II. NEED FOR EMISSIONS REDUCTIONS

This chapter discusses the emission impacts of trucks and buses in California, and the continued need to reduce emissions in order to reduce the health impacts of these emissions.

There are nearly one million trucks and buses that travel California's highways each year. Of these, about 400,000 are registered and operated exclusively in California, with the balance of these out-of-sate trucks that annually frequent California.

Today and into the future, these vehicles remain the largest contributor of emissions from all mobile sources, and they contribute substantially to violations of the ambient air quality standards for both PM2.5 and ozone, to localized health risk associated with exposure to diesel PM, and to premature deaths associated with exposure to PM2.5. For this reason, the emission reductions anticipated from the Truck and Bus regulation remain important to reduce the public health impacts from truck and bus emissions.

A. Updates to Truck Emissions Inventory

During development of the Truck and Bus regulation in 2006-2008, staff conducted a comprehensive re-evaluation of the heavy duty diesel truck and bus emissions inventory, which led to a revised analysis of emissions on a statewide basis. Revised emissions estimates were calculated using a database that embedded methodologies derived from ARB's then existing on-road emissions model, EMFAC2007, and integrated new data and assumptions into an emissions database. The revised calculation approach accounted for different categories of trucks and buses which were differentiated based on their age, travel characteristics, registration type, registration status, and vocation.

In December 2008, the National Bureau of Economic Research declared that the United States had entered an economic recession and as a result, the staff began to assess the impacts of the recession on emissions from trucks and buses. Staff's results suggested that emissions in 2009 across all trucks and buses operating in California were approximately 20 percent lower (ARB, 2009a) than estimates provided in the technical support document for the 2008 rulemaking (ARB, 2008b).

Over the past year staff has continued to make improvements to the emissions analysis to reflect the recession and new data. Updates to the inventory included refinements to the assessment of the impact of the recession on emissions, development of regional emissions estimates, revisions to the number of miles traveled in California by non-California registered vehicles, addition of new vehicle categories, and improved lifetime mileage assumptions. Staff also received a request from Sierra Research to reduce lifetime mileage assumptions even further beyond the changes made already to the inventory, and to reduce mileage accrual assumptions for older vehicles. After reviewing the information submitted by Sierra Research, staff found their data

insufficient to support the requested changes. As a result, staff did not include the requested changes in the final inventory.

1. Impact of the Recession on Emissions

The 2008 rulemaking emissions forecasts for the Truck and Bus regulation were designed to focus on longer-term trends in emissions and not on the impact of the economic cycle on emissions. Since 2008, California and the nation have been impacted by a major economic recession that has significantly reduced on-road diesel fuel use due to reduced demand for trucking and bus services, and significantly reduced new vehicle sales, whose impact will affect the truck and bus fleet age profiles into the future. Because of these two factors, staff developed revised activity growth and age profile assumptions for each calendar year in the inventory.

Staff evaluated fuel usage, employment, new vehicle sales and other economic surrogates to assess the impact of the recession on emissions. The recession has led to a 25 percent reduction in overall trucking activity in California in 2009 from what was previously estimated for the 2008 Rulemaking. Staff evaluated economic forecasts to assess a range of possible trucking activity recovery scenarios. No economic analyses forecast California-specific on-road diesel fuel use or emissions into the future. As a result, staff developed two possible truck activity and sales growth scenarios for coming out of the recession. The faster recovery scenario assumed the economy would rebound and return to previously forecasted activity in 2017. The second slower recovery scenario assumed previous economic levels would not be reached until 2023 or later. Staff considered the possibility of assuming the slower recovery scenario, but determined that would be inappropriate. The slower recovery scenario was designed to be a worst-case estimate of longer term emissions growth trends. Rather than rely on either the slower or faster recovery scenarios, staff assumed a middle case between the two forecasts.

2. Development of Regional Emissions Estimates

Staff developed a new procedure for allocating statewide emissions to each air basin in California so the impact of the regulation could be evaluated regionally. This is a major improvement from the previous analysis in which only statewide emissions estimates from the revised analysis were available, and is based upon extensive staff data collection and analysis.

3. Revisions to Annual Mileage Estimates for Non-California Registered Trucks

The 2008 inventory analysis assumed a set amount of vehicle miles traveled by out-of-state trucks in California in 2005, based on information provided from the State Board of Equalization (BOE) International Fuel Tax Agreement (IFTA) program. Staff received updated information after the 2008 rulemaking in 2009 and 2010 that suggested out-of-state truck mileage estimates should be lower than were previously assumed. Staff revised the estimates lower; the incorporation of this new data reduced

out-of-state truck vehicles miles traveled (VMT) in California by 28 percent from previous estimates.

4. Addition of New Vehicle Categories

In order to reflect the impact of the recession and selected regulatory provisions, staff developed new inventory categories reflecting construction trucks, motorcoaches, and divided the medium-heavy duty diesel truck and bus categories into two categories – one each above and below 26,000 pounds gross vehicle weight rating (GVWR).

5. Modification of Lifetime Mileage Assumptions

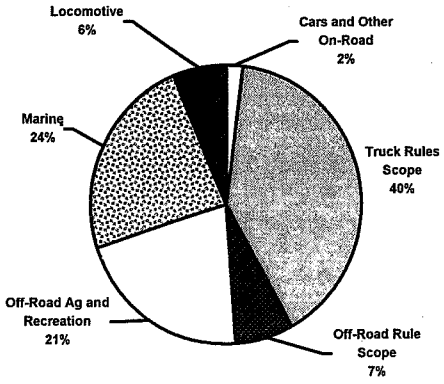
Truck emission rates are a function of cumulative mileage on the vehicle - an emissions process called deterioration. The cumulative mileage estimated on the vehicle can be measured with the vehicle odometer. Our previous analyses assumed that the odometer reading is the sum of estimated year by year mileage accrual. However, staff evaluated this assumption using several data sources and found that older vehicles did not have nearly as high an odometer reading as would be predicted by that assumption. Staff evaluated several different data sources and found that medium-heavy duty diesel truck odometer readings tended, on average, to not increase with age above 400,000 miles. Staff found that heavy heavy-duty diesel truck odometer readings tended not to increase with age above 800,000 miles. As a result, staff capped modeled odometer values at those levels, which reduced emission rates for older vehicles. This change reduced baseline emissions by a few percent, and had a minimal impact on the inventory after the regulation was applied.

Changes to emissions inputs independent of the recession, including out-of-state VMT estimates and lifetime mileage assumptions reduced baseline emissions by about 10 percent from what was assumed in 2008. The recession has reduced emissions by an additional 25 percent in 2009 and 2010, an additional 7 percent in 2014, and 10 percent in 2020 from what was assumed in 2008. Overall, emissions are 35 percent lower in 2010, 17 percent lower in 2014, and 20 percent lower in 2020 than was anticipated in the 2008 Rulemaking.

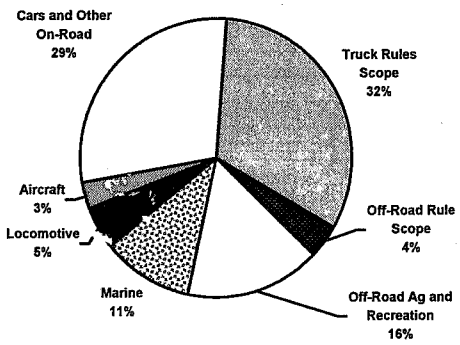
B. Current and Future Emissions

As can be seen below in Figure II-1, in 2010, even after considering the impacts of the recession, emissions from trucks that are subject to both the Truck and Bus regulation and Drayage Truck regulation are the single largest statewide contributor to mobile source emissions, representing 40 percent of PM emissions, and also contribute over 30 percent of NOx emitted from all mobile sources in California, including cars. Both NOx and PM contribute to ambient PM2.5 concentration, and NOx is also a precursor to ozone. In Figure II-1 and Figure II-2, the vehicles within the scope of the Truck and Bus regulation and Drayage Truck regulations are labeled "Truck Rules Scope."

Figure II-1: Truck Contribution to 2010 Statewide Mobile Source Emissions (Particulate Matter and NOx Without Regulations)



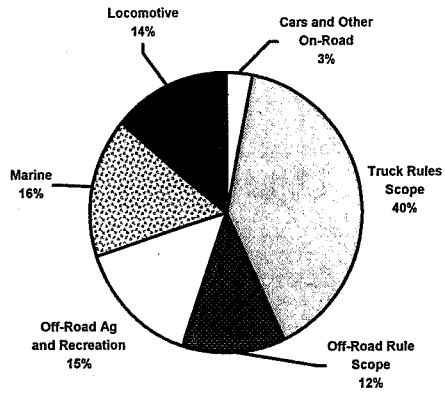
PM Emissions



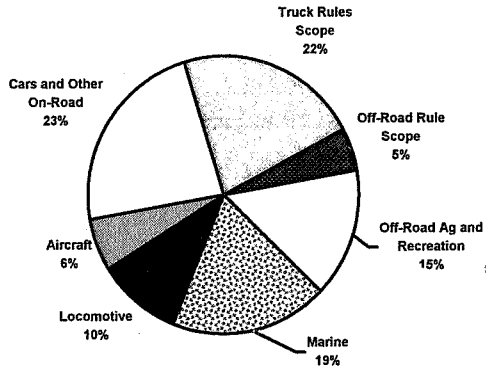
NOx Emissions

Without the truck regulations, in 2020 the emission impact of trucks within the scope of the truck regulations would remain significant. As can be seen in Figure II-2 below, trucks would continue to be the single largest statewide mobile source contributor to PM emissions, and would contribute nearly a quarter of the NOx emitted from all mobile sources including cars in California.

Figure II-2: Truck Contribution to 2020 Statewide Mobile Source Emissions (Particulate Matter and NOx Without Regulations)



PM Emissions



NOx Emissions

Today these vehicles are significant contributors to exceedances of federal ambient air quality standards, and because these vehicles are expected to remain a significant contributor to overall emissions, they will also continue to contribute substantially to continue to violations into the future. Uncontrolled, they will also continue to contribute

to the localized health risk associated with exposure to diesel PM and to premature deaths associated with exposure to ambient PM2.5.

C. Meeting Air Quality Standards

1. National Ambient Air Quality Standards

The U.S. EPA has established health protective National Ambient Air Quality Standards (NAAQS) for a number of criteria pollutants, including PM2.5 and ozone. States with areas that do not meet these standards must develop SIPs and adopt regulations to meet the standards by certain deadlines. Figure II-3 and Figure II-4 below show the nonattainment areas in California for PM and Ozone, respectively. Two air basins in California in particular – the South Coast Air Basin and the San Joaquin Valley Air Basin – are in nonattainment for both PM2.5 and the 8-hour ozone standard.

Figure II-3: California Nonattainment Areas for PM2.5

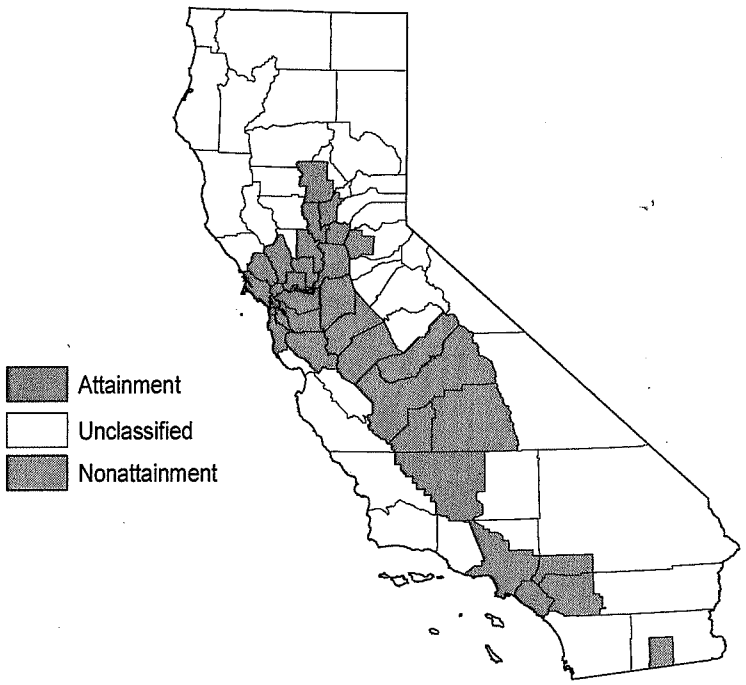
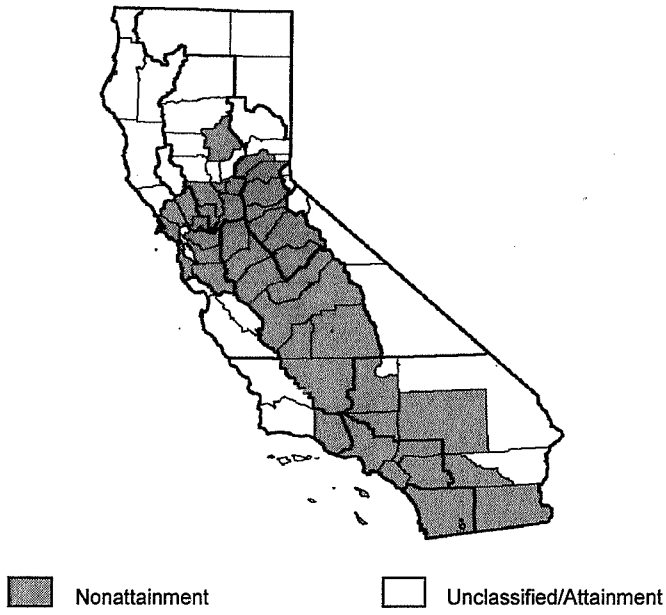


Figure II-4: California Nonattainment Areas for Ozone



In September 2007, ARB approved a SIP committing the State to develop measures to achieve emission reductions from sources under State regulatory authority and attain the NAAQS in these areas.[2] These air basins are both required to attain the PM2.5 standard by 2014, and the 8-hour ozone standard by 2023. A, key strategy towards meeting these standards is significantly reducing emissions from existing trucks and buses operating in California.

Overall, to meet the PM2.5 standard in the South Coast and the San Joaquin Valley Air Basins, NOx emissions must be reduced by approximately 50 percent. Even greater reductions of NOx, on the order of 75 to 88 percent, will be needed to achieve the 8-hour ozone standard in the by 2023. Despite the fact that emissions in future years are expected to be lower than originally anticipated when the regulations were adopted, substantial emissions reductions from trucks and buses are still needed by 2014 to meet the PM2.5 attainment deadline and by 2023 to meet the 8-hour ozone attainment deadline.

2. Meeting SIP Targets

In directing staff to propose changes to the Truck and Bus and Off-Road regulations together, the Board directed staff to also consider the impact of the recession and inventory changes on fleets affected by these regulations in deciding how to provide appropriate economic relief. This was intended to ensure emissions reductions could

[2] Additional discussion of the SIP is addressed in the 2008 Technical Support Document (ARB, 2008).

be targeted most cost effectively, and the combined emissions benefits achieved by the two rules would continue to meet SIP requirements.

To assess progress towards meeting the emission reduction obligations in the SIP, staff evaluated whether the lower emissions from the revised inventories for both trucks and off-road vehicles, combined with the effects of the recession, provided greater emission reductions than were expected. Any excess emission reductions achieved are referred to as an emission margin. The margin defines how much economic relief can be provided under the regulations while still meeting the legal emission reduction requirements of the SIP.

To allow for a comparison of different pollutants (PM and NOx), the margin is calculated, by air basin, in NOx equivalent emissions, since both pollutants contribute to ambient levels of PM2.5 in the atmosphere. Table II-1 below shows the emission margin for the South Coast and San Joaquin Valley Air Basins for 2014, which is the attainment date for these two air basins to meet federal PM2.5 standards. As can be seen, based on this analysis, it is feasible to provide economic relief to affected fleets while still meeting all SIP obligations, so long as these emission margins are not exceeded.

Table II-1: Emissions Are Less than the 2014 SIP Target – Existing Truck and Off-Road Regulations, Including Recession

Air Basin	Equivalent Tons of NOx Below Combined SIP Target
South Coast	62
San Joaquin Valley	40

D. PM Emissions and Mortality

The U.S. EPA recently published a review of the PM-related health science literature in the Integrated Science Assessment, which is the first part of the ongoing review of the national ambient air quality standards for PM (U.S. EPA, 2009). Based on the overall evidence from the more than one thousand peer-reviewed publications of PM2.5 exposure in humans, animals, and cells, the U.S. EPA concluded that long-term exposure to PM2.5 exposure is causally associated with premature mortality, and that premature deaths caused by PM2.5 occur at levels as low as 5.8 micrograms per cubic meter, which is considerably lower than the current national standard of 15 micrograms per cubic meter. A causal relationship means it has the highest scientific level of certainty in its ability to contribute to premature death. This report was peer reviewed through a public process by the Clean Air Scientific Advisory Committee Particulate Matter Review Panel, an independent body of 24 national scientists.

The U.S. EPA risk assessment methodology, the basis for ARB's calculation, was developed to estimate premature deaths associated with PM2.5 exposure across the

nation. This report was also peer reviewed through a public process by the Clean Air Scientific Advisory Committee Particulate Matter Review Panel. The relationship between premature death and PM2.5 relies on a new comprehensive study of about 500,000 participants in 116 U.S. cities (Krewski et al., 2009). Besides the large representative study population, the U.S. EPA concluded this study has significant advantages over other epidemiological studies of the relationship between PM2.5 and premature death. These include the use of more recent measured PM2.5 air quality data, more individual lifestyle information to allow for consideration of potential confounding (compared to other cohort studies), and rigorous statistical methods. Using this relationship, the U.S. EPA conducted a national-scale analysis and a more limited risk assessment, which was focused on 15 urban study areas, including Fresno and Los Angeles (U.S. EPA, 2010).

Based on this work, the U.S. EPA estimates that about 63,000 to 80,000 premature deaths each year in the United States are related to PM2.5. Using the same methodology, ARB staff estimated that 9,200 (7,300 to 11,000, 95 percent confidence interval) of these deaths occur annually in California and that reducing emissions to meet the Federal standard would result in 2,700 fewer premature deaths annually. Reducing PM emissions further would provide an additional reduction in the number of premature deaths.

E. Exposure to Localized Diesel PM Emissions

Diesel PM as a component of ambient PM2.5 is a significant public health concern throughout the state. Additionally, in August 1998, the ARB identified particulate emissions from diesel-fueled engines as toxic air contaminants. It is, by far, the largest contributor of known ambient air toxics cancer risk in California (ARB, 2009b).

Following the identification process, the ARB developed the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan) in September 2000, paving the way for the development of control measures designed to reduce toxic diesel PM emissions. Through this plan, staff identified strategies; including air toxics control measures and other regulations, to reduce diesel emissions by 75 percent by 2010, and by 85 percent by 2020. The goal of each regulation is to make diesel engines as clean as possible to reduce emissions and their associated cancer risk. The Truck and Bus and Drayage Truck regulations are critical pieces of the Diesel Risk Reduction Plan, as is evidenced by the significant emissions of diesel PM from the vehicles subject to those regulations. Failure to obtain substantial reductions in diesel PM from trucks and buses will likely mean the overall goals of the Diesel Risk Reduction Plan will not be met.

III. PROPOSED AMENDMENTS TO THE TRUCK AND BUS REGULATION

This chapter summarizes the proposed changes to the Truck and Bus regulation. Staff is proposing to amend the Truck and Bus regulation to implement the Board's directive to provide additional flexibility for fleets adversely affected by the economy, while taking into account that emissions are lower than expected as a result of the recession. A detailed discussion of the proposed amendments to the Truck and Bus regulation can be found in Appendix D.

A. Existing Regulation

The existing Truck and Bus regulation applies to nearly one million diesel vehicles that annually operate in California with a manufacturer's gross vehicle weight rating (GVWR) greater than 14,000 pounds, two-engine sweepers, yard trucks with on-road or off-road engines, and all diesel-fueled shuttle vehicles that frequent transit centers. The regulation does not include vehicles subject to previously adopted fleet regulations except for drayage trucks and utility-owned vehicles that become subject to the Truck and Bus regulation beginning January 1, 2021.

Starting January 1, 2011, fleets are required to install PM filters for certain engine model years and to begin accelerating engine or vehicle replacement starting January 1, 2013 so that by 2014, half of the vehicles in the fleet have 2010 model year or newer engines and the rest of the fleet have PM filters. PM filters include those that are originally installed by the manufacturer and those that are installed afterwards (PM retrofit). After 2014, fleets are required to phase-in additional 2010 model year or newer engines such that by 2023 all engines operating in California and subject to the regulation will be model year 2010 or later or have been retrofitted to achieve equivalent emission reductions.

Fleets may meet the annual requirements by retrofitting vehicles with a VDECS that will achieve PM or NOx reductions or both as required, replacing vehicles with newer cleaner ones that are originally equipped with PM filters by the manufacturer, or replacing existing engines with newer, cleaner engines. Fleets may also retire older vehicles, or operate higher emitting vehicles less often, designating them as low-use vehicles.

The current regulation has three compliance options and fleets may change compliance options from one year to the next. The options include the following:

- BACT Schedule - a schedule that specifies which vehicles must be equipped with a PM filter or replaced with 2010 model year engines to meet NOx and PM BACT based on engine model year
- BACT Percentage Limit Option - a schedule that specifies the minimum number of PM filters to meet PM BACT and the minimum number 2010 model year engines required to meet both NOx and PM BACT in the fleet each year

- Fleet Averaging Option - where annual PM and NOx emissions targets can be met by any combination of vehicles and retrofits that achieve similar emissions reductions as the first two options.

The specific requirements of the current BACT Schedule and the current BACT Percentage Limit Option are shown below in Table III-1 and Table III-2, respectively.

Table III-1: Current Best Available Control Technology Compliance Schedule

Compliance Deadline, Jan 1	Engine Model-Years	BACT Requirements
2011	Pre-1994	PM BACT
2012	2003 – 2004	PM BACT
2013	2005 – 2006	PM BACT
	1994 – 1999	NOx and PM BACT
2014	2000 – 2002	NOx and PM BACT
	All other model years	PM BACT
2015	Pre-1994	NOx and PM BACT
2016	2003 – 2004	NOx and PM BACT
2017	2005 – 2006	NOx and PM BACT
2018	All pre-2007	No new requirements
2019	All pre-2007	No new requirements
2020	All pre-2007	No new requirements
2021	2007 or equivalent	NOx and PM BACT
2022	2008	NOx and PM BACT
2023	2009	NOx and PM BACT

Table III-2: Percent of Fleet That Must Comply with Current PM and NOx BACT Standard

Compliance Deadline As of January 1	Percent of Total Fleet Complying with BACT	
	PM BACT	NOx BACT
2011	25%	N/A
2012	50%	N/A
2013	75%	25%
2014	100%	50%
2015	100%	50%
2016	100%	60%
2017	100%	80%
2018	100%	80%
2019	100%	80%
2020	100%	90%
2021	100%	90%
2022	100%	90%
2023	100%	100%

Small fleets with three or fewer vehicles have an alternative compliance option that delays the first compliance date until January 1, 2014, as described below:

- A one truck owner electing this option is required to have a 2004 model year or newer engine equipped with a PM filter by January 1, 2014.
- A fleet with two trucks is required to have one 2010 model year engine and one truck equipped with a PM filter, or both trucks having a 2004 model year or newer engine and equipped with a PM filter by January 1, 2014.
- A fleet with three trucks can elect to comply by having all vehicles equipped with 2004 model year engines or newer with PM filters by January 1, 2014, or choose to delay the PM filter requirement for one truck until January 1, 2016 if another truck is equipped with a 2010 model year engine by 2014.

All small fleets would need to meet the same BACT schedule as other fleets starting January 1, 2019.

School buses are exempt from any NOx reduction requirements but must meet PM BACT requirements. School buses would have three compliance options to meet PM BACT starting January 1, 2011 so that all school buses would have PM filters by January 1, 2014.

The regulation also includes a number of special provisions that delay some or all of the requirements for certain fleets and vehicle uses. These provisions are available for:

- Low-use vehicles
- Agricultural vehicles
- Vehicles operating exclusively in designated NOx exempt areas

- Motorcoaches
- Unique vehicles

The regulation also provides credits for:

- Vehicle retirements that have occurred since 2008
- Adding fuel efficient hybrid vehicles
- Alternative fueled vehicles
- Early PM retrofit installations

B. Proposed Amendments to the Truck and Bus Regulation

1. Overview

The proposed amendments to the Truck and Bus regulation represent a significant overhaul and simplification to the existing regulation. Overall, the proposed amendments would exempt about 150,000 lighter trucks with a GVWR of 26,000 pounds or less from meeting the PM filter requirements, and would delay any replacement requirements for their trucks until 2015. Heavier trucks (with a GVWR greater than 26,000 pounds) having 1998 to 2006 model year engines would be required to install PM filters between 2012 and 2014 which is a one year delay from the current initial PM filter requirements, and would be able to operate an additional eight years before being replaced. All other heavier trucks with 1997 model year and older engine would be required to be replaced from 2015 to 2017 when 20 years old or older.

Overall, the initial requirements to modernize the fleet would be delayed by two years to 2015, for both lighter and heavier trucks. From 2015 to 2020, fleets would be required to replace or upgrade engines that are 20 years old or older to 2010 model year engines or emissions equivalent. From 2020 to 2023, all remaining 2009 and older model year engines would be phased out, such that by 2023 all engines would meet 2010 model year emissions standards or have equivalent emissions. The fleet owner would have the option to delay replacement of any truck until 2020 by equipping the vehicle with a PM filter by January 1, 2014.

2. Requirements for Lighter Vehicles (GVWR 26,000 pounds or less)

Staff is proposing a new requirement for vehicles with a GVWR less than 26,001 pounds. These lighter vehicles would no longer be subject to a PM filter requirement and would be instead required to be modernized. Starting January 1, 2015, and continuing each year thereafter until 2020, vehicles with engine model years that are 20 years old or older would need to be replaced with vehicles equipped with 2010 model year engines or have equivalent emissions. Then, from 2020 to 2023, all remaining 2009 model year and older engines would be required to be 2010 model year engines, or equivalent according to the following schedule.

- 2003 and older engine model years by January 1, 2020
- 2006 and older engine model years by January 1, 2021
- 2009 and older engine model years by January 1, 2022

By January 1, 2023, all vehicles in the fleet must have 2010 model year engines or have equivalent emissions. Fleets have an option to keep any lighter vehicle regardless of the engine's model year until 2020 by equipping it with a PM filter prior to January 1, 2014. There are no other compliance options for these vehicles.

3. Requirements for Heavier Vehicles (GVWR greater than 26,000 pounds)

Staff is proposing that heavier vehicles with a GVWR greater than 26,000 pounds be required to comply with a BACT schedule that specifies the action required based on engine model year. The existing BACT schedule would be amended to require PM filters between 2012 through 2014 on newer engines and would delay vehicle replacements (without PM filters) until 2015 for older trucks. The proposed BACT compliance schedule is shown in Table III-3 below. According to the schedule, 1998 to 2006 model year engines would be required to meet PM BACT between January 1, 2012, and January 1, 2014, and older vehicles would be required to modernize to 2010 model year engines or have equivalent emissions starting 2015. Under staff's proposal, no engine less than 20 years old would be required to be replaced early until 2021.

Table III-3: Proposed BACT Schedule for Heavy Weight Vehicles

Engine Model	Compliance Deadlines	
	Install PM Filter By	2010 Engine By
Pre 94	N/A	January 1, 2015
1994-1995	N/A	January 1, 2016
1996-1997	N/A	January 1, 2017
1998-2000	January 1, 2012	January 1, 2020
2001-2004	January 1, 2013	January 1, 2021
2005-2006	January 1, 2014	January 1, 2022
2007-2009	January 1, 2014 if not originally equipped with a PM filter	January 1, 2023

4. Optional Phase-In Schedule for Heavier Vehicles

The proposed amendments also provide for an optional phase-in schedule for both large and small fleets that would allow them to spread out their compliance obligation in the early years. This would help ensure that no fleet will have to turn over an excessive amount of their vehicles in any single year.

a) Large Fleets

The proposed amendments provide for an optional phase-in compliance schedule to allow large fleets with trucks with a GVWR greater than 26,000 pounds to decide which of these vehicles to retrofit or replace, regardless of model year. This option would be especially beneficial for fleets with most or all of these vehicles in one or two model year

ranges in the BACT compliance schedule as it allows fleets to spread out their compliance requirements. This option would allow fleets with engines originally equipped with PM filters to count them towards compliance, thereby reducing the overall number of retrofit PM filters needed.

As shown in Table III-4, with this option, a fleet would phase-in PM filters (originally equipped or retrofit) at 30 percent per year from January 1, 2012 to 2014, and would require the remaining 10 percent of the fleet to be compliant with the BACT compliance schedule beginning January 1, 2016. With this option, any vehicle with a PM filter regardless of model year would be compliant until at least 2020. A fleet using this option would still need to meet the BACT schedule for all of their vehicles under 26,001 pounds GVWR.

Table III-4: Phase-In Option Schedule

Compliance Date	Vehicles with a GVWR More than 26,000 Pounds Equipped with a PM Filter
January 1, 2012	30%
January 1, 2013	60%
January 1, 2014	90%
January 1, 2015	90%
January 1, 2016	All Must Comply with BACT Schedule

b) Small Fleets with 3 or Fewer Trucks

This proposed amendment would retain less stringent provisions for small fleets with vehicles with a GVWR greater than 26,000 pounds. Small fleets would still be defined as fleets of three or fewer total vehicles with a GVWR greater than 14,000 pounds subject to the regulation. The use of this option would not apply to trucks 26,000 pounds GVWR or less that are not subject to the PM reduction requirements. As shown in Table III-5, small fleets would be required to demonstrate that one vehicle per year has a PM filter (originally equipped or retrofit) starting January 1, 2014.

Table III-5: Small Fleet Phase-In Option Schedule

Compliance Date	Vehicles with a GVWR More than 26,000 Pounds Equipped with a PM Filter
January 1, 2014	1 vehicle
January 1, 2015	2 vehicles
January 1, 2016	3 vehicles

Beginning January 1, 2020, small fleet would need to comply with the BACT schedule like all other fleets. In addition, to utilize this option, small fleets would need to report beginning January 1, 2012.

5. Credits

A number of existing credits are proposed to be modified, and new credits would be added with the proposed amendments.

a) Economic Relief for Fleet Size Reduction

This amendment would provide expanded credits until 2016 for fleets that have fewer trucks than they had in 2006, and is intended to reduce the annual requirements for fleets most affected by the recession. Until January 1, 2016, and in conjunction with the optional Phase-in schedule for heavier trucks, a fleet would be able to reduce its requirement for a compliance year by the same percentage that the fleet has downsized from its 2006 baseline fleet. Table III-6 shows how the fleet size reduction credit would reduce the compliance requirements for a business that has 25 percent fewer vehicles than it did in 2006. Because the fleet is 25 percent smaller, the fleet would subtract 25 percent from the annual phase-in option requirement each year until 2016. The second column in the table shows the phase-in option requirements without credits and the far right column shows the requirements adjusted for a fleet with a 25 percent smaller fleet. If the fleet size changes from year to year the credit would adjust.

Table III-6: Example of Economic Relief for Fleet Downsized 25 Percent

Compliance Date	Vehicles Meeting PM BACT (No Credits)	Fleet Size Compared to 2006 Baseline	PM BACT Required for Reduced Fleet
January 1, 2012	30%	-25%	5%
January 1, 2013	60%	-25%	35%
January 1, 2014	90%	-25%	65%
January 1, 2015	90%	-25%	65%
January 1, 2016	All Must Comply with BACT Schedule		

The proposed changes would provide fleets with additional credits by extending the baseline year back from 2008 (the baseline year for determining credits in the current regulation) to 2006. This would provide more credit since nearly all fleets had more vehicles in 2006 than 2008. The proposed amendments would also increase the credit by allowing non-operational vehicles to be counted as retired (that is, excluded from the calculation of fleet size). The credit would also continue until January 1, 2016 rather than expiring January 1, 2014 as provided in the current regulation. To take advantage of these credits, fleets would be required to report information about all trucks with a GVWR greater than 26,000 pounds in the fleet and comply with the optional phase-in compliance schedule starting in January 2012.

b) Early PM Retrofit Credits

Fleets that have already installed a PM filter or install them prior to July 2011 would be able to treat another vehicle as compliant until 2017. This credit would encourage early action and would reward fleets for having installed PM filters. The vehicle that was retrofitted early would also be compliant until 2020. The proposed amendments would also extend the expiration date of the credit in the existing regulation from 2014 to 2017. However, these credits would not be available for action taken to comply with other regulations or for PM filters partially paid for by public funding according to the funding contract terms.

This credit could be used by fleets in a number of ways, for fleets using the optional phase-in compliance schedule, the retrofitted vehicle and the credit would each count towards compliance. For example, a fleet with two early retrofits would be treated as having four PM filters until 2017. Alternatively, a fleet that complies with the BACT requirements and doesn't report could claim the credit by reporting information about the truck equipped with the PM filter and the truck that would be treated as compliant using the provided credit. Additionally, a fleet that retrofits a lighter vehicle prior to July 1, 2011, could treat a heavier vehicle as compliant until January 1, 2017.

Overall, the amendment would increase the value of the existing early retrofit credit provision by providing a one for one credit that is good until January 1, 2017, rather than providing a credit like the existing regulation that declines each year until it expires January 1, 2014.

In addition, any lighter or heavier vehicle that has a PM filter installed prior to 2014 would be compliant until 2020. Fleets can use this option to keep older trucks until 2020 even if the BACT compliance schedule would require the vehicle to be replaced between 2015 and 2020. Credit will not be given for partially state funded vehicle retrofits according to the funding program guidelines.

c) Hybrid and Alternative Fuel Vehicle Credits

Fleets that purchase fuel efficient hybrid vehicles, alternative fueled vehicles, or vehicles equipped with pilot ignition engines any time prior to 2017 would be able to treat another vehicle as compliant until 2017. This credit could be used with the optional phase-in compliance schedule where the credit for another vehicle would count towards compliance. In addition, a fleet that complies with the BACT requirements and doesn't need to report the entire fleet could claim the credit by reporting information solely about the hybrid vehicle and the vehicle that would be treated as compliant using this credit. Like the early PM retrofit credit, this amendment would increase the value of the credits by providing a one for one credit rather than the credit value in the existing regulation that declines each year. Credit will not be given for partially state funded vehicle replacements according to the funding program guidelines.

6. Other Changes

a) Log trucks

Fleets with log trucks (which are currently considered the same as other agricultural vehicles), would have an option to use an alternate phase-in schedule for 2010 and later model year engines on their log trucks starting 2014, and would be exempt from the PM filter requirements. As shown in Table III-7, the fleet would be required to phase-in 2010 model year engines, or equivalent, at a rate of 10 percent per year for the log trucks utilizing this option, beginning 2014, and to have all log trucks in the fleet equipped with 2010 model year engines or have equivalent emissions by January 1, 2023. Log trucks would need to be labeled like other agricultural vehicles, but would have no mileage restrictions and could operate statewide.

Table III-7: Percentage of Log Trucks that Must have 2010 Model Year Emissions Equivalent

Compliance Deadline As of January 1	Percent of Total Fleet Complying
2011	0%
2012	0%
2013	0%
2014	10%
2015	20%
2016	30%
2017	40%
2018	50%
2019	60%
2020	70%
2021	80%
2022	90%
2023	100%

b) School buses

Staff is proposing a number of amendments to the school bus provisions to provide economic relief to school bus fleets while still protecting children in the state. Staff's proposal would exempt smaller school buses with a GVWR less than 26,001 pounds from the PM filter requirements and provide a one-year delay in the implementation of requirements for larger school buses – those with a GVWR greater than 26,000 pounds.

The other proposed changes are similar to the relief proposed for other vehicles subject to the regulation. The BACT Percentage Limits option and the Fleet Averaging option would be eliminated and the existing BACT compliance schedule would be replaced with the phase-in compliance schedule shown in Table III-8 below. The fleet would be required to bring 33 percent of the diesel-fueled school buses with a GVWR greater

than 26,000 pounds into compliance with PM BACT by January 1, 2012, 66 percent by January 1, 2013, and the rest of the fleet by January 1, 2014.

Table III-8: Phase-In Compliance Schedule for School buses Greater than 26,000 lbs GVWR

Compliance Deadline, as of January 1	*Minimum Percent of Total Fleet Complying with BACT*
2012	*33%*
2013	*66%*
2014	*100%*

The proposed amendments also include credits for installation of a PM filter on the smaller school buses, replacement purchases of smaller school buses, and for the purchase of hybrid, alternative-fueled, or heavy-duty pilot ignition school buses, provided that the funding of those buses allows the use of these credits. For each school bus that earns any of the credits described above, the fleet could treat another school bus as compliant because of the credit until January 1, 2014. The fleet would be required to keep records on the school buses receiving credit and the school buses to be treated as compliant.

Similar to the proposal for other vehicle categories, staff is proposing a provision that offers economic relief to school bus fleets that have reduced their fleet size relative to their fleet size on October 1, 2006 – the new baseline year proposed in the amended regulation. Until January 1, 2014, a fleet would be able to reduce its requirement in a compliance year by the same percentage that the fleet has downsized from the 2006 baseline fleet. The fleet may include all school buses with a GVWR greater than 14,000 pounds when determining this credit. Except for fleets needing a compliance extension based on unavailability of PM filters, staff proposes to require no reporting for school bus fleets – only recordkeeping.

c) Agricultural vehicles

Staff is also proposing to extend the deadline for reporting agricultural vehicles until March 31, 2011 to allow another opportunity for eligible fleets to apply. Staff is also proposing to amend the definition of an agricultural vehicle to clarify the definitions and to allow non-qualifying trucks in agricultural fleets to utilize all other credits and provisions available to all other fleets. The definitions would clarify that any truck transporting a load of unprocessed crops between the farm and the first point of processing would be eligible. This would clarify that trucks would still be eligible if making interim movements between the farm an the processor and would include yard trucks. Staff is also proposing to change the definition of specialty agricultural vehicles to include all livestock feed trucks such as mixer-feed trucks rather than limiting the definition to use at cattle or calf feedlots.

C. Effect of Proposed Amendments on Affected Fleets

To evaluate the effect of the proposed changes on affected fleets, staff developed a number of examples to demonstrate what actions would be required of fleets with the proposed amendments. All of the following examples are for the same fleet of heavier trucks with a GVWR of greater than 26,000 pounds and engine model years ranging from 1992 to 2006. This is shown in Table III-9 which lists the engine model years for the example fleet in the left column.

Also shown in Table III-9 are the compliance requirements for meeting the current BACT schedule requirements of the existing regulation (shown in the middle column), and compliance requirements for the same fleet using proposed BACT schedule (shown in the right column). The subsequent examples use the same 10 vehicle fleet to show how a fleet could comply with the regulation by taking advantage of the proposed credit provisions.

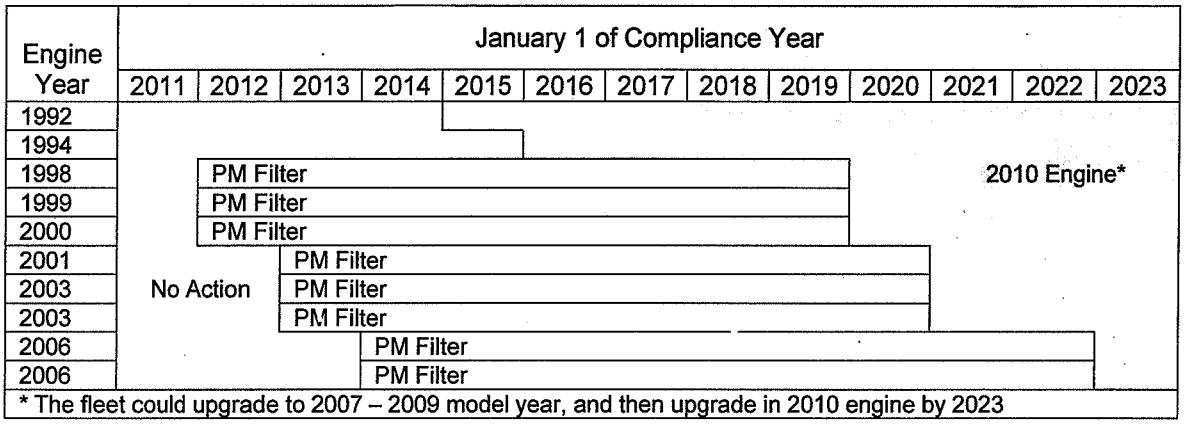
Table III-9: Existing and Proposed BACT Schedule Compliance Example

Engine Model Year	*Existing Regulation*	*Proposed Amendments*
1992	PM filter by 2011 and 2010 engine by 2015	2010 engine by 2015
1994	2010 engine by 2013	2010 engine by 2016
1998	2010 engine by 2013	PM filter by 2012 and 2010 engine by 2020
1999	2010 engine by 2013	PM filter by 2012 and 2010 engine by 2020
2000	2010 engine by 2013	PM filter by 2012 and 2010 engine by 2020
2001	2010 engine by 2013	PM filter by 2013 and 2010 engine by 2021
2003	PM filter by 2012 and 2010 engine by 2016	PM filter by 2013 and 2010 engine by 2021
2003	PM filter by 2012 and 2010 engine by 2016	PM filter by 2013 and 2010 engine by 2021
2006	PM filter by 2013 and 2010 engine by 2017	PM filter by 2014 and 2010 engine by 2022
2006	PM filter by 2013 and 2010 engine by 2017	PM filter by 2014 and 2010 engine by 2022

1. BACT Compliance Schedule

The following example shows the example fleet using the BACT Compliance schedule that specifies the annual requirements by engine model year. The required compliance actions for this fleet are shown in Figure III-1.

Figure III-1: Example of Compliance with BACT Schedule



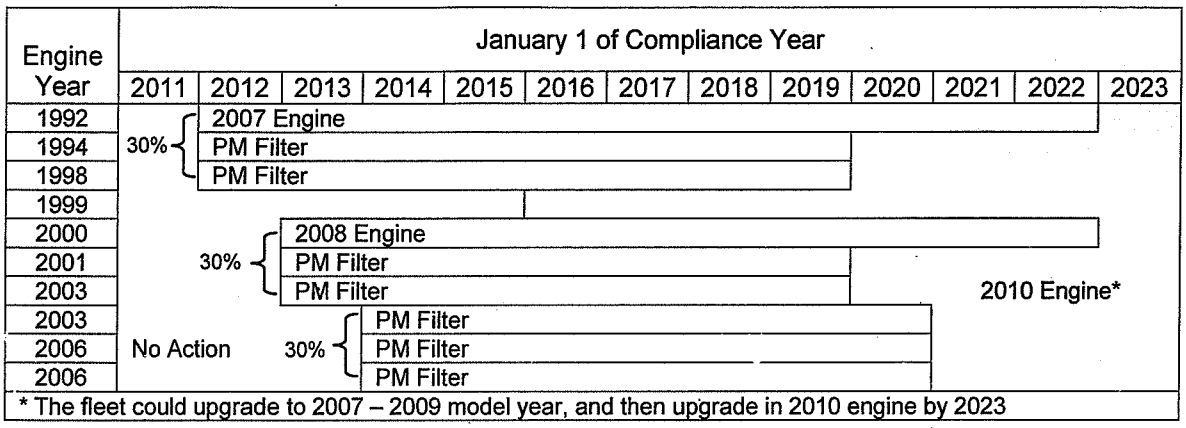
The actions required are described below:

- By January 1, 2012, the 1998 through 2000 model year vehicles would need to have a PM filter installed. By January 1, 2020, these vehicles would need to be upgraded to 2010 model year engine or equivalent emission.
- By January 1, 2013, the 2001, model year engine and both of the 2003 model-year engines would need to have PM filters installed. By January 1, 2021, the vehicles would need to be upgraded to 2010 model year engine or equivalent emission
- By January 1, 2014, both of the 2006 model-year vehicles would need to have PM filters installed. By January 1, 2022, these vehicles would need to be upgraded to 2010 model year engines or equivalent emissions.
- By January 1, 2015, the truck with the 1992 model-year engine would have to be replaced with one having a 2010 model year engine or equivalent emissions.
- Finally, by January 1, 2016, the 1994 vehicle would need to be replaced with a 2010 model year engine or equivalent emissions.

2. Example Using the Phase-in Compliance Option

Following is an example of the same example fleet utilizing the Phase-in Compliance Option. This option provides fleets with the flexibility to annually determine which trucks to either retrofit or replace with a truck having a PM filter originally installed from the engine manufacturer. Because this provision allows fleets to choose which vehicles they want to upgrade each year, there is no single option to meet these requirements. However, one potential compliance scenario is shown in Figure III-2. Note that in this example, it is assumed all PM filters are installed after July 1, 2011, and the fleet has no PM retrofit credits.

Figure III-2: Example of Compliance with the Phase-in Option



The actions used in this compliance example are described below:

- By January 1, 2012, the fleet needs to show it has 30 percent of its vehicles (3 trucks) with PM filters, regardless of whether they are retrofits or originally equipped with the engine. In this example the fleet chose to upgrade the truck with a 1992 model year engine to a used truck with a 2007 model year engine and to install PM filters on the 1994 and the 1998 model year trucks. These two vehicles, which could be cranes or some other expensive vehicles, could then be kept in the fleet until 2020.
- By January 1, 2013, the fleet would need to show that another 30 percent of the fleet has PM filters for a total of 60 percent. That means that three more vehicles would need PM filters. In this example the fleet chooses to replace its 2000 model year truck with a 2008 model year truck already equipped with a PM filter and installs PM filters on the 2001 and 2003 model year trucks.
- By January 1, 2014, the fleet installs PM filters on an additional 30 percent of the fleet, for a total of 90 percent of the trucks having PM filters. The 2003 model year and two 2006 model year engines would need to have PM filters installed.
- By January 1, 2016, the fleet would replace the 1999 model year truck with a 2010 or newer engine.
- Starting January 1, 2020, the fleet would need to phase-in 2010 model year engines according to the BACT schedule for the remaining vehicles.

3. Example of Credit for Fleets that have Downsized

Following is an example of the same example fleet as before except that is has reduced the number of trucks from 13 in 2006 to 10 trucks by the first compliance date; therefore, the fleet size was reduced by 23 percent. To take advantage of the fleet size reduction credits, fleets must report their fleet information and comply with the Phase-in Option.

Table III-10 shows how the adjusted compliance requirement for this fleet would be determined. The second column shows the phase-in requirements, the middle column shows the fleet size reduction, and the right column shows the adjusted requirement

after applying the credit. As shown in the table, the adjusted requirement is calculated by subtracting 23 percent from the annual compliance requirement in each year.

Table III-10: Example of Adjusted Compliance Requirements for a Fleet That Downsized 23 Percent

Compliance Date	Vehicles Meeting PM BACT (No Credits)	Fleet Size Compared to 2006 Baseline	PM BACT Required for Reduced Fleet
January 1, 2012	30%	-23%	7%
January 1, 2013	60%	-23%	37%
January 1, 2014	90%	-23%	67%
January 1, 2015	90%	-23%	67%
January 1, 2016	All Must Comply with BACT Schedule		

Figure III-3: Example of a Fleet Utilizing Economic *Relief Provision for Fleets that have Downsized*

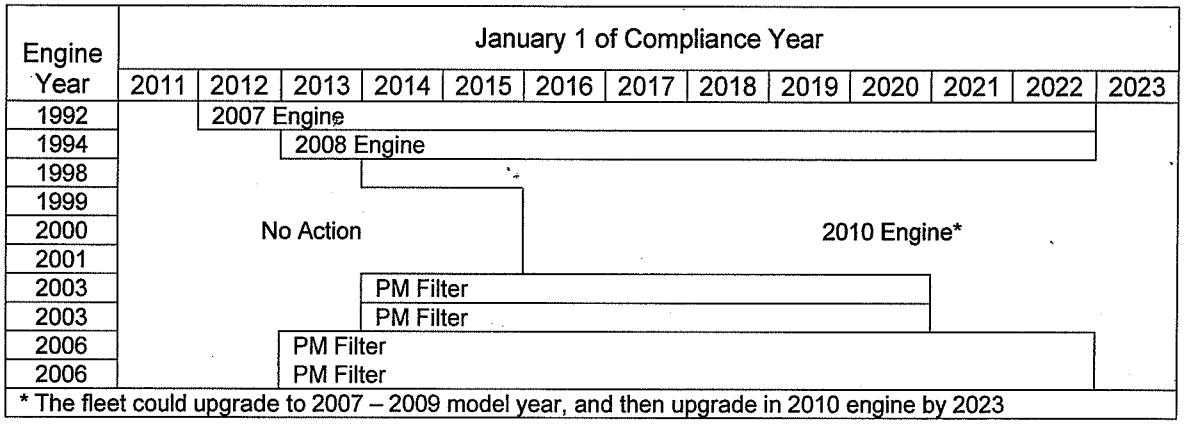


Figure III-3 shows the actions used in this compliance example which are described below:

- By January 1, 2012, the fleet would need to show that 7 percent of the fleet or one truck (with rounding) meets PM filter requirement. Like the prior example, the fleet could comply by replacing its 1992 model year truck with a used truck having a 2007 model year engine that would be compliant until 2023. Additionally, the fleet would avoid installing two additional PM filters because of the credit.
- By January 1, 2013, 37 percent of the trucks (four trucks total) would need to have PM filters to be compliant. Since one truck already has a PM filter three additional trucks would need to have PM filters. In this example the fleet upgrades the truck with the 1994 model year engine to a truck with a 2008 model year engine that is compliant until 2023, and installs PM filters on both 2006 vehicles that can be operated until 2022.

- By January 1, 2014, 67 percent of the fleet (7 vehicles total) need to be compliant, meaning three more need to be brought into compliance. The fleet could install filters on both 2003 vehicles that would be compliant until 2021, and upgrade the truck with the 1998 model year engine to one with a 2010 model year engine that meets the final requirements. On January 1, 2016, the credits expire and the remaining three trucks need to meet the BACT compliance requirements. In this example the fleet upgrades to used vehicles with 2010 model year engines.
- Beginning January 1, 2021, the fleet would phase-in 2010 model year engines according to the BACT schedule for the remaining vehicles.

IV. PROPOSED AMENDMENTS TO THE DRAYAGE TRUCK REGULATION

This chapter discusses the proposed changes to the Drayage Truck regulation. The regulation is intended to reduce exposure to diesel PM in communities located near California's ports and intermodal rail yards and to help meet the SIP goals for 2014. A detailed discussion of the proposed amendments to the Drayage Truck regulation can be found in Appendix E.

A. Existing Drayage Truck Regulation

The Drayage Truck regulation was approved by the Board in December 2007. The regulation applies to heavy-duty diesel drayage trucks having a GVWR greater than 33,000 pounds and operating at California ports and intermodal rail yards. As adopted, it was to be implemented in two phases. Phase 1 of the regulation requires drayage trucks with pre-1994 model year engines to be phased out by 2010, 1994-2003 model year engines to be retrofitted with a level 3 PM filter starting in 2010 and 2004-2006 model year engines be retrofitted with level 3 PM filter by 2012 and 2013. Phase 2 requires drayage trucks to meet 2007 model year and newer engine standards by 2014.

B. Proposed Amendments

Staff is proposing several amendments designed to align the requirements of the regulation with the proposed amendments to the Truck and Bus regulation. The goals of the changes are to provide economic relief to drayage truck owners, to improve the cost effectiveness for retrofitting equipment, and to improve the enforceability of the regulation by preventing dray-off. The changes would also ensure that the PM exposure reduction goals for communities located near port and rail yards would continue to be met.

Specifically, staff is proposing to extend the compliance period for retrofitted engines by eliminating the Phase 2 requirement of the regulation that requires drayage trucks to be equipped with engines that meet 2007 or later emission standards. The proposed changes would allow trucks to operate with PM filters at ports and intermodal rail facilities until 2020, which is an additional six years, at which time the Truck and Bus regulation would phase out older engines and require that all drayage trucks servicing the ports and intermodal rail yards be equipped with 2010 model year engines or have equivalent emissions.

In addition, the Drayage Truck regulation would sunset on January 1, 2017. This corresponds to the date when the amended Truck and Bus regulation requirements would effectively require PM controls on all heavier trucks operating in California. Coincidental with this date, all reporting, labeling and record keeping requirements of the Drayage Truck regulation would no longer be required cease and all heavy-duty trucks in California would be subject to the Truck and Bus regulation.

Staff is also proposing to mitigate dray-off activities by expanding the definition of a 'Drayage Truck' to include trucks hauling cargos, containers, or chassis that are either

bound from or destined for a port or rail yard. These proposed modifications would allow ARB enforcement to curtail dray-off activity occurring off of port and rail yard properties, which effectively circumvents the regulation. Noncompliant drayage trucks and their dispatching motor carriers would be subject to penalties for engaging in such activities.

Staff is also proposing amendments to expand the definition of a drayage truck to include trucks with a GVWR of 26,001 – 33,000 pounds (class 7) trucks that operate at port and intermodal rail yards and require them to be operated with a level 3 PM filter by 2014. This would ensure that the Board's goal of quickly reducing PM exposure in communities located near ports and intermodal rail yards is continued. Because the existing Truck and Bus regulation already requires all (with few exceptions) trucks greater than 14,000 pounds to be equipped with a PM filter by January 1, 2014, this change would add no new requirements for these vehicles compared to current regulations.

V. PROPOSED AMENDMENTS TO THE TRACTOR-TRAILER GHG REGULATION

This chapter discusses the proposed changes to the Tractor-Trailer GHG regulation. Staff is proposing to amend the regulation to provide fleets with additional flexibility in meeting its requirements, to simplify compliance planning, and in many cases to reduce compliance costs, with minimal impact on the GHG benefits of the regulation. A detailed discussion of the proposed amendments to the Truck and Bus regulation can be found in Appendix F.

A. Existing Regulation

The Tractor-Trailer GHG regulation was approved by the Board on December 12, 2008. The current regulation requires 2011 model year and newer tractors that pull 53 foot and longer box type trailers to be U.S. EPA SmartWay certified. The current regulation requires pre-2011 model year tractors to use all SmartWay verified tires by January 1, 2012. In addition, the regulation requires that 53 foot and longer box type trailers affected by this regulation must either be U.S. EPA SmartWay certified or be retrofitted with SmartWay approved technologies (aerodynamic devices and low rolling resistance tires).

The current regulation offers owners of large trailer fleets two different options for bringing their pre-2011 model year trailers into compliance. They may either bring their entire trailer fleet into compliance by January 1, 2013, or register for and participate in an optional compliance phase-in schedule that would give the fleet six years to comply, between 2010 and 2015. To participate in the optional phase-in, fleets must have already registered with ARB by July 1, 2010. The total number of large fleet owners that registered by the deadline was 95, registering approximately 180,000 trailers.

B. Proposed Amendments to the Tractor-Trailer GHG Regulation

The specific amendments staff is proposing are as follows:

- Add a second optional large fleet compliance schedule which would begin a year after the existing large fleet compliance schedule, but end at the same time. This option would provide an additional year for fleets that were not aware of this regulation to register and participate in an optional compliance schedule.
- Provide the option to report compliance on an annual basis for trailers participating in an optional compliance schedule, rather than on an up-front, one-time basis as currently required.
- Add language allowing owners of trailers to modify SmartWay verified aerodynamic equipment from its original verified configuration, subject to Executive Officer approval.
- Add an exemption from the aerodynamic and tire requirements for storage trailers.
- Add a limited term exemption from the aerodynamic technology requirements for trailers that are configured such that none of the SmartWay verified aerodynamic

technologies can be effectively installed on them; the exemption would require Executive Officer approval.

- Exempt empty local-haul trailers from meeting the aerodynamic equipment requirements and empty storage trailers from meeting both the aerodynamic equipment and tire requirements when they are being relocated to another local-haul base or storage location.
- Provide for temporary passes to allow local-haul and storage trailers loaded with freight to travel on California highways on a temporary basis without the required aerodynamic technologies and low rolling resistance tires. These include a relocation pass and a transfer of ownership pass.
- Provide for a temporary pass for tractors, and the trailers they pull, that only travel in California once a year, allowing them to travel on California highways without the required aerodynamic technologies and low rolling resistance tires for a period of no more than three days, subject to Executive Officer approval.
- Require California-based vehicle dealers of 53-foot and longer box-type trailers and heavy duty tractors to maintain records of the disclosure statement given to buyers regarding the Tractor-Trailer GHG regulation.
- Extend the deadlines by one year for tractors and four years for trailers for requiring use of low rolling resistance tires on all pre-2011 model year tractors and trailers; the deadline for tractors would be January 1, 2013, and for trailers January 1, 2017.
- Provide a limited term exemption to allow the use of open shoulder drive tires on 2011 and subsequent model year tractors. Open shoulder tires are tires where the outermost tread is separated into blocks that are designed to provide traction when traveling on mud or snow covered highways. This exemption would sunset on January 1, 2013.

Staff is also proposing several administrative changes to the regulation to improve clarity and enforceability of the regulation.

C. Effect of Proposed Amendments on Individual Fleets

The proposed amendments to the Tractor-Trailer GHG regulation would provide additional flexibility to affected fleets in meeting the requirements of the regulation, improve the ability of fleets to periodically adjust their compliance plan and in some cases reduce compliance costs, with a minimal impact on the GHG benefits initially approved.

VI. ENVIRONMENTAL IMPACTS

This chapter describes how the proposed amendments continue to achieve needed emissions reductions, reduce localized risk from exposure to diesel PM, reduce impacts of diesel engine emissions on mortality and other health effects and meet SIP commitments to meet federal air quality standards.

A. Legal Requirements

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. The legal requirements applicable to the environmental impact analysis are the same as those presented in Chapter XII, Section A of the Technical Support Document for the original regulation (ARB, 2008a).

The results of the analysis of the environmental impacts of the proposed amendments are presented below. Alternatives to the proposed amendments are discussed in Chapter VIII of this report. ARB staff has concluded that there are no alternative means of compliance that would achieve similar diesel PM and NOx emission reductions at a lower cost, while addressing the serious economic recession and its impact on industry and residents of the State.

B. Emission Impacts from Proposed Amendments

1. Emissions Benefits of the Proposed Amendments

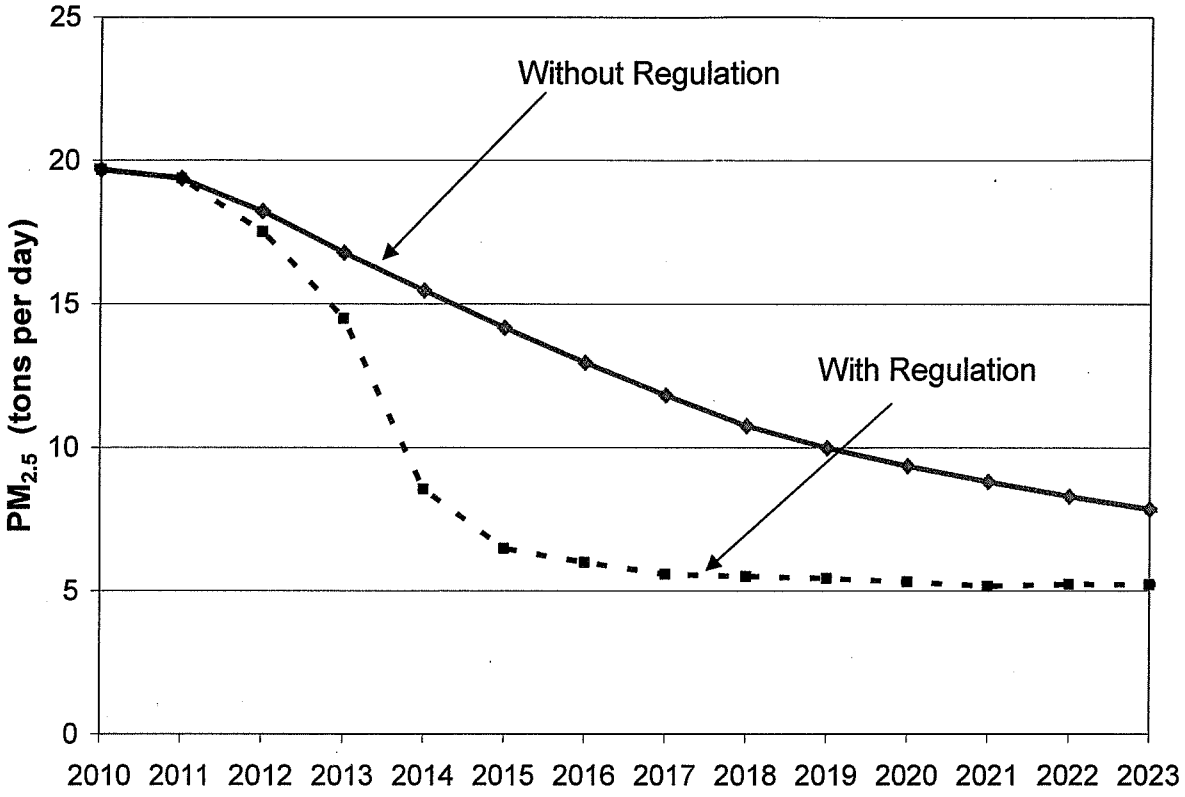
Staff anticipates the proposed amendments to the Truck and Bus regulation and the Drayage Truck regulation would reduce diesel PM emissions by 50 percent from baseline levels in 2014 and ensure that by 2020 practically all trucks operating in California will be equipped with a diesel PM filter. The revised baseline truck emissions inventory and the impact of the regulation on emissions in years relevant to attainment of federal clean air quality standards are shown below in Table VI-1

Table VI-1: Impact on Statewide NOx and PM Emissions

Year	NOx Emissions			PM Emissions		
	Without Regulation	Proposed Regulation	Benefits	Without Regulation	Proposed Regulation	Benefits
2014	422	421	0	15.5	8.6	6.9
2017	339	305	34	11.8	5.6	6.2
2020	276	231	44	9.4	5.3	4.0
2023	245	157	88	7.8	5.2	2.6

Figure VI-1 compares anticipated emissions without the regulation to emissions with the amended regulation, as currently proposed. Both lines in the graph include the effect of the recession.

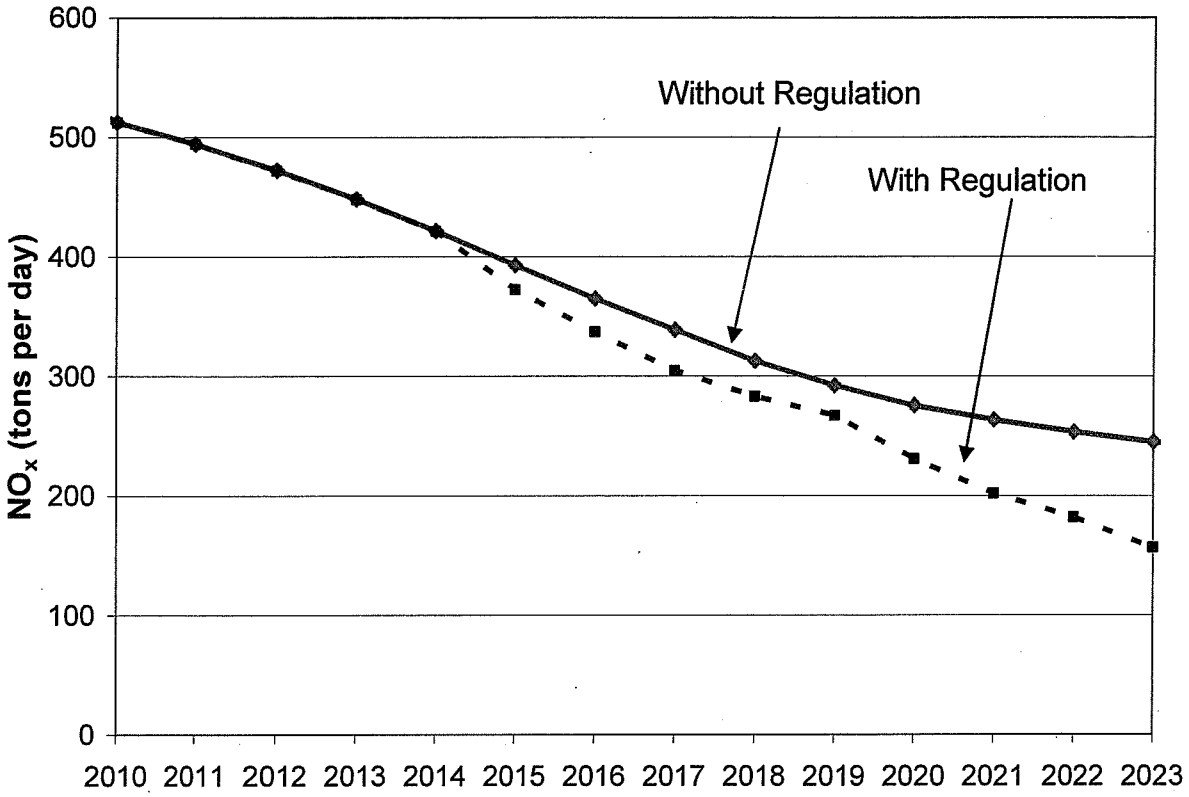
Figure VI-1: Statewide Truck and Bus PM Emissions*



*** Vehicles subject to either the Truck and Bus or Drayage Truck regulation**

Staff also anticipates the amended regulations would achieve a 36 percent reduction in statewide NOx emissions in 2023, and an overall 15 percent reduction in statewide NOx emissions from baseline levels between 2015 and 2023. Figure VI-2 compares anticipated emissions without the regulations to emissions with the proposed amendments.

Figure VI-2: Statewide Truck and Bus NOx Emissions*



*** Vehicles subject to the Truck and Bus regulation and Drayage Truck regulation**

2. Comparison of Emissions Benefits to Existing Regulation

The proposed amendments would still achieve most of the PM emissions reductions compared to the exiting regulation, but would not achieve as much NOx emissions reductions. Table VI-2 compares the benefits of the current regulation and the regulation as proposed to be amended. The PM benefits of the proposed amendments are lower in 2014 but are nearly the same starting 2017 because all heavier trucks will have PM filters like the existing regulation requires. Lighter trucks would be exempt from PM filter requirements, but by 2021 all lighter trucks would have trucks with originally equipped PM filters. Lighter trucks have lower emissions per mile traveled and contribute much lower emissions than heavier trucks. The NOx benefits of the proposed amendments are lower than if the current regulation were implemented, through 2020. However, by 2023, all engines must still be 2010 model year engines or have equivalent emissions.

Table VI-2: Benefits of the Current Regulation Compared to the Proposed Amendments (tpd)

Year	NOx Benefits		PM Benefits	
	Existing Regulation	Proposed Amendments	Existing Regulation	Proposed Amendments
2014	106	0	11.2	6.9
2017	102	34	7.1	6.2
2020	71	44	4.4	4.0
2023	84	88	2.7	2.6

3. PM and NOx Emissions Benefits are Preserved

a) Combined On-Road and Off-Road Emissions

The proposed regulatory amendments across both the Truck and Bus and Off-Road regulations are designed to provide the maximum amount of economic relief while still preserving as much of the originally envisioned benefits as possible. Our estimates suggest that the combined statewide impact of the recession with the proposed amendments to the Truck and Bus and Off-Road regulations will provide essentially the same cumulative remaining emissions levels between 2011 and 2023 as was expected with the existing regulations before the recession. These estimates are shown in Figure VI-3 and Figure VI-4 for PM2.5 and NOx respectively

As can be seen in Figure VI-3, while the emissions that would occur in the early years with the proposed amendments are not equivalent to those that would be achieved with the current regulation, cumulatively the amended regulation would result in essentially the same NOx and PM2.5 emissions levels compared to what was expected when the regulation was approved by the Board before the recession. More information on the preservation of benefits expected with emissions is detailed in Appendix G.

Figure VI-3: Year by Year Comparison of Truck and Bus and Off-Road PM Emissions after Regulation is Applied: Current Rule Without Recession vs. Amended Rule with Recession

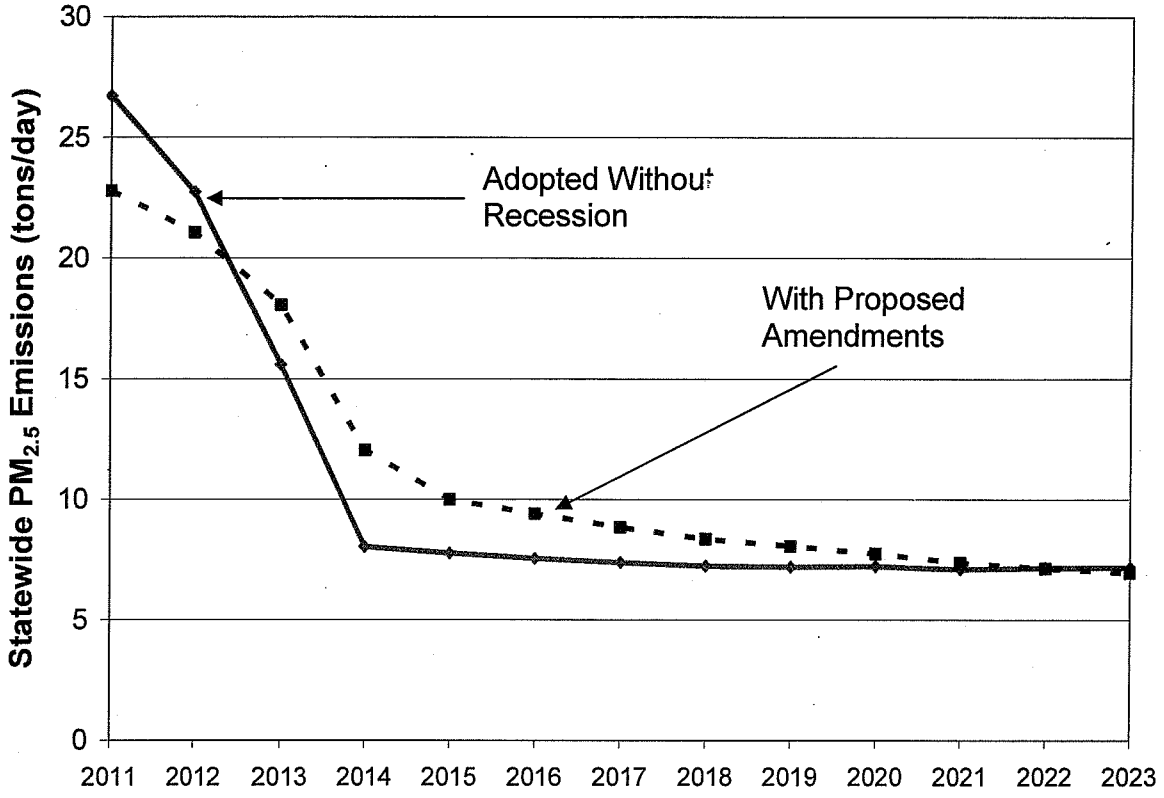
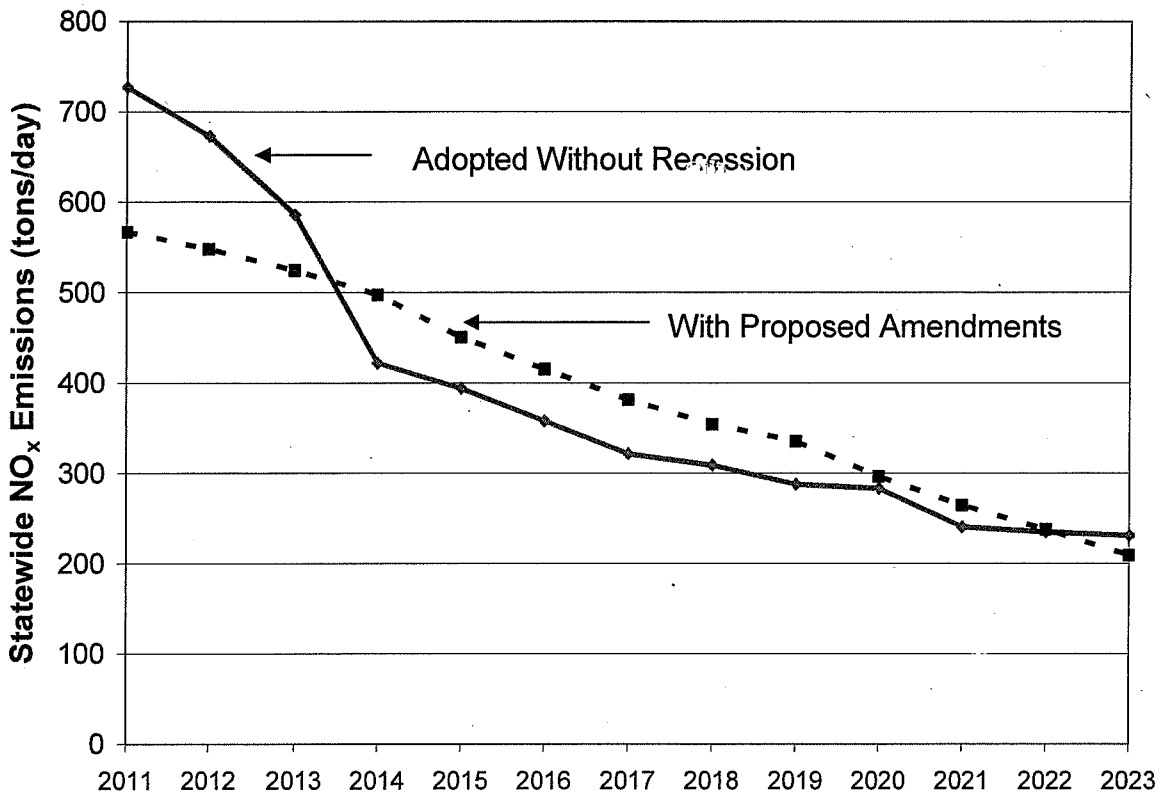


Figure VI-4: Year by Year Comparison of Truck and Bus and Off-Road NOx Emissions after Regulation is Applied: Current Rule Without Recession vs. Amended Rule with Recession



b) Emissions Impacts from Drayage Trucks

Because the requirement for drayage trucks have 2007 model year and newer engines by 2014 has largely been achieved through the Clean Truck Programs at the Ports of Los Angeles and Long Beach, minimal air quality impacts from the elimination of the Phase 2 requirements of the Drayage Truck regulation in the South Coast Air Basin are anticipated. Under this program, both Ports required all trucks to emit at or below 2007 model year and newer emission standards by January 1, 2012, a full two years ahead of the current Drayage Truck regulation's requirement. As such, most drayage fleets operating at the Southern California ports have already modernized to meet the existing Phase 2 requirements.

In addition, the downturn in the economy has resulted in lower cargo volumes and drayage truck activity than previously expected, further reducing NOx and PM emissions below the levels expected during the implementation of Phase 2.

The proposed amendments to the Drayage Truck regulation would reduce expected 2014 NOx emissions benefits by 7.4 tons/day (primarily outside the South Coast Air Basin), which is a 13 percent increase in remaining emissions statewide. This reduction in benefits will be experienced mostly in the San Francisco Bay Area. However, this region already meets the PM2.5 standard. The emissions impact will not have a significant effect in the San Joaquin Valley because drayage trucks travel less than 1 percent of their miles in the San Joaquin Valley. Because all drayage trucks will be equipped with a PM filter by 2014, reductions in directly emitted diesel PM emissions from drayage trucks in all regions of the State will be unaffected.

C. Impact on SIP Targets

Per the direction of the Board, staff considered the maximum economic relief that could be provided while ensuring that all applicable SIP targets were met. To do this, staff considered the impact of the recession and inventory changes on both truck and buses and off-road vehicles together in deciding how to provide appropriate economic relief. This approach allowed staff to better target emissions reductions across the two categories of vehicles while continuing to ensure that the combined emissions targets in the SIP were met.

As previously discussed, to determine how much economic relief could be provided and still meet applicable SIP remaining emissions targets, staff compared what emissions were expected to be remaining with the existing regulations and the pre-recession inventories to what emissions are expected to be with the proposed amendments and the updated inventories. The difference between these two is the emission margin. Since there are SIP targets for both NOx and PM2.5, staff expressed the margin as a weighted total of the two in NOx equivalent terms. The margin is 62 TPD of NOx equivalent emissions in the South Coast in 2014, and 40 TPD in the San Joaquin Valley.

Next, to evaluate whether the proposed amendments still met all applicable SIP targets, staff compared the remaining emissions from these vehicles, after applying the benefits of the proposed amendments and the revised emission inventories, to the 2014 SIP margins in the South Coast and San Joaquin Valley. In the San Joaquin Valley the proposed amendments reduce the margin to zero, meaning that the emission levels (after considering the amendments and the recession) will be at the same level that was expected with the existing regulation before the recession. In the South Coast, the margin will be reduced to about five tons per day NOx equivalent. Overall, t[illegible] demonstrates that the proposed amendments continue to provide maximum economic relief while meeting all applicable SIP targets for trucks and buses and off-road vehicles.

D. Impact on PM Mortality

Even with the major amendments and economic relief proposed, the regulations would provide significant health benefits by reducing premature mortality from PM2.5 exposure and localized risk from diesel PM. Staff estimates that 3,500 premature deaths (2,700 to 4,400, 95 percent confidence interval) would be avoided by implementation of the

amended truck regulations from 2010 to 2025. This estimate is based on U.S. EPA's new risk assessment methodology (U.S. EPA, 2010), and includes the most recent air quality data available (2006 to 2008) and the latest emissions inventory estimates.

E. Impact on Localized Risk

The proposed amendments continue to reduce PM emissions from trucks and buses by the maximum feasible amount, and even with the proposed amendments, the regulations will significantly lower diesel PM emissions. Staff estimates that by 2014, diesel PM emissions would be reduced by 48 percent, and by 2020, nearly every truck operating in California will have a PM filter. The Diesel Risk Reduction Plan set a goal to reduce diesel PM by 85 percent when compared to 2000. The proposed amendments meet the goals of the plan by achieving the maximum feasible PM reductions.

F. Impact on Climate Change Emission

Recent studies by scientists cited in the IPCC's report estimate that emissions of black carbon (BC) are the second largest contributor to global warming, after carbon dioxide emissions (Ramanathan and Carmichael, 2008). Studies in the peer-reviewed literature also indicate that BC emissions cause warming primarily in the region where they are emitted. Therefore, it is important to understand that BC's warming impact requires close attention to the geography of emissions. A study published this year shows that the darkening of snow and ice by black carbon deposition is a major factor for the rapid disappearance of snow packs. The observed trend toward earlier melting of the snow packs in the Sierras is an important factor in water supply problems in California (Hadley et al., 2010).

Reviewing all source categories of PM2.5 emissions, the BC content is greatest for diesel exhaust. Fifty percent of PM2.5 emissions from on-road diesel exhaust consists of BC, while 40 percent of PM2.5 emissions from off-road diesel exhaust consists of BC (Chow et al., 2010). By estimating the BC fraction of diesel PM and the GWP of BC, using 500 GWP100-yr and 2000 GWP20-yr (Hansen et al., 2007), the approximate climate warming effect of the proposal to amend the Truck and Bus regulation for 2025 is 6 and 22 million metric tons of carbon dioxide equivalents (MMTCO2-eq) for 100-year and 20-year time horizons, respectively.

Estimates of the reduced climate warming impacts from BC emissions for proposed statewide off-road diesel truck regulation for 2010-2029 are about 1 and 4 MMT CO_2-eq for 100-year and 20-year time horizons, respectively. These estimates represent considerable reductions in global warming impacts from current BC emissions based on baseline regulations. Finally, although use of a GWP may be a helpful tool to assess the importance of BC climate warming impact, the GWPs of atmospheric short-lived compounds (e.g. non Kyoto compounds such as BC) are more uncertain and their climate forcing will strongly depend on the location and timing of the emission.

The proposed amendments to the Tractor-Trailer GHG regulation will not impact the 2020 GHG emission benefits from the original regulation which is approximately 0.7 million metric tons of CO2-equivalent (MMT CO2e) in California. However, because the proposed provisions delay tractor-trailer compliance deadlines with the low rolling resistance tires, the 2010 to 2020 cumulative statewide GHG emission benefits will be reduced by approximately 6 percent, from 5.1 MMTCO2e to 4.8 MMT CO2e. This emission benefit loss is minimal compared to the overall emission benefits of the program and the necessary flexibility it provides fleets to ease the burden of compliance.

G. Environmental Justice and Neighborhood Impacts

The objectives of ARB's statewide regulatory programs are better air quality and reduced health risk for all residents throughout California. The Board has a policy that community health and environmental justice concerns be addressed in all of ARB's regulatory programs

The proposed amendments to the Truck and Bus, Tractor-Trailer GHG, and Drayage Truck regulations are consistent with the goals of the current regulations to reduce PM, NOx, and greenhouse gas emissions, as well as reduce the associated cancer risks and other health impacts over time statewide. This is consistent with the ARB's environmental justice policy of reducing exposure to air pollutants and reducing the adverse impacts from toxic air contaminants in all communities, including low-income and minority communities.

H. Other Environmental Impacts

The emissions benefits from the amended regulation would be lower than the existing regulation; however, the proposed amendments would reduce the cost of the regulation by more than 50 percent. More significantly, with the proposed regulation, the capital investments required in the next five years would be dramatically reduced because all vehicle replacement requirements have been delayed by 2 years and now would only be required for trucks that are 20 years old or older. With the recession, the ability of fleets to borrow and make needed capital investments has been significantly reduced. Although, the proposed amendments do not achieve the same emissions reductions, the reduced economic impacts on fleets outweighs the disadvantages. More detailed information on health impacts and benefits and methodology is provided in Appendix J.

I. Conclusion

The proposed amendments would result in foregone emission reductions compared to the current regulation. However, ARB staff believes there are overriding economic and social considerations driving these proposed changes. The recession has significantly impacted the economic health of the regulated industry and, consequently, has greatly affected its ability to comply with the current regulation. Additionally, the recession has had significant social implications, causing a number of businesses to reduce their activities or go out of business, which has resulted in significant unemployment throughout the State. The recession has also caused emissions to be lower than

anticipated when the regulations were initially approved. Hence, in addressing concerns with respect to CEQA, staff is proposing that the Board find that overriding considerations exist.

VII. ECONOMIC IMPACTS

This chapter discusses the effect of the proposed amendments on individual fleets and businesses affected by the regulations in more detail.

The proposed amendments to the Truck and Bus regulation and Drayage Truck regulation are expected to provide substantial economic relief to all affected fleets. The proposed amendments to the Tractor-Trailer GHG regulation would primarily provide compliance flexibility, but would not result in significant changes in costs.

A. Truck and Bus Regulation Amendments

1. Cost Methodology

To estimate the economic impacts of the proposed amendments, staff utilized an overall methodology that was similar to the one used when originally estimating the costs for the initial 2008 rulemaking. The estimated costs were calculated by predicting and evaluating the compliance paths for real individual fleets; these estimates were then scaled to statewide costs using the estimated population in the statewide fleet. (ARB, 2008c)

To evaluate the costs (and cost savings) of the proposed amendments, the compliance plan modeling was done using updated access database code previously used for the original rule making. For this effort, 200 real fleets were utilized. The most significant change to the modeling methodology was to add a method to reflect slower truck replacement rates for several years to reflect the impacts of the recession consistent with the rates reflected in the emissions inventory.

For each fleet in the truck compliance model, staff calculated the costs the fleet would normally spend without the regulation over the period of 2011 to 2025. These costs are referred to as a fleet's baseline costs, and depend upon a fleet's average age, the replacement vehicle age and the calculated normal turnover rate. Once the baseline cost for a fleet was determined, a compliance cost was then calculated, based on a fleet's anticipated compliance path over the same time period. The difference between a fleet's baseline cost, and a fleet's compliance cost is the cost attributed to the regulation. Annual costs for reporting, PM filter maintenance, and the estimated effect of credits were calculated and added into the overall cost estimate separately. More information on the vehicle and retrofit costs used to calculate a fleet's baseline cost and compliance costs are in Appendix I.

2. Estimated Costs for Amended Truck and Bus Regulation

As compared to the current regulation, the proposed amendments would reduce compliance costs for all affected fleets by:

- Reducing the number of required retrofits
- Providing a longer period of time for retrofitted trucks to operate before having to upgrade to a 2010 MY engine or equivalent.

- Delaying truck replacements substantially
- Extending credits for early retirement and alternative-fueled and hybrid trucks.

Table VII-1 provides a comparison of what actions would be required with the existing regulation for all in-state registered trucks with a GVWR greater than 14,000 pounds in comparison to the proposed amendments without any compliance credits.

Table VII-1: Comparison of 2014 Actions Required (Percentage of Trucks)

Action	Proposed Amendments	Existing Regulation
Early Replacements	0%	28%
PM Retrofit Filters	28%	30%
Business as Usual	72%	42%
Total	100%	100%

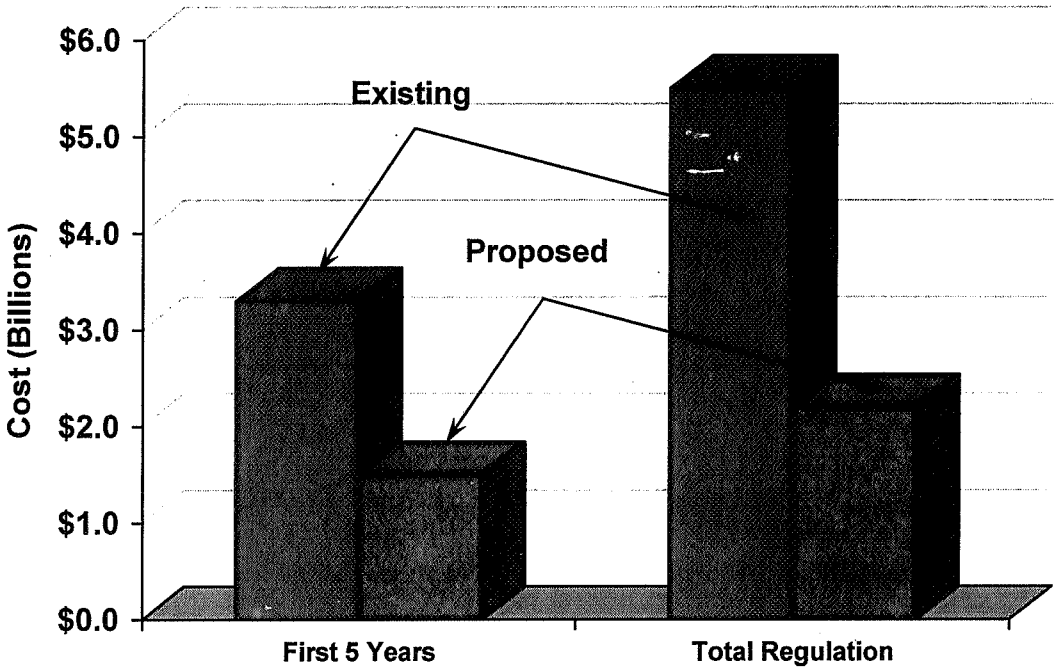
As is shown in Table VII-1, prior to 2015, the existing regulation would require 28 percent of the vehicles to be replaced early, compared to the proposed amendments that would not require any vehicle to be replaced early. Both the existing regulation and proposed amendments would require retrofit PM filters on about 30 percent of all trucks with a GVWR greater than 14,000 pounds. However, the proposed amendments would exempt lighter trucks (less that 26,001 pounds GVWR), representing about 30 percent of the total population, from meeting the PM filter requirements. Cumulatively, nearly 75 percent of the trucks would be replaced as normal and would remain compliant with the proposed amendments, as compared to just over 40 percent with the current regulation.

Overall, the estimated costs of the Truck and Bus regulation would be reduced substantially. The net investments required in the first five years would be reduced from $3.3 billion to about $1.5 billion, a reduction of more than 50 percent. For the life of the regulation the overall cost would be reduced by about 60 percent - from $5.5 billion to about $2.2 billion. Average costs for businesses such as local contractors, retailers and local moving companies, would be reduced by 70 percent, with nearly all of the costs being eliminated entirely for thousands of small businesses with lighter trucks. Figure VII-1 shows how the average statewide costs of the regulation would decline compared to the original estimates for the current regulation.

While businesses in the transportation sector would experience substantial cost savings, the amount of savings could vary significantly. For example, a long haul truckload carrier that replaces its fleet within a 7-year cycle would continue to have no costs attributable to the regulation. A less than truckload carrier that replaces the fleet within an 8 year cycle would have no costs other than one year of reporting with the proposed amendments instead of having to install PM filters on 10 percent of the fleet with the existing regulation. This would be a greater than 90 percent cost savings. Fleets that replace their trucks within a 10-year cycle would need to install PM filters on 10 percent of their trucks with the proposed amendments instead of 20 percent of their

trucks as is currently required in the existing regulation which would be a 50 percent cost savings.

Figure VII-1: Cost of Proposed Truck and Bus Regulation Down Substantially



Additionally, as can be seen in Table VII-2, the overall cost effectiveness of the proposed regulation with the updated inventory would be improved slightly to $1.70 per pound of NOx reduced and $44 per pound of PM reduced. This compares to the cost effectiveness of the existing regulation originally estimated at $1.76 per pound of NOx reduced and $46 per pound of PM reduced.

Table VII-2: Cost Effectiveness Ratio Comparison

Emission Reductions	Proposed Amendments	Current Regulation
NOx ($/lb)	$1.70	$1.76
PM ($/lb)	$44.20	$46.00

Although the proposed amendments achieve fewer emissions benefits than the current regulation, overall cost effectiveness for both NOx and PM has improved. This is largely due to the fact that 150,000 lighter vehicles would no longer need to be retrofit and tend to have relatively low miles and represent a small proportion of the emissions. Also, for heavier vehicles, fleets may now retrofit a vehicle without needing to replace it early, and older vehicles would not need to have PM retrofits and could be replaced with a new or used replacement one time. With the proposed changes, fewer vehicles would need to be retrofit and then replaced early. Only 3 percent of trucks are older than 20

years old. The methodology used to calculate cost effectiveness is the same as described in the TSD for the original truck and bus regulation rulemaking (ARB, 2008a).

The proposed amendments would not impose any additional costs on small businesses, and in fact should result in small businesses, many of them small fleets, being able to spread out the compliances costs over a longer period of time, thus, lowering their average yearly compliance costs.

The proposed amendments would also provide expanded credits for early retrofits and reduce the requirements for fleet that have downsized. The proposed changes would also provide fleets with additional credits and economic relief by changing the baseline year for vehicle retirement credits from 2008 to 2006, by allowing non-operational vehicles to count as retired, and extending the credit period for vehicle retirement from 2014 to 2017.

3. Costs Analysis for Individual Fleets

Although the overall economy for trucks is down about twenty percent on average, some fleets and sectors are more affected than others. Staff collected survey data from fleets and analyzed the savings expected from the proposed amendments for some individual fleets.

a) Moving Company

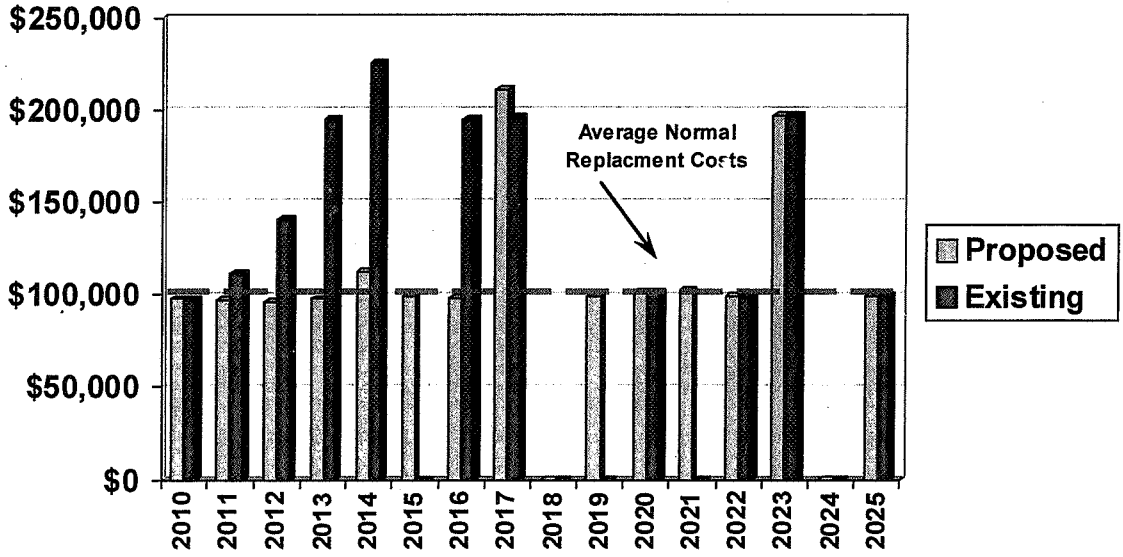
The following company is an actual moving fleet with 14 trucks, seven of which are heavier trucks (more than 26,000 pounds GVWR) and the others are lighter trucks (less than 26,001 pounds GVWR). The engine model years for the trucks range from 1996 to 2007. The fleet has downsized 30 percent since 2006 and typically will replace one truck per year at a cost of about $94,000 after trade-in. Staff assumed the annual revenue of this company for 2010 would remain the same as in 2009. From 2006 to 2010 the average annual revenue was about $4.9 million.

The existing regulation would require the fleet to install six retrofit PM filters and to replace eight trucks one to two years earlier than normal. The fleet's total costs with the existing regulation above normal replacement costs from 2010 to 2025 would be $160,000 (2010 dollars).

With the proposed amendments the fleet would need to install two retrofit PM filters and replace two trucks one year early. Figure VII-2 shows the annual expenditures the company would make in current dollars with the proposed amendments compared to the existing regulation. The average normal replacement costs are shown by the dashed line. With the proposed amendments, the fleet's total compliance costs would be reduced to about $74,000 above normal replacement costs, or 55 percent lower than with the current regulation. More importantly the proposed amendment would impose no additional costs other than business as usual for this fleet until 2014, in part, because of the credits for downsizing. By January 1, 2014, the fleet would need to

install one PM filter on an existing truck. The cost to comply would represent about 0.15 percent of annual revenue.

Figure VII-2: Moving Company Annual Rule Costs vs. Normal Replacement Costs



b) Concrete Company

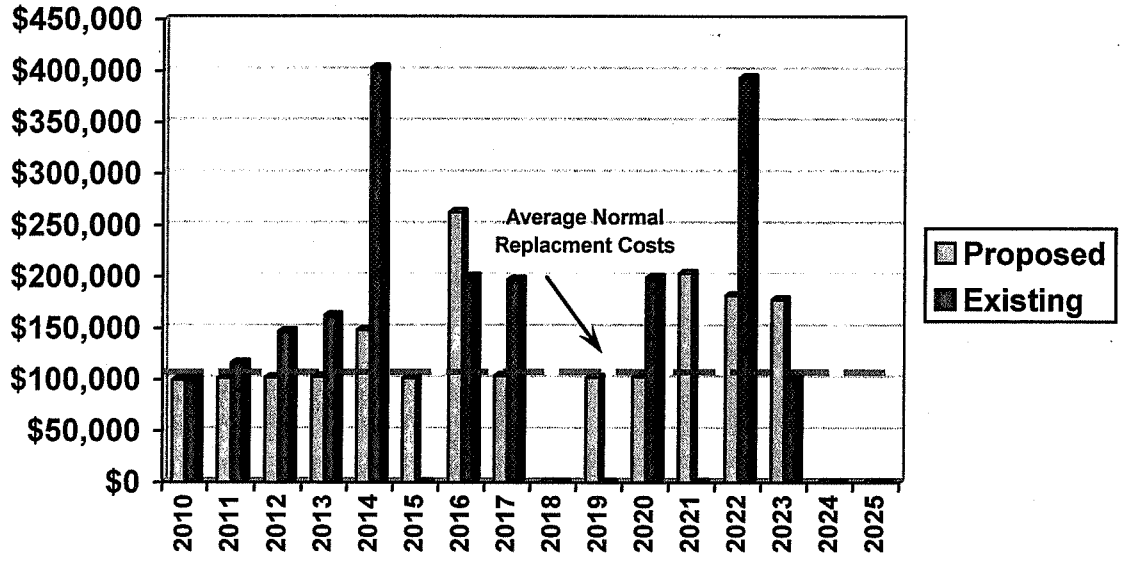
Staff also evaluated the impact of the proposed amendments for an actual concrete company. The concrete company has 18 trucks with engine model years ranging from 1994 to 2007, all of which are heavier trucks with a GVWR greater than 26,000 pounds. The company has annual revenues above $3,000,000. The fleet has the same number of trucks as it did in 2006, but it has not been operating six of the trucks. Therefore, the fleet could utilize a 33 percent economic relief credit (six out of 18 trucks). The fleet typically replaces one truck per year at a cost of about $103,000 per year after trade-in. Staff assumed the annual revenue of this company for 2010 would remain the same as in 2009. From 2006 to 2010 the average annual revenue was about $6.5 million.

The existing regulation would require the fleet to install eight retrofit PM filters and to replace 14 trucks one to six years earlier than normal. With the existing regulation, the fleet's cumulative compliance costs from 2010 to 2025 are expected to be $440,000 (2010 dollars) above normal replacement costs.

With the proposed amendments, the fleet would be expected to install seven retrofit PM filters and to replace nine trucks early. Figure VII-3 shows the annual expenditures the company would make in current dollars with the proposed amendments compared to the existing regulation. One truck is replaced one year early in 2016 because the fleet would not be expected to install a PM filter on a truck that would normally be replaced in one year. Most of the early replacements occur from 2021 to 2023. With the proposed amendments, the fleet's cumulative compliance costs from 2010 to 2025 would be reduced to about $230,000 above normal replacement costs or about 50 percent lower

than with the current regulation. More importantly the amended regulation would impose no costs for this fleet until 2014 when three PM filters would be required compared to substantially higher costs with the existing regulation. In 2016, one more truck than normal was replaced 2 years early and reflects that a fleet would not be likely to install a retrofit PM filter on a truck that was about to be replaced.

Figure VII-3: Concrete Company Rule vs Normal Replacement Costs



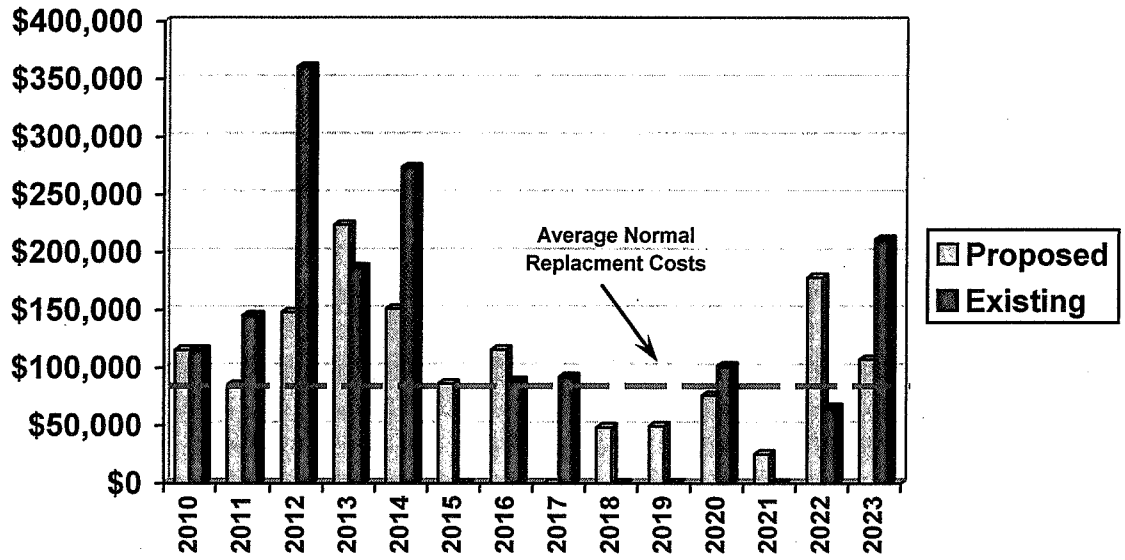
c) Transportation Company

The following company is an actual freight transportation fleet, primarily a truckload carrier, with 33 truck tractors (GVWR greater than 26,000 pounds). The engine model years range from 1990 to 2009. Staff assumed the annual revenue of this company for 2010 would remain the same as in 2009. From 2006 to 2010 the average annual revenue was about $5.5 million. The fleet did not provide information about the number of trucks in 2006; therefore, staff did not assume the fleet size declined and no economic relief credits for downsizing would apply in this example. The fleet typically replaces two trucks per year with used trucks that are three years old at a cost of less than $45,000 per truck after trade-in.

The existing regulation would require the fleet to install 14 retrofit PM filters and to replace 27 trucks one to six years earlier than normal. The cost increase in 2010 reflects that the fleet would purchase a newer truck than normal that is originally equipped with a PM filter. The fleet would be expected to replace some trucks early in planning to meet future NOx reduction requirements while reducing the number of retrofit PM filters. The fleet's total costs to comply with the existing regulation from 2010 to 2025 would be $410,000 (2010 dollars) above normal replacement costs with the highest capital investments required 2012 to 2014.

With the proposed amendments the fleet would be expected install 16 retrofit PM filters and to change the order in which the older trucks are replaced. Figure VII-4 shows the annual expenditures the company would make in current dollars with the proposed amendments compared to the existing regulation. The fleet would continue to replace two trucks per year until 2016 when the fleet would need to replace four trucks. In 2022 and 2023 the fleet would need to replace 11 trucks early. With the proposed amendments, the fleet's total compliance costs would be reduced to about $185,000 above normal replacement costs, or 55 percent lower than with the current regulation. The capital investments required from 2010 to 2015 would be about 50 percent lower. The cost increase in 2010 reflects that the fleet has begun to purchase newer trucks than normal that are originally equipped with a PM filter. The average normal replacement costs are shown by the dashed line. The cost to comply with the proposed amendments would represent about 0.3 percent of annual revenue.

Figure VII-4: Freight Company Annual Rule Costs vs. Normal Replacement Costs



4. Financial Feasibility for Individual Fleets

Staff is continuing to evaluate the potential impacts on actual individual fleets and industries subject to the regulation. Towards this end, staff plans to present additional economic information regarding cash flow analyses, access to capital, and fleets' "ability to pay" to comply with the revised regulation as part of the December 2010 Board hearing.

5. Specific Impacts of Proposed Amendments

For the next decade the proposed amendments would only require modernization of engines that are 20 years old or older, and would exempt about 150,000 lighter trucks (less than 26,001 pounds GVWR) from meeting the PM filter requirements. In addition,

the proposed amendments would reduce costs for fleets with heavier trucks (GVWR greater than 26,000 pounds) by extending the allowable period of retrofit PM filter use from four years to eight years and, until 2020, would limit truck replacements to only those that have 20 year old or older engines, rather than requiring replacements for trucks with engines as new as 12 years old. Below is a description of the significant proposed amendments that have the largest potential for cost savings.

a) Requirements for Lighter Vehicles

Lighter vehicles with a GVWR 26,000 pounds or less would now be exempt from meeting the PM BACT requirements and only vehicles with engines that are 20 years old or older would need to be replaced from 2015 to 2020 with a 2010 model year engines or having equivalent emissions. This change would eliminate the PM filter requirements for about 150,000 lighter trucks and most or all of the costs for up to 75,000 companies and small businesses with lighter trucks such as plumbers, electricians, general contractors, local moving companies, parts suppliers, retail and wholesale stores, equipment and supply manufacturers and services providers. Additionally, no reporting would be required. The savings attributable to this change in requirements for lighter trucks is nearly $1 billion

b) BACT Compliance Schedule for Heavier Trucks

The amendments to the existing BACT compliance schedule would now apply only to heavier trucks (GVWR greater than 26,000 pounds) with fleets meeting the requirements of the schedule still not needing to report. The PM requirements would be delayed one year and would only apply to 1998 and newer model years, while at the same time applying to fewer vehicles. The replacement requirements would start two years later, in 2015, but would only apply to vehicles having 20 year old engines rather than 12 year old engines. This change would allow most vehicles that would be required to have retrofit PM filters to be able to operate their full useful lives.

Staff's proposal would also allow 1997 and older model year engines to be replaced when 20 years old or older rather than be retrofit with PM filters. With this change, fleets with older trucks would be able to operate their vehicles most or all of their useful lives without any regulatory costs and would have a better opportunity to buy used replacement trucks that meet the final requirements. The overall cost savings for changing the BACT compliance schedule is about $2.3 billion.

c) Phase-in Option for Small Fleets

This optional compliance schedule for small fleets with one to three vehicles would begin January 1, 2014 but would eliminate the requirement that the fleet upgrade to a 2004 model year or newer engine prior to installing a PM retrofit. Instead, starting January 1, 2014, small fleets would need to demonstrate one vehicle per year is equipped with a PM filter, whether it is a retrofit or originally equipped. Fleets that already have a truck originally equipped with a PM filter could delay the installation of a retrofit on the second vehicle. Small fleets would no longer need to bring more than one vehicle into compliance in a single year and could spread out their costs. Delaying the

PM requirements for the second and third vehicle until 2015 and 2016 respectively also provides small fleets the ability to replace existing vehicles with less expensive used vehicles that meet the final requirement or are already equipped with PM filters. Most of the cost savings for small fleets comes from delaying truck replacements already described as part of the changes to the BACT compliance schedule. The savings attributable to this phase-in option are primarily from delayed compliance for the second or third truck.

d) Phase-in Option for Large Fleets

The phase in option would require a fleet to increase the number of PM filters on their vehicles by 30 percent each year from 2012 to 2014, and by 2016 the remaining 10 percent of the fleet would need to meet the overall BACT schedule requirements. This option would allow fleets to decide the order in which vehicles would be retrofit and replaced, regardless of their age. This would provide additional flexibility to fleets so they may be able to keep older, more expensive or specialized vehicles in their fleet longer than would be allowed with the BACT schedule.

Another change with this option would be to allow fleets with both drayage and non-drayage trucks to include all their vehicles in the phase-in option. This change would allow fleets that go to the ports or intermodal rail yards infrequently to count their cleaner vehicles in determining compliance and could lower the compliance costs for mixed fleets and provide more flexibility for fleets.

e) Economic Relief for Fleets that have Reduced their Fleet Size

This provision would offers economic relief for fleets that have reduced their fleet size since 2006. The credit would reduce the annual requirements for fleets most affected by the recession until January 1, 2016. With this proposal, a fleet would be able to reduce its clean-up requirement in a compliance year by subtracting the percentage that the fleet has downsized from the annual requirement. A fleet that has 30 percent fewer trucks operating would be able to treat three out of ten trucks as compliant until 2016 and would effectively defer the compliance requirements for the entire fleet by 1 year until 2016. The capital investments required in the first five years would be reduced by about 30 percent. A fleet that has downsized by 50 percent would reduce the capital investments required in the first five years by 50 percent.

B. Effects of Amendments to the Drayage Truck Regulation

Similarly, aligning the requirements of the Drayage Truck regulation with the proposed amendments to the Truck and Bus regulation would lower costs for drayage truck operators by extending the useful life of their already retrofitted trucks an additional six years and by eliminating the requirement to modernize to a truck with a 2007 model year engine or newer.

The change to expand the definition of drayage trucks to include class seven tractors would also lower costs for some fleets. The existing Truck and Bus regulation already requires PM filters on all trucks by 2014 and requires most to have 2004 or newer

engines. The inclusion of class 7 tractors would keep the PM requirements in place, but would eliminate the requirement to modernize to a truck with a cleaner engine.

While trucks serving the Ports of Long Beach and the Port of Los Angeles already have 2007 model year engines or newer through the Clean Ports Program, only about 23 percent of the 4,200 drayage trucks outside the South Coast are expected to have 2007 and newer engines by 2014. Staff estimates that the proposed amendment eliminating the requirement to upgrade to the 2007 engine by 2014 would save the owners of the remaining 77 percent of pre-2007 model year trucks about $29 million in replacement costs by reducing the reporting and record keeping period for drayage trucks from 10 years to seven years and would result in approximately $13 million in savings for the 18,000 truck owners ($270 yearly saving per truck) and the 1,800 motor carriers ($4,700 yearly savings per motor carrier) subject to the regulation.

C. Effects of Amendments to the Tractor-Trailer GHG regulation

Most of the proposed amendments to the Tractor-Trailer GHG regulation are intended to provide additional flexibility to fleets, but are not expected to have a major impact in the average cost of the regulation. However, fleets that elect to utilize the proposed provision to delay compliance with the low rolling resistance tire requirements would not realize the cost savings benefits resulting from the existing regulation. Nevertheless, most of the fleets are expected to utilize fuel efficient tires prior to the proposed compliance date as the existing tire casings reach their natural end of retread life cycle and the tires get replaced with new ones. Thus, the proposed compliance delay with the low rolling resistance tires is expected to not have a significant impact on the overall cost savings and estimated costs of the existing program.

D. Impacts on Incentive Funding

1. Impact of Proposed Amendments on Funding Opportunities

State incentive funding programs play a complementary role to the state's regulatory emission reduction programs to help meet the state's SIP requirements and achieve California's air quality goals. ARB's portfolio of incentive funding and loan assistance programs includes the Carl Moyer Program, the Goods Movement Emission Reduction Program, Lower Emission School Bus Program, and the AB118 Air Quality Improvement Program.

Funding is currently available for truck and bus replacement, retrofits, and repowering that provide early or extra reductions to the regulatory requirements. Eligibility depends on several factors, including fleet size, vocation, and the type of vehicle and reduced emission technology. The regulation compliance deadlines affect eligibility by defining the end of the surplus emission reduction period. In addition, each funding program must be consistent with statutory requirements that vary by program.

In general, the proposed regulatory changes should enable greater funding opportunities by allowing more time for applicants to apply for funding before compliance dates. Staff will present a summary of potential incentive impacts when the

Board considers regulatory changes in December. Staff plans to propose incentive program revisions that reflect the Board's action and direction with other funding program changes at a later date, with revisions to funding opportunities for the Carl Moyer Program already planed for next year.

Many federal and state programs are administered by local agencies, so vehicle owners should check with their local air quality management district for funding opportunities. Some vehicles may have their own specially funded programs based on type and use. In addition, funding may be available for technologies such as zero-emission and hybrid vehicles that achieve emission reductions beyond those required by regulation.

2. Access to Funding for Vehicle Owners

Interested vehicle owners can obtain more information on funding and compliance by using any of ARB's outreach tools including the Truck Stop website at www.arb.ca.gov/truckstop, the phone hotline at 866-6DIESEL (866-634-3735), or the email address at 8666diesel@arb.ca.gov.

VIII. ALTERNATIVES CONSIDERED

This chapter discusses alternatives to the proposed amendments to the Truck and Bus, Tractor-Trailer GHG, and Drayage Truck regulations.

A. Alternatives Considered to the Truck and Bus Regulation

Staff considered a number of alternatives instead of the proposed amendments. These included making no changes to the regulation, simply modifying the existing requirements of the regulation, and establishing clean up requirements that varied each year based on economic indicators. Each of these alternatives was rejected in favor of staff's proposed amendments.

1. Make No Changes to Regulation

The current regulation requires 50 percent of trucks to be replaced with 2010 engines to achieve substantial NOx emissions reductions originally expected to be needed to meet the 2014 PM2.5 federal attainment deadline, and also requires that 100 percent of the in-use fleet have PM filters. Staff rejected this proposal for the following reasons:

- The downturn in the economy has resulted in lower emissions than previously anticipated, thereby reducing the overall amount of NOx and PM reductions needed by 2014. By not changing the existing regulation, this proposal would compel fleets to take actions to achieve emission reductions that are not necessary to meet NAAQS or the SIP.
- This proposal would provide no economic relief to fleets, and does not meet the Board's direction to staff.
- This proposal would not reduce the overall complexity of the regulation, as opposed to staff's proposed amendments which would make the regulation substantially more straightforward to understand.

2. Simply Modify the Existing Requirements of the Regulation

Staff considered several alternatives that retained the existing structure of the regulation (including all three existing compliance options), but modified the amount of actions fleets would have to take each year.

a) Change existing BACT and Percent Turnover Rates

Staff considered retaining the existing structure of the regulation and modifying the annual compliance requirements for all three compliance options. However, because substantial NOx reductions are no longer required by 2014, the structure set up to give fleets flexibility to meet NOx and PM requirements at the same time is no longer needed. This alternative would not decrease the current complexity of the regulation.

b) Establish Reduced Requirements for Medium Fleets (4 to 20 Vehicles)

Staff considered a provision for fleets with less than 40 vehicles that would have allowed a one to two year deferral to provide immediate near-term economic relief, but

still had all fleets meet the current 2014 requirements. Staff rejected this alternative because it would have resulted in high peak year costs and higher overall costs, as these fleets would have had to compress all of their retrofits and turnover of 50 percent of their fleet in only two years (2013 and 2014). Staff does not believe that this alternative provides substantial economic relief when compared to the proposed amendments, as staff's proposal spreads out the costs, decreases peak year costs, and provides additional credits for fleets. Also, this alternative would not decrease the current complexity of the regulation.

c) Two Year Delay of the Regulation for All Fleets

Staff considered a full two year delay of the current regulation for all fleets. Staff rejected this alternative because a two year delay of all requirements would fail to meet the State's overall SIP targets by 2014 and would still require a substantial number of vehicle replacements by 2016.

3. Establish Requirements that Vary by Economic Indicators

Staff evaluated the feasibility of modifying the regulation such that its requirements would vary based in response to specific economic indicators such as the State's gross domestic product (GDP), unemployment rate, earnings, the consumer price index, and/or housing starts. As the selected indicators change, the regulatory requirements would change in response.

This alternative was rejected for two reasons. First, there is no single indicator that adequately represents all business sectors or business sizes. The use of any selected indicator would either be an advantage to certain sectors over others or could unfairly benefit businesses of a certain size over other sizes. In addition, linking regulatory requirements to economic indicators creates significant uncertainty in the planning process for affected fleets and businesses and would make it more difficult to get approvals to make the needed investments in a timely fashion.

Most economic indicators are not publicly available for 3 to 6 months; therefore, it would be difficult to inform fleets of any changes to the compliance requirements in time for them to adjust their compliance plans. Fleets would be placed in an awkward situation where those who wait to make the needed investments would have an advantage over those who plan ahead and later learn the action taken was not needed. If the requirement is not reduced as expected, then fleets that did not make the needed investments early would have a difficult time getting into compliance on time. Without sufficient notice and the ability to project future expenses, strategic planning for compliance would no longer be feasible to affected fleets. If the economic indictor was used to adjust a compliance requirement at least one year after the data was made available to allow fleets time to plan for the needed expenditures, the requirements would substantially lag behind the indicator and the requirements would be less stringent than needed during a recovery period and would be more stringent after a peak when economic relief would be needed the most.

B. Alternatives Considered to the Drayage Truck Regulation

Staff analyzed and ultimately rejected two alternatives to the proposed amendments to the Drayage Truck regulation. The first alternative considered was to make no changes to the regulation. The second alternative considered was to delay the Phase 2 requirements in the current regulation by only two years, until December 31, 2015.

1. Make No Changes to the Regulation

Drayage trucks are required to comply with the current Phase 1 retrofit requirements for a level 3 PM filter, as well as ultimately upgrade their vehicles to one having a 2007 model year or later engine by 2014. However, the downturn in the economy has resulted in lower emissions from drayage trucks than previously anticipated. As such, economic relief can be provided to drayage truck operators while still maintaining the localized diesel PM reductions of the regulation and meeting applicable SIP targets.

Because this alternative would not provide any economic relief to fleets affected by the recession, and would exceed the emission reductions needed to meet applicable SIP targets, staff does not believe this alternative is consistent with the Board's direction. Therefore, this alternative was rejected.

2. Delay Phase 2 Requirements 2 years

This alternative would delay the Phase 2 regulatory requirements by two years. This would result in slightly lower overall costs for the regulation, as fleets' anticipated costs to meet the Phase 2 requirements would simply be shifted back by two years to January 1, 2016. While not significant, this reduction in costs would be due to both a delay in the regulatory requirements by two years, as well as due to the fact that compliant trucks would be two years older (and slightly less expensive to buy by 2016 rather than by 2014). Staff estimates that the proposed changes to the regulation will provide a 30 percent greater cost savings than this alternative. Therefore, this two year postponement option would provide less economic relief to drayage truck operators compared to the economic relief from staff's proposed changes. Therefore, this alternative was rejected.

C. Alternatives Considered to the Tractor-Trailer GHG Regulation

The only alternative considered by staff was to not amend the Tractor-Trailer GHG regulation. This alternative was rejected in part because it would not provide any additional flexibility to fleets that either missed the optional large fleet compliance phase-in registration date or needed to amend their compliance plans. In addition, making no changes to the regulation would not provide trailer fleets with guidance regarding which aerodynamic equipment modifications would or would not comply with the Tractor-Trailer GHG regulation. Finally, making no changes to the regulation could result in a significant financial burden on the owners of specific types of trailers, (e.g. storage trailers and local-haul trailers) without any corresponding GHG emission benefits.

IX. REFERENCES

ARB, 2000. California Air Resources Board. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.* October 2000.
http://www.arb.ca.gov/diesel/documents/rrpapp.htm

ARB, 2007. California Air Resources Board. *Expanded Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration.* October 2007.
http://www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf

ARB, 2008a California Air Resources Board. *Climate Change Scoping Plan Appendices. Volume I: Supporting Documents and Measure Detail, Appendix C.* Sacramento: October 2008.
http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm

ARB, 2008b. California Air Resources Board. *Technical Support Document: Proposed Regulation for In-Use On-Road Diesel Vehicles.* October 2008.
http://www.arb.ca.gov/regact/2008/truckbus08/tsd.pdf

ARB, 2008c. California Air Resources Board. *Initial Statement of Reasons for Proposed Rulemaking: Proposed Regulation for In-Use On-Road Diesel Vehicles.* October 2008.
http://www.arb.ca.gov/regact/2008/truckbus08/tbisor.pdf

ARB, 2009a, California Air Resources Board. *The Effect of the Recession on Trucking Emissions.* Presentation at the Board Hearing, December 9, 2009.
http://www.arb.ca.gov/board/books/2009/120909/09-10-8pres.pdf

ARB, 2009b. California Air Resources Board. *The California Almanac of Emissions and Air Quality.* 2009 Edition.
http://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm

ARB, 2010a. California Air Resources Board. *Estimate of Premature Deaths Associated with Fine Particle Pollution (PM2.5) in California Using a U.S. Environmental Protection Agency Methodology.* August 2010.
http://www.arb.ca.gov/research/health/pm-mort/pm-report_2010.pdf

ARB, 2010b. California Air Resources Board. *Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and Off-Road Large Spark Ignition Engine Fleet Requirements.* October 2010.

Chow et al., 2010. Chow J.C.; Watson J.G.; Lowenthal D.H.; Chen L.W.; Motallebi N., (2010). *Black and organic carbon emission inventories: review and application to California.* J. Air Waite Manag Assoc. Apr;60(4):497-507.

Hadley et al., 2010. Hadley, O. L.; Corrigan, C. E.; Kirchstetter, T. W.; Cliff, S. S.; and Ramanathan, V. (2010). *Measured black carbon deposition on the Sierra Nevada snow pack and implication for snow pack retreat*, Atmos. Chem. Phys., 10, 7505-7513.

Hansen et al., 2007. Hansen, J.; Sato, M.; Kharecha, P.; Russell, G.; Lea, D. W.; Siddall, M. (2007). *Climate change and trace gases.* Philos. Trans. R. Soc. London, Ser. A., 365 (1856), 1925–1954.

Krewski et al., 2009. Krewski D.; Jerrett M.; Burnett R.T.; Ma R.; Hughes E.; Shi Y.; Turner M.C.; Pope C.A. III; Thurston G.; Calle E.E.; Thun M.J. 2009. *Extended Follow-Up and Spatial Analysis of the American Cancer Society Study Linking Particulate Air Pollution and Mortality.* HEI Research Report 140. Health Effects Institute, Boston, MA.

Núñez, 2006. (Núñez, Chapter 488, Statutes of 2006) *California Global Warming Solutions Act of 2006.* September 27, 2006. http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf

Ramanathan, V.; Carmichael, G. (2008). *Global and regional climate changes due to black carbon.* Nature Geoscience 156, 221-227.

U.S. EPA, 2009. U.S. Environmental Protection Agency. *Integrated Science Assessment for PM (Final Report).* http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_isa.html

U.S. EPA, 2010. U.S. Environmental Protection Agency. *Quantitative Health Risk Assessment for Particulate Matter - Final Report.* http://www.epa.gov/ttnnaaqs/standards/pm/s_pm_2007_risk.html

Appendix A

Proposed Regulation Order
Amendments to the Regulation for In-Use On-Road Diesel Vehicles

PROPOSED REGULATION ORDER

REGULATION TO REDUCE EMISSIONS OF DIESEL PARTICULATE MATTER, OXIDES OF NITROGEN AND OTHER CRITERIA POLLUTANTS FROM IN-USE ON-ROAD DIESEL-FUELED VEHICLES

Note: Proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions, compared to the preexisting regulatory language.

Amend section 2025, title 13, California Code of Regulations to read as follows.

Section 2025. Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants, from In-Use Heavy-Duty Diesel-Fueled Vehicles

(a) *Purpose.*

The purpose of this regulation is to reduce emissions of diesel particulate matter (PM), oxides of nitrogen (NOx) and other criteria pollutants~~, and greenhouse gases~~ from in-use diesel-fueled vehicles.

(b) *Scope and Applicability.*

~~(1)~~

Except as provided in subsection (c), this regulation applies to any person, business, federal government agency, school district or school transportation provider that owns or operates, leases, or rents, affected vehicles that operate in California. The regulation also applies to persons that sell affected vehicles in California. Affected vehicles are those that operate on diesel-fuel, dual-fuel, or alternative diesel-fuel that are registered to be driven on public highways, were originally designed to be driven on public highways whether or not they are registered, yard trucks with on-road or off-road engines, both engines of two engine sweepers, schoolbuses, and have a manufacturer's gross vehicle weight rating (GVWR) greater than 14,000 pounds. ~~Affected vehicles also include shuttle vehicles defined in section 2025(d)(68).~~

(c) *Exemptions*

This regulation does not apply to:

(1) Vehicles subject to the solid waste collection vehicle rule commencing with title 13, CCR, section 2021;

(2) On-road diesel-fueled heavy-duty vehicles ~~over~~greater than 14,000 pounds owned or operated by a municipality, as defined in title 13, section 2020(b), that comply with the Best Available Control Technology (BACT) requirements of title 13, CCR section 2022.1(a)(1);

(3) Vehicles subject to the fleet rule for public transit agencies commencing with title 13, CCR, section 2023;

(4) Vehicles subject to the rule for mobile cargo handling equipment at ports and intermodal rail yards commencing with title 13, CCR, section 2479;

(5) Military tactical support vehicles, as described in title 13, CCR, section 1905;

(6) Authorized emergency vehicles as described in California Vehicle Code (Veh. Code), section 165;

(7) Off-road vehicles subject to title 13, CCR, sections 2401, 2411, 2421, 2432, and 2449;

(8) Dedicated snow-removal vehicles as defined in section 2025(d)~~(18)~~(15);

(9) Two-engine cranes as defined in title 13, CCR, section 2449(c)(56);

(10) Historic vehicles as defined in section 2025(d)~~(41)~~(36);

(11) Motor homes for non-commercial private use;

(12) Except as specified in section 2025(l) v~~V~~ehicles subject to the regulation for drayage trucks commencing with title 13, CCR, section 2027 until January 1, 202~~1~~17; ~~and~~

(13) Trucks with a GVWR of 19,500 pounds or less with a ~~riginally equipped~~ pick-up bed~~s~~ used exclusively for personal ~~use~~, non-commercial, or non-governmental use~~.~~;

(14) Two-engine water well drilling rigs as defined in title 13, CCR, section 2449(c)(57); and

(15) Except school buses with a GVWR greater than 14,000 lbs manufactured before April 1, 1977, school buses as defined in the California Veh. Code, section 545, with a GVWR less than 26,001 lbs.

(d) *Definitions*

For purposes of this regulation, the following definitions apply:

~~(1) "2004 Model Year NOx Emissions Equivalent" means emissions from:~~

~~(A) An engine certified to the 2003 or prior model year heavy duty diesel engine emission standard that was built to 2004 engine emission stands ds and was not used in any manufacturer's averaging, banking and trading pr ram.~~

~~(B) A pre-2004 model year heavy duty diesel engine that is equipped with a verified diesel emissions control strategy (VDECS) that reduces NOx exhaust emissions by at least 55 percent.~~

(1) "2006 *Baseline Fleet*" means on-road diesel-fueled heavy-duty vehicles greater then 26,000 pounds GVWR included in the scope of section 2025(b) that were owned by a fleet and registered to operate in California on October 1, 2006 with the California Department of Motor Vehicles, or were owned by a fleet, registered to operate on October 1, 2006 in a jurisdiction that is an International Registration

Plan member, and were driven at least 1,000 miles in California in the calendar year 2006. All vehicles in the scope and applicability section 2025(b) must be included and all vehicles exempt from the regulation in the exemptions section 2025(c) must be excluded.

~~(3) *2008 Baseline Fleet*" means the motor vehicles that were owned by the fleet, registered with California's department of motor vehicles or registered in the home jurisdiction of one of the International Registration Plan member jurisdictions on July 1, 2008, and were driven at least 1,000 miles in the year 2008 in California.~~

(2) "*2007 Model Year ~~NOx~~ Emissions Equivalent*" means emissions from:

(A) An engine as specified below that is equipped with the highest level VDECS that reduces PM emissions and reduces NOx exhaust emissions by at least 40 percent.

1. An engine certified to the 2004 through 2006 model year heavy-duty diesel engine emissions standard; or

2. An engine that was built to the 2004 engine emission standard and was not used in any manufacturer's averaging, banking, or trading program.

~~(A) An engine certified to the 2003 or prior model year heavy-duty diesel engine emissions standard that is equipped with a VDECS that reduces NOx exhaust emissions by at least 70 percent; or~~

(B) An engine certified to the 2004 through 2006 model year heavy-duty diesel engine emissions standard or was built to the 2004 engine emission standard and was not used in any manufacturer's averaging, banking, or trading program that is equipped with a the highest level VDECS that reduces PM emissions and reduces NOx exhaust emissions by at least 40 percent; or

~~(C) A 2004 model year NOx emissions equivalent heavy-duty diesel engine, as defined in section 2025(d)(1)(A), that is equipped with a VDECS that reduces NOx exhaust emissions by at least 40 percent.~~

~~(D)~~(C) An engine certified to the 2007-2009 model year heavy-duty engine emissions standard.

~~(4)~~(3) "*2010* Model *Year ~~NOx~~ Emissions Equivalent*" means emissions from:

(A) An engine as specified below that is equipped with the highest level VDECS that reduces PM emissions and reduces NOx exhaust emissions by at least 85 percent.

1. An engine certified to the 2004 through 2006 model year heavy-duty diesel engine emissions standard; or

2. An engine that was built to the 2004 engine emission standard and was not used in any manufacturer's averaging, banking, or trading program.

~~(A) An engine certified to the 2004 model year heavy-duty diesel engine emissions standard that is equipped with a VDECS that reduces NOx exhaust emissions by more than 85 percent; or~~

(B) An engine certified to the 2007 model year heavy-duty diesel engine emissions standard that meets PM BACT and ~~that~~ is equipped with a VDECS that reduces NOx exhaust emissions by more than 70 percent; or

(C) An engine certified to the 2010 model year or newer heavy-duty diesel engine emissions standard; or

(D) A heavy-duty engine certified to 0.2 g/bhp-hr or less NOx emissions level and 0.01 g/bhp-hr or less PM emissions level; or

(E) An off-road engine certified to the Tier 4 Final engine emissions standard.

~~(5)~~(4) "*Agricultural Operations*" means:

(A) The activity of growing or harvesting crops for the primary purpose of making a profit or providing a livelihood including any horticultural, viticultural, aquacultural, forestry, dairy, livestock, poultry, bee or farm product. Raising plants at nurseries that sell exclusively retail are not included, or

(B) The cutting or removing of timber, other solid wood products, including Christmas trees, and biomass from forestlands for commercial purposes. The services also include all the work incidental thereto, including but not limited to, construction and maintenance of roads, fuel breaks, firebreaks, stream crossings, landings, skid trails, beds for falling trees, fire hazard abatement, and site preparation that involves disturbance of soil or burning of vegetation following forest removal activities. Forest operations include the cutting or removal of trees, tops, limbs and or brush which is processed into lumber and other wood products, and or for landscaping materials, or biomass for electrical power generation. Forest operations do not include conversion of forestlands to other land uses such as residential or commercial developments.

~~(6)~~(5) "*Agricultural Vehicle*" means ~~one of the following types of vehicles~~; a vehicle that can be eligible to utilize the requirements for agricultural vehicles in section 2025(m) and meet one of the definitions of (A) through (E) below. An agricultural vehicle does not include vehicles that do not directly support farming operations such as personal use vehicles, vehicles rented or leased out, or vehicles used in a transportation business.

~~(B)~~(A) A vehicle, or truck-tractor and trailer combination, owned by farming business and used exclusively in any combination of the following ways:

1. in agricultural operations;

2. to transport harvested farm products to the first point of processing;

3. to directly support the farming or forestry operation including supply trucks, cattle trucks, and other vehicles; or

Vehicles meeting this definition do not need to meet the definitions in sections 2025(d)(5)(B), (C), (D), or (E).

(B) A vehicle, or truck-tractor and trailer combination, owned by a bee keeping business and used exclusively transport their own bees.

~~(A)~~(C) A truck, or a truck-tractor and trailer combination, that is required to display a hazardous material placard during delivery and exclusively delivers fertilizer or crop protection chemicals that require placard identification for use in agricultural operations from a distribution center to a farm and back, and is owned by a business holding a valid fertilizer or pest control license.

1. Owners of such vehicles must hold~~;~~:
   a. a valid pest control dealer license issued by the California Department of Pesticide Regulation as required under Food & Agricultural Code, Division 6, Chapter 7, Article 6, Section 12101; or~~;~~
   b. a valid fertilizing materials license issued by the California Department of Food and Agriculture as required under Food & Agricultural Code, Division 7, Chapter 5, Article 4, Section 14591(a). ~~and,~~
2. Such vehicles must exclusively carry products defined under one of the following, and be required to display an appropriate placard, as required by the United States Department of Transportation:
   a. 49 CFR, CHAPTER 1, PART 173.127 (Division 5.1)~~;~~; or
   b. 49 CFR, CHAPTER 1, PART 173.132 (Division 6.1)~~;~~; or
   c. 49 CFR, CHAPTER 1, PART 173.115 Class 2, (Division 2.1, 2.2, and 2.3)~~;~~; or
   d. 49 CFR, CHAPTER 1, PART 173.136 Class 8~~;~~; or
   e. 49 CFR, CHAPTER 1, PART 173.140 Class 9.

~~(B) A vehicle, or truck-tractor and trailer combination, owned by a farming business and used exclusively in agricultural operations, or owned by a beekeeping business used exclusively to transport their own bees. This includes supply trucks, cattle trucks, and other vehicles, but excludes vehicles that do not directly support farming operations such as personal use vehicles, vehicles rented or leased out, or vehicles used in a transportation business.~~

~~(C)~~(D) A truck, or truck-tractor and trailer combination, designed for in-field operations, that is exclusively engaged in agricultural operations on the farm. Examples include truck configurations designed to spread manure, dispense hay, and dispense freestall bedding. It also includes water trucks and trucks designed or modified to be used exclusively for the dusting, spraying, fertilizing, or seeding of crops. Except as allowed in (A) above, trucks, or truck-tractor and trailer combinations that transport any products, materials, personnel, or equipment are excluded.

~~(D)~~(E) A truck, or truck-tractor and trailer combination, including yard trucks, that exclusively transports any unprocessed horticultural, viticultural, aquacultural, forestry, dairy, livestock, poultry, bee or farm products such as raw, unprocessed crops, livestock, fish, or fowl ~~from~~ between the farm and ~~to the~~

where the first point of processing occurs after harvest. Also included are trucks that are used to harvest crops for silage, ~~and~~ trucks that transport unprocessed agricultural materials from forest or farm to a biomass facility.

~~(7)~~(6) *"Alternative Diesel Fuel"* means any fuel used in diesel engines that is not a reformulated diesel fuel as defined in sections 2281 and 2282 of title 13, CCR, and does not require engine or fuel system modifications for the engine to operate, other than minor modifications (e.g., recalibration of the engine fuel control) that may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer-Tropsch fuels, and emulsions of water in diesel fuel. Natural gas is not an alternative diesel fuel. An emission control strategy using a fuel additive will be treated as an alternative diesel fuel based strategy unless:

(A) the additive is supplied to the engine fuel by an on-board dosing mechanism~~,~~; or

(B) the additive is directly mixed into the base fuel inside the fuel tank of the engine~~,~~; or

(C) the additive and base fuel are not mixed until engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.

~~(8)~~(7) "*Alternative Fuel*" means natural gas, propane, ethanol, methanol, ~~gasoline (when used in hybrid electric vehicles only),~~ hydrogen, electricity, fuel cells, or advanced technologies that do not rely on diesel fuel. "Alternative fuel" also means any of these fuels used in combination with each other or in combination with other non-diesel fuels.

~~(9)~~(8) "*Alternative-Fueled Engine*" means an engine that is exclusively fueled with a fuel meeting the definition of alternative fuel.

~~(10)~~(9) *"Authorized Emergency Vehicle"* has the same meaning as California Vehicle Code section 165.

~~(11) *"Best Available Control Technology BACT Standard"* (BACT) means the exhaust PM and NOx standards that must be met according to the requirements of section 2025(f) and 2025(g).~~

~~(12)~~(10) *"California Based Broker"* means a person, with operations based in California, who, for compensation, arranges or offers to arrange the transportation of property by an authorized motor carrier. A motor carrier, or person who is an employee or bona fide agent of a carrier, is not a broker when it arranges or offers to arrange the transportation of shipments which it is authorized to transport and which it has accepted and legally bound itself to transport.

~~(13) *"Cattle or Calf Feedlot"* means a lot or facility where cattle or calves have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and where crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.~~

~~(14)~~(11) "*Commercial Vehicle*" means a motor vehicle or combination of motor vehicles as defined in California Veh. Code, section 260.

~~(15)~~(12) "*Common Ownership or Control*" means being owned or managed day to day by the same person, corporation, partnership, or association. Vehicles managed by the same directors, officers, or managers, or by corporations controlled by the same majority stockholders are considered to be under common ownership or control even if their title is held by different business entities. Common ownership or control of a federal government vehicle shall be the primary responsibility of the unit that is directly responsible for its day to day operational control.

~~(16)~~(13) "*Compliance Year*" means January 1 through December 31 of a calendar year.

~~(17)~~(14) "*Compression Ignition Engine*" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

~~(18)~~(15) "*Dedicated Snow Removal Vehicle*" means a vehicle that has permanently affixed snow removal equipment such as a snow blower or auger, and is operated exclusively to remove snow from public roads, private roads, or other paths to allow on-road vehicle access.

~~(19)~~(16) "*Diesel Fuel*" has the same meaning as defined in title 13, CCR, sections 2281 and 2282.

~~(20)~~(17) "*Diesel Particulate Filter*" means an emission control technology that reduces diesel particulate matter emissions by directing the exhaust through a filter that physically captures particles but permits gases to flow through. Periodically, the collected particles are either physically removed or oxidized (burned off) in a process called regeneration.

~~(21)~~(18) "*Diesel Particulate Matter (PM)*" means the particles found in the exhaust of diesel-fueled compression ignition engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

~~(22) "*Diesel PM Index*" for the purposes of section 2025(h)(3)(B) means an indicator of the overall PM emission rate.~~

~~(23) "*Diesel PM Target Rate*" means the diesel PM fleet average that a spec. s fleet must meet in a compliance year in order to show compliance with the fleet average requirements.~~

~~(24)~~(19) "*Drayage Truck*" is the same as defined in title 13, CCR. ~~S~~section 2027.

~~(25)~~(20) "*Dual-Fuel Engine*" means any compression ignition engine that is engineered and designed to operate on a combination of alternative fuels, such as compressed natural gas (CNG) or liquefied petroleum gas (LPG) and diesel fuel or an alternative diesel fuel. These engines have two separate fuel systems, which

inject both fuels simultaneously into the engine combustion chamber. A dual-fuel engine is not an alternative-fuel engine.

~~(26)~~(21) "*Electronic Tracking System*"

(A) The tracking device must acquire date, time, and engine-on data at a minimum of 15 minute intervals, with no more than 30 minute data gaps. The tracking device must also acquire location data for vehicles claiming to operate exclusively in NOx-exempt areas and for vehicles that must document low use in California when their total miles of operation exceed 1,000 miles and total hours of operation exceed 100 hours.

(B) The tracking records must be collected by an independent entity with no business relationship to the owners of the vehicles being tracked, other than to provide the tracking service.

~~(27)~~(22) "*Emergency Operation*" means operation of an authorized emergency vehicle or emergency support vehicle to help alleviate an immediate threat to public health or safety. Examples of emergency operation include vehicle used at an emergency event to repair or prevent damage to roads, buildings, terrain, and infrastructure as a result of an earthquake, flood, storm, fire, terrorism, or other infrequent acts of nature. Emergency operation includes authorized emergency vehicle and emergency support vehicle travel to and from an emergency event when dispatched by a local, state, or federal agency. Routine operation to prevent public health risks does not constitute emergency operation.

~~(28)~~(23) "*Emergency Support Vehicle*" means a vehicle, other than an authorized emergency vehicle that has been dispatched by a local, state, or federal agency that is used to transport services or supplies in connection with an emergency operation.

~~(29) "*Emission Factor*" means diesel PM or oxides of nitrogen (NOx) emission rate in grams per mile (g/mile) as shown in Appendix A. For engines that have been retrofitted with VDECS, the PM Emission Factor is reduced by 50 percent for a level 2 VDECS, and 85 percent for a level 3 VDECS; the NOx Emission Factor is reduced by the percentage NOx emission reductions that are verified, if any. The PM Emission Factor is not reduced for a level 1 VDECS.~~

~~(30)~~(24) "*Executive Officer*" means the Executive Officer of the ARB or his or her authorized representative.

~~(31)~~(25) "*Farm*" means a physical location for which the primary purpose is making a profit or providing a livelihood from~~:~~:

(A) horticultural, viticultural, aquacultural, forestry or crops or plants that are grown and harvested at the location, (Nurseries that sell exclusively retail are not farms)~~;~~; or

(B) raising, breeding, grazing, feeding, or milking animals, fish, fowl, or bees.

~~(32)~~(26) "*Farming Business*" means a business involved in the cultivating, operating, or managing a farm for profit, either as owner or tenant or a business contracted to harvest trees in a forest for profit. A farming business does not

include businesses that derive their principal source of income from providing agricultural services such as, landscape services, veterinary, farm labor, or management for a fee or on a contract basis, or are engaged in the business of artificial insemination, raising, and caring for dogs, cats, or other pet animals.

~~(33)~~(27) "*First Point of Processing*" means the location where harvested crops, bees, fowl, fish, livestock, animals, or their products, such as wool, milk, or eggs, are first altered from their original state, or the first location where unaltered products are packaged and prepared for transportation. First point of processing is not a location of the product's final use and for some crops the location may be in the field, such as chipping wood. First point of processing also includes biomass facilities that receive agricultural waste in the form of unprocessed agricultural materials. A first point of processing may include, but is not limited to, packinghouses, slaughterhouses, cotton gins, nut hullers/shellers and processors, dehydrators, lumber mills, feed and grain mills, and biomass facilities. First point of processing does not include distribution centers, wholesale retail sales locations where the first processing of product does not occur, livestock auction houses, and subsequent locations where processing, canning, or similar activities occur after departing a first point of processing location.

~~(34)~~(28) "*Fleet*" means one or more vehicles, owned by a person, business, or government agency, traveling in California and subject to this regulation. A fleet may fall into one of the following subclassifications:

~~(A) "*Agricultural Fleet*" means a fleet utilizing the agricultural fleet provision in section 2025(m). A fleet owner utilizing the agricultural fleet provisions must include all vehicles under common ownership or control in the agricultural fleet including those vehicles that are not agricultural vehicles. Fleets not utilizing the agricultural fleet provision must comply with section 2025(e).~~

~~(B)~~(A) "*Federal Fleets*" ~~means vehicles~~ - a ~~in~~ fleet~~s~~ owned by a department, agency, or instrumentality of the federal government of the United States of America and its departments, divisions, public corporations, or public agencies including the United States Postal Service. With respect to the Department of Defense and its service branches, federal fleets may be managed regionally, locally, or a combination of regional and local management. There may be multiple federal fleets within a military service or an installation~~.~~; or

~~(C)~~(B) "*Rental or Leased Fleets*" ~~means vehicles that are~~ - a fleet owned by a person (rental or leasing entity) for the purpose of renting or leasing, as defined in California Uniform Commercial Code, section 10103(a)(10) such vehicles to other persons (renters or lessees) for use or operation.

~~(D) "*Schoolbus Fleet*" means a fleet comprised only of vehicles that meet the definition of schoolbus given in section 2025(d)(67).~~

~~(E) "*Schoolbus Sub-Fleet*" means the schoolbuses in a fleet comprised of schoolbuses and vehicles other than schoolbuses.~~

~~(F) "*Small Fleet*" means a fleet with a fleet size of three or fewer vehicles. When determining fleet size, all of the vehicles under common ownership and control must be counted.~~

~~(35)~~(29) *"Fleet Owner"* means, except as modified below in paragraphs (A) and (B), either the person registered as the owner or lessee of a vehicle by the California Department of Motor Vehicles (DMV), or its equivalent in another state, province, or country; as evidenced on the vehicle registration document carried in the vehicle.

(A) For vehicles that are owned by the federal government and not registered in any state or local jurisdiction, the owner shall be the department, agency, branch, or other entity of the United States including the United States Postal Service, to which the vehicles in the fleet are assigned or which have responsibility for maintenance of the vehicles.

(B) For vehicles that are rented or leased:

1. The owner shall be presumed to be the rental or leasing entity for purposes of compliance with section 2025(e), if:
   a. The rental or lease agreement for the vehicle is for a period of less than one year; or
   b. The rental or lease agreement for the vehicle is for a period of one year or longer, unless the terms of the rental or lease agreement or other equally reliable evidence identifies the party responsible for compliance with state laws for the vehicle to be the renting operator or lessee of the vehicle.
2. For purpose of enforcement, if ~~at the time that~~ the vehicle is inspected and cited for noncompliance with this regulation and neither the operator of the vehicle nor the rental or leasing entity can produce ~~does not possess~~ evidence of the party responsible for compliance with state laws, the owner shall be presumed to be both the rental or leasing entity and the renting operator or lessees of the vehicle.

~~(36)~~(30) *"Fleet Size"* means the total number of diesel vehicles with a GVWR greater than 14,000 lbs in a fleet, regardless of whether the vehicles operate in California, that are under common ownership or control even if they are part of different subsidiaries, divisions, or other organizational structures of a company or agency.

(31) "*Fuel Efficient Hybrid Vehicle*" means a vehicle with an onboard energy storage system that improves the average fuel economy of the vehicle by at least 20 percent compared to a conventional diesel vehicle of the same model year and configuration. The vehicle must have a combination of an engine and onboard energy storage system that provides motive power for accelerating the vehicle, recapture of energy when the vehicle decelerates, or operates auxiliary equipment that serves as the primary function for the vehicle while stationary. The energy storage systems can be electric, hydraulic, pneumatic or of any other type that recovers its energy directly or indirectly from the engine. In addition, the onboard

energy storage systems of the hybrid vehicle can have the capability to supplement its energy from an external power source.

~~(37)~~(32) "*Governmental Agency*" means any federal, state, or local governmental agency, including, public schools, water districts, or any other public entity with taxing authority.

(33) "*GVWR*" means gross vehicle weight rating which is the weight specified by the manufacturer as the maximum loaded weight of a single vehicle.

~~(38)~~(34) "*Heavy-Duty Pilot Ignition Engine*" means an engine designed to operate using an alternative fuel, except that diesel fuel is used for pilot ignition at an average ratio of no more than one part diesel fuel to ten parts total fuel on an energy equivalent basis. An engine that can operate or idle solely on diesel fuel at any time does not meet this definition.

~~(39)(38) "Heavy Heavy-Duty Diesel Vehicle (HHD)" for the purposes of this regulation, means a diesel motor vehicle having a manufacturer's gross vehicle weight rating greater than 33,000 pounds or a truck tractor regardless of GVWR, or a motorcoach.~~

~~(40)~~(35) "*Highest Level VDECS*" means the highest level VDECS verified by ARB under its Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (Verification Procedure), title 13, CCR, sections 2700-2710, for a specific engine as of 10 months prior to the compliance date, which the diesel emission control strategy manufacturer and authorized diesel emission-control strategy dealer agree can be used on a specific engine and vehicle combination without jeopardizing the original engine warranty in effect at the time of application.

(A) The highest level VDECS is determined solely on verified diesel PM reductions. Plus designations do not affect the diesel PM level assigned to a VDECS; that is, a ~~l~~Level 3 Plus is the same diesel PM level as ~~l~~Level 3.

(B) A Level 2 VDECS shall not be considered the highest level VDECS as long as a ~~l~~Level 3 VDECS can be retrofitted on a vehicle in the fleet.

(C) Level 1 devices are never considered highest level VDECS for the purpose of this regulation.

~~(41)~~(36) "*Historic Vehicle*" means a vehicle that has met the qualifications ~~qualifies~~ for and has a historical vehicle license plate pursuant to the California Veh. Code, section 5004, and is operated or moved over the highway primarily for the purpose of historical exhibition or other historic vehicle club activities.

(37) *"Hubodometer"* means a non-resettable device mounted on the axle of a vehicle that measures distance traveled that has a serial number and a lock-out feature that permanently prevents tampering.

~~(42) "*Hybrid Vehicle*" means a vehicle that has a combination of an engine and onboard energy storage systems that provide for one or more of the following processes: motive power for starting the vehicle from a stop, motive power for accelerating the vehicle, recapture of energy when the vehicle decelerates. The~~

~~energy storage systems can be electric, hydraulic, pneumatic or of any other type that recovers its energy directly or indirectly from the engine. In addition, the onboard energy storage systems of the hybrid vehicle can have the capability to supplement its energy from an external power source.~~

~~(43)~~(38) "*International Registration Plan (IRP)*" is a registration reciprocity agreement among states of the United States and provinces of Canada providing for payment of license fees on the basis of total distance operated in all jurisdictions.

(44) ~~"*Limited-Mileage Agricultural Vehicle*" means until January 1, 2017, an agricultural vehicle with a properly functioning odometer installed at all times, that operates less than the miles specified below per calendar year, based on the model year of the installed engine or any vehicle that replaces a limited-mileage vehicle pursuant section 2025(m) (6)(B):~~

~~(A) A pre-1996 model year engine that is operated fewer than 15,000 miles; or~~

~~(B) A 1996 through 2005 model year engine that is operated fewer than 20,000 miles; or~~

~~(C) A 2006 or newer model year engine that is operated fewer than 25,000 miles.~~

(39) "*Log Truck*" means a heavy-duty vehicle with a manufacturer's GVWR greater than 33,000 pounds that exclusively transports logs and has log bunks permanently attached.

~~(45) "*Low-Mileage Agricultural Vehicle*" means until January 1, 2023, an agricultural vehicle with a properly functioning odometer installed at all times, that operates less than 10,000 miles per calendar year each year since January 1, 2010 or a vehicle that replaces a low-mileage vehicle per section 2025(m) (7)(B).~~

~~(46) "*Low-use Schoolbus*" means a schoolbus whose propulsion engine was operated in California for fewer than 1,000 miles during the preceding 12 month period from January 1 to the end of December. Such vehicles must have a properly functioning odometer installed at all times but are not required to have an hour-meter.~~

(40) "*Low-use Vehicle*" means a vehicle that will be operated fewer than 1,000 miles in any compliance year and has an odometer or hubodometer that is properly functioning at all times. A vehicle with power take off (PTO) that only operates equipment while stationary must also operate its PTO less than 100 hours in any compliance year except for PTO used to load and unload cargo from the vehicle. Vehicles subject to the hour limitations must have a functioning non-resettable hour-meter installed at all times.

~~(47) "*Low-use Vehicle*" means a vehicle whose propulsion engine was operated in California for fewer than 1,000 miles and less than 100 hours during the preceding 12 month period from January 1 to the end of December. Such vehicles must have a properly functioning odometer and hour-meter installed at all times.~~

~~(48) "*Medium Heavy-Duty Diesel Vehicle (MHD)*" for the purposes of this regulation, means a diesel motor vehicle having a manufacturer's gross vehicle weight rating less than or equal to 33,000 pounds excluding truck tractors regardless of GVWR.~~

~~(49) "*Motorcoach*" (MC) is an on-road motor vehicle having an under floor luggage compartment separate from the passenger cabin used for conveying passengers, is at least 35 feet in length, and is designed for and has seating capacity for 40 or more passengers.~~

~~(50)~~(41) "*Motor Carrier*" is the same as defined in California Veh. Code section 408 for fleets other than those that are comprised entirely of ~~schoolbuses~~ school buses, which for the purposes of this regulation, means the registered owner, lessee, licensee, school district superintendent, or bailee of any ~~schoolbus~~ school bus, who operates or directs the operation of any such bus on either a for-hire or not-for-hire basis.

~~(51)~~(42) "*Motor Home*" means a single vehicular unit designed for human habitation for recreational or emergency occupancy and built on, or permanently attached to, a self-propelled motor vehicle chassis, chassis cab, or van, which becomes an integral part of the completed vehicle or a vehicle that exclusively tows a trailer that was originally designed for human habitation for recreational or emergency occupancy.

~~(52)~~(43) "*New Fleet*" means a fleet that is acquired or that enters California after ~~January 1, 2011~~January 1, 2012. Such fleets may include new businesses or out-of-state businesses that bring vehicles into California for the first time after ~~January 1, 2011~~January 1, 2012.

~~(53)~~(44) "*Non-Commercial Use*" means any use or activity where a fee is not charged and the purpose is not the sale of a good or service, and the use or activity is not intended to produce a profit.

~~(54) "*NOx BACT*" means an on-road engine newly manufactured in 2010 or later or a 2010 emissions-equivalent engine as defined in section 2025(d)(4).~~

~~(55)~~(45) "*NOx Exempt Areas*" are the following counties – Alpine, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Monterey, Plumas, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Shasta, Sierra, Siskiyou, Trinity, Tehama, and Yuba.

~~(56) "*NOx Exempt Vehicle*" is any vehicle identified in paragraphs 0 through (E) below. These vehicles are exempt from meeting the NOx BACT requirements sections 2025(f) or (g), or the NOx fleet average requirements of section 2025(h) for the compliance years specified in section 2025(p).~~

~~A NOx exempt vehicle is:~~

~~(A) A schoolbus as defined in section 2025(d)(67); or~~

~~(B) A vehicle that operates exclusively in the NOx exempt areas defined in section 2025(d)(55); or~~

~~(C) A vehicle that is granted a compliance extension under the early action provision of section 2025(p)(8); or~~

~~(D) A NOx mileage exempt vehicle, as defined in section 2025(d)(56); or~~

~~(E) A motorcoach as defined in section 2025(d)(47).~~

~~(57) *"NOx Index"* for the purposes of section 2025(h)(2)(B) means an indicator of a fleet's overall NOx emission rate.~~

~~(58) "*NOx Mileage Exempt Vehicle*" is exempt from meeting NOx BACT in sections 2025(f) or (g), or the NOx fleet average in section 2025(h) during the compliance years specified in section 2025(p)(1), and section 2025(h) regardless of where the vehicle is operated and is limited to:~~

~~(A) A heavy heavy-duty diesel vehicle that has a power take off system to perform work in a stationary mode, or a diesel yard truck that is operated fewer than 7,500 miles and less than 250 hours per year;~~

~~(B) A medium heavy-duty diesel vehicle that has a power take off system to perform work in a stationary mode that is operated fewer than 5,000 miles and less than 175 hours per year;~~

~~(C) A heavy heavy-duty diesel vehicle that does not have a power take off system to perform work in a stationary mode and is operated fewer than 7,500 miles per year, with no hours limitation; or~~

~~(D) A medium heavy-duty diesel vehicle that does not have a power take off system to perform work in a stationary mode and is operated fewer than 5,000 miles per year, with no hours limitation.~~

~~(59) *"NOx Target Rate"* means the NOx fleet average that a specific fleet must meet in a compliance year in order to show compliance with the fleet average requirements.~~

~~(60) *"Oxides of* Nitrogen *(NOx)"* means compounds of nitric oxide, nitrogen dioxide, and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition, and to the formation of particulate matter.~~

~~(61)~~(46) "*Person*" means an individual, corporation, business trust, estate, trust, partnership, Limited Liability Company, association, joint venture, government, governmental subdivision, agency, or instrumentality, public corporation, or any other legal or commercial entity.

~~(62)~~(47) *"PM BACT"* means the technology employed on the highest level VDECS for PM or an engine originally equipped with a diesel particulate filter and certified to meet the 0.01 g/bhp-hr certification standard.

~~(63)~~(48) "*Registered and Driven Safely On-Road*" means a vehicle that meets the requirements to be registered for on-road operation in California Veh. Code division 3, chap. 1, article 1, section 4000 et seq. (i.e., required to be registered or could be registered), and the requirements to be driven safely on-road in "Equipment of Vehicles" requirements in Veh. Code division 12, chap. 1,

sections 24000 et seq. and "Size, Weight, and Load" requirements in Veh. Code division 15, sections 35000 et seq, or a vehicle defined as an implement of husbandry as defined in California Veh. Code division 16, chap. 1, section 36000 et seq.

~~(64)~~(49) "*Repower*" means to replace the engine in a vehicle with a newer engine certified to lower emission standards for PM or NOx or both as applicable.

~~(65)~~(50) "*Responsible Official*" means one of the following:

(A) For a corporation: A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, their delegate, designee, or any other person who performs similar policy or decision-making functions for the corporation;

(B) For a partnership or sole proprietorship: a general partner or the proprietor, respectively; or

(C) For a municipality, state, federal, or other governmental agency: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of the U.S. EPA). For the purposes of the Department of Defense Military Services, a commanding officer of an installation, base or tenant organization.

~~(66)~~(51) "*San Joaquin Valley Air Basin*" includes the entire counties of San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, and Kings and western part of Kern County as described starting page 23888 of the Federal Register Vol. 69, No. 84.

~~(67)~~(52) *"~~Schoolbus~~ School Bus"* is a motor vehicle as defined in California Veh. Code, section 545.

~~(68) *"Shuttle vehicle" means a diesel-powered motor vehicle of any gross vehicle weight rating with a capacity of 10 or more passengers, routinely driving an average of 10 trips per day to or from airport terminals, marine terminals, and rail based stations.~~

~~(69)~~(53) "*Specialty Agricultural Vehicle*" means, until January 1, 2023, an agricultural vehicle having one of the following body types and that have been approved for the exemption under section 2025(m)~~(8)~~(10) by the Executive Officer:

(A) A truck, or a truck-tractor and trailer combination, designed or modified to be used exclusively for the fueling, repairing, or loading of an airplane or helicopter used for the dusting, spraying, fertilizing, or seeding of crops;

(B) A truck, or a truck tractor and trailer combination, that is equipped with a self-loading bed and is designed and used exclusively to transport field manufactured cotton modules to a cotton gin;

(C) A truck equipped with a water tank owned by a farmer, not operated for compensation, and used exclusively in agricultural operations to provide dust

suppression on dirt roads providing access to agricultural fields and for the transportation of water for crop or tree irrigation or for livestock; or

(D) A feed truck or mixer-feed truck~~,~~ specially designed for dispensing feed to livestock. ~~and is used exclusively at a cattle or calf feedlot. It does not include a feed truck or mixer feed truck used at dairies or other locations other than cattle and calf feedlots.~~

~~(70)~~(54) "*Three Day Pass*" means a once-a-year temporary permit to operate a vehicle in California for three consecutive days without meeting the requirements of section 2025(e) provided that prior to entering California the vehicle owner has reported the information required in sections 2025(r) ~~(7)~~(19) ~~and (r)(8)~~ and the date the vehicle will be entering California. No vehicle or fleet will be granted more than one three day pass per year.

~~(71)~~(55) "*Tier 0 Engine*" means an engine not subject to the requirements in title 13, CCR, section 2423; Title 40, Code of Federal Regulations (CFR), Part 89; or Title 40, CFR, Part 1039.

~~(72)~~(56) "*Tier 4 Final Engine*" means an engine subject to the final after-treatment-based Tier 4 emission standards in title 13, CCR, section 2423(b)(1)(B) and/or Title 40, CFR, Part 1039.101. This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 4 FEL listed in title 13, CCR, section 2423(b)(2)(B) and/or Title 40, CFR, Part 1039.101

~~(73) "*Truck-Tractor*" means a motor vehicle as defined in section 655 of the California Motor Veh. Code.~~

(57) "*Two*-Engine Sweeper" means an on-road heavy-duty vehicle with a manufacturers GVWR greater than 14,000 pounds, used for the express purpose of removing material from road surfaces, by mechanical means through the action of one or more brooms, or by suction through a vacuum or regenerative air system or any combination of the above. A two-engine street sweeper has an engine to propel the vehicle and an auxiliary engine to power the broom or vacuum.

~~(74)~~(58) "*Unique Vehicle*" means a vehicle for which:

(A) a used vehicle that performs a similar function with a 2007 NOx equivalent emissions engine or cleaner is not available, and

(B) a used suitable cab and chassis upon which the truck bed could be mounted is not available, and

(C) a verified NOx emissions control device that could reduce the vehicle's exhaust NOx emissions is either installed or not available, and

(D) the vehicle's engine is equipped with the highest level VDECS.

~~(75)~~(59) "*Private Utility Vehicle*" means a vehicle owned by a privately-owned or publicly held company or corporation that provides the same or similar services for water, natural gas, and electricity as a public utility operated by a municipality.

~~(76)~~(60) "*Verified Diesel Emission Control Strategy*" (VDECS) means an emissions control strategy, designed primarily for the reduction of diesel PM emissions,

which has been verified pursuant to the Verification Procedures. VDECS can be verified to achieve ~~l~~Level 1 diesel PM reductions (25 percent), ~~l~~Level 2 diesel PM reductions (50 percent), or ~~l~~Level 3 diesel PM reductions (85 percent). VDECS may also be verified to achieve NOx reductions. See also definition of Highest Level VDECS.

~~(77)~~(61) "*VDECS Failure*" means the condition of not achieving the emissions reductions to which the VDECS is verified. Such condition could be due to inappropriate installation, damage, or deterioration during use. If a ~~l~~Level 3 VDECS is emitting visible smoke, it is assumed to have failed.

~~(78)~~(62) "*Yard Truck*" means a vehicle, with an on-road or off-road engine, and a hydraulically elevated fifth wheel, that is used in moving and spotting trailers and containers at locations or facilities. Yard trucks are also known as yard goats, hostlers, yard dogs, trailer spotters or jockeys.

(e) *General Requirements*

Beginning with the applicable effective dates, a fleet owner must comply with the following requirements of this regulation:

(1) Starting January 1, 2015, fleets must meet the requirements of section 2025(f) for all vehicles with a GVWR 26,000 lbs or less and may utilize the exemptions and extensions provided in of section 2025(p).

(2) Starting January 1, 2012, fleets must meet the requirements of section 2025(g) or the phase-in options of section of 2025(i) for all vehicles with a GVWR greater than 26,000 lbs and must follow the reporting requirements of section 2025(r) if complying using the phase-in option. The fleet owner may use the exemptions and extensions provided in section 2025(p).

(3) Fleets with one to three vehicles with a GVWR greater than 14,000 lbs may utilize phase-in option for small fleets with vehicles with a GVWR greater than 26,000 lbs provided in 2025(h).

(4) Beginning January 1, 2012, fleets with school buses must comply with the requirement of section 2025(k) for all school buses in the fleet.

(5) Beginning January 1, 2021, all private utility vehicle owners must comply with the requirements of section 2025(l).

(6) Beginning January 1, 2017, fleets with drayage trucks must comply with the requirements of section 2025(l).

(7) Fleets with log trucks may utilize the log truck provision of section 2025(m)(11).

(8) Fleets may utilize the credits of 2025(j) or the extensions and exemptions of section 2025(p).

~~(1) Except for small fleets electing to comply with section 2025(i), the fleet owner must comply with the best available control technology (BACT) requirements of section 2025(f) or the BACT percentage limits of section 2025(g) or the fleet average requirements of section 2025(h). The compliance option need not be the~~

~~same for each pollutant. The fleet owner may also opt to comply with the early compliance provision of section 2025(p)(8).~~

~~(2) Schoolbus fleets, as defined in section 2025(d)(34)(D), must comply with the requirements of section 2025(j).~~

~~(3) Each fleet that includes schoolbuses and other vehicles must meet the following requirements:~~

~~(A) The schoolbus sub-fleet as defined in section 2025(d)(34)(E) must meet the requirements of section 2025(j).~~

~~(B) The remaining non-schoolbus vehicles, excluding the schoolbus sub-fleet, must comply with the requirements of section 2025(e)(1) above; or the owner may include the schoolbus sub-fleet in the determination of compliance for the entire fleet with the requirements of section 2025(e)(1). Schoolbuses used in this determination remain exempt from meeting NOx BACT in sections 2025(f) or (g), or the NOx fleet average in section 2025(h). However, the owner may not use non-schoolbus vehicles to satisfy the schoolbus sub-fleet requirements of section 2025(j).~~

~~(4) Requirements for Drayage~~ Trucks ~~and Utility Vehicles~~

~~Starting in January 1, 2021, all drayage truck and utility vehicle owners must comply with the BACT requirements of section 2025(f).~~

~~(5)~~ (9) Although the total number of vehicles under common ownership or control is determinative of fleet size, if some of the vehicles within the fleet are under the control of different responsible officials because they are part of different subsidiaries, divisions, or other organizational structures of a company or agency, the fleet owner of a "common ownership of control fleet" may elect to have the vehicles under the control of different responsible officials report compliance independently of other vehicles in the general fleet if choosing to comply with the ~~fleet averaging requirements of~~ phase-in option of section 2025~~(h)~~(i) ~~or the BACT percentage limits requirements of section 2025(g)~~ for the segment of the fleet under the control of the different responsible officials.

~~(6) A fleet may meet the requirements of section 2025(e)(1), 2025(e)(2), or 2025(i)(2) by applying a VDECS that will achieve PM or NOx reductions or both as required, replacing an engine, or replacing a vehicle.~~

~~(7) Except as provided below in (B), one of the following is required for all fleet owners who elect to utilize the BACT percent limits option of section 2025(g), the fleet averaging option of section 2025(h), the optional requirements for small fleets of section 2025(i), the agricultural provisions of section 2025(m), the retired vehicle provisions of section 2025(k), or the exemptions or credits of sections 2025(p)(1), (2), (9), and (10):~~

(10) Except personal, non-commercial, unregistered motor vehicles, or vehicles otherwise not required to obtain operating authority, the following is required for all fleet owners who elect to utilize the phase-in options of sections 2025(h) and 2025(i), credits for early PM retrofits, hybrids vehicles and alternative fueled

vehicles of section 2025(j), the agricultural provisions of section 2025(m), or the exemptions and extensions provisions of sections 2025(p):

~~(A)~~

(A)~~1.~~ a valid California motor carrier of property number~~,~~;

(B)~~2.~~ a valid identification number assigned by the United States Secretary of the Department of Transportation~~,~~;

(C)~~3.~~ a valid operating authority number issued by the Public Utilities Commission~~,~~; or

(D)~~4.~~ other applicable valid operating authority number approved by the Executive Officer.

~~(B) this requirement does not apply to personal, non-commercial, unregistered motor vehicles, or vehicles otherwise not required to obtain operating authority numbers as described in section (e)(7)(A) above.~~

~~(8) A vehicle that is exempt from meeting the NOx BACT sections 2025(f) or the percent limits in section 2025(g), or the NOx fleet average in section 2025(h) must comply with the requirements of section 2025(p)(e)(1).~~

~~(9)~~(11) All information specified in section 2025(r) must be reported to the Executive Officer.

~~(10)~~(12) Records must be kept as specified in section 2025(s).

~~(11)~~(13) Once a vehicle is required to be in compliance with this regulation, it must remain in compliance at all times that it is operating in California.

(f) *Requirements for Vehicles with a GVWR 26,000 lbs or less*

(1) Except as provided in (3) below, all vehicles with a GVWR 26,000 lbs or less must be 2010 model year emission equivalent pursuant to the following schedule in Table 1:

Table 1: Best Available Control Technology Compliance Schedule for Vehicles with a GVWR 26,000 lbs or less

Compliance Date as of January 1	*Existing Engine Model Year*	*BACT Requirements*
2015	1995 & older	2010 model year emission equivalent
2016	1996	
2017	1997	
2018	1998	
2019	1999	
2020	2003 & older	
2021	2004-2006	
2022		
2023	2007-2009	

(2) Each year the fleet must meet the requirements of all prior years shown in the schedule. A 2007 model year emissions equivalent engine complies with the BACT requirements until January 1, 2023.

(3) There are no reporting requirements for vehicles with a GVWR 26,000 lbs or less except as identified in 2025(f)(4) below.

(4) Any vehicle that meets PM BACT prior to January 1, 2014, is exempt from upgrading to a 2010 model year emission equivalent engine until January 1, 2020 and must meet the reporting and record keeping requirements of sections 2025(r) and (s).

(g) *Requirements for Vehicles with a GVWR greater than 26,000 lbs*

Except as required in sections 2025(3) and (4) below, if all vehicles in the fleet meet the requirements of this section the fleet is exempt from the reporting requirements of section 2025(e)(11). A fleet may meet PM BACT by installing the highest level VDECS or with a vehicle originally equipped with a diesel particulate filter. A fleet may meet the 2010 model year emissions equivalent by replacing the engine or vehicle with one with a 2010 model year engine or later, retrofitting the engine with a VDECS that achieves 2010 model year equivalent emissions, or by replacing a vehicle with one that has a future compliance deadline.

(1) Starting January 1, 2012, vehicles with a GVWR greater than 26,000 lbs must meet PM BACT and upgrade to a 2010 model year engine or equivalent emissions pursuant to the schedule set forth in Table 2 below.

Table 2: Best Available Control Technology Compliance Schedule for Vehicles with GVWR greater than 26,000 lbs

Engine Model Year	Compliance Date Install PM Filter by	Compliance Date 2010 Engine by
1993 & older	N/A	January 1, 2015
1994-1995	N/A	January 1, 2016
1996-1997	N/A	January 1, 2017
1998-2000	January 1, 2012	January 1, 2020
2001-2004	January 1, 2013	January 1, 2021
2005-2006	January 1, 2014	January 1, 2022
2007-2009	January 1, 2014 if not originally equipped	January 1, 2023

(2) Each year the fleet must meet the requirements of all prior years shown in the schedule. A 2007 model year emissions equivalent engine complies with the BACT requirements until January 1, 2023.

(3) Until January 1, 2015, any fleet may optionally choose to meet PM BACT according to the following schedule:

1. 2003-2004 model year engines and 1993 model year and older engines must meet PM BACT by January 1, 2012.
2. 2005-2006 model year engines and 1994-1999 model year engines must meet PM BACT by January 1, 2013.
3. All engines meet PM BACT by January 1, 2014.

Beginning January 1, 2015, this option expires and the fleet must comply with general requirement 2025(e). Fleet owners choosing this option must comply with the reporting and record keeping requirements of sections 2025(r) and (s).

(4) Any vehicle that meets PM BACT prior to January 1, 2014, is exempt from meeting 2010 model year emission equivalent requirement until January 1, 2020 at which time it must comply with the requirements of Table 2 below. Fleet owners choosing this option must comply with the reporting and record keeping requirements of sections 2025(r) and (s).

(h) *Phase-in Option for Small Fleets*

This is an option for fleets with a fleet size of one to three vehicles with a GVWR greater than 14,000 lbs that allows the fleet to delay meeting the PM BACT requirements until January 1, 2014 and the 2010 engine or equivalent emissions requirement until January 1, 2020. This option applies only to vehicles in the fleet with a GVWR greater than 26,000 lbs.

(1) The fleet shall have one vehicle comply with PM BACT, by January 1, 2014, two vehicles by January 1, 2015, and three vehicles by January 1, 2016.

(2) Vehicles with a GVWR greater than 26,000 lbs are exempt from meeting the 2010 model year emissions equivalent until January 1, 2020. Beginning January 1, 2020, all vehicles in the fleet must comply with the 2010 engine or equivalent emissions requirements of the BACT compliance schedule in Table 2.

(3) This option is not available to divisions within a company or subsidiaries under common ownership and control that has a fleet size greater than three.

(4) Fleets with vehicles with 1998-2000 model year engines that do not meet PM BACT by January 1, 2012, must comply with the reporting requirements of section 2025(r) starting January 31, 2012.

(5) Fleets with vehicles with 2001-2004 model year engines that do not meet PM BACT by January 1, 2013, must comply with the reporting requirements of section 2025(r) starting January 31, 2013.

(6) Fleet owners using this provision must comply with the reporting and record keeping requirements of sections 2025(r)(5) through (10) and (s) by January 1, 2014

(i) *Phase-in Option for Large Fleets*

The phase-in option for fleets with vehicles with a GVWR greater than 26,000 lbs provides fleets with an alternative compliance option to phase in the requirements from January 1, 2012 to January 1, 2016.

(1) Beginning January 1, 2012, fleets must meet the PM BACT and upgrade to a 2010 model year emission equivalent engine pursuant to the schedule set forth in Table 2 below.

Table 3: Phase-in Compliance Schedule for Vehicles with GVWR greater than 26,000 lbs

Compliance Date as of January 1	*Percent of Total Fleet Complying with BACT*	*BACT Requirements*
2012	30%	PM BACT
2013	60%	
2014	90%	
2015	90%	
2016	All vehicles must comply with section 2025(g)	

(2) If the calculated number of engines in each model year group required to be brought into compliance with the percentage limits is not equal to a whole number, the owner shall round up to a whole number when the fractional part of the required number of engines is equal to or greater than 0.5, and round down if less than 0.5.

(3) Vehicles in which public funds contributed to the purchase or retrofit of a vehicle must be excluded in determining the fleet size and the number of vehicles in accordance with the funding program guidelines.

(4) To utilize this option, fleet owners must comply with the reporting and record keeping requirements of sections 2025(r) and (s) by January 31, 2012.

(5) Relief for Fleets that have Downsized

This credit is only available to fleets utilizing the phase-in option. Until January 1, 2016, a fleet that has fewer vehicles with a GVWR greater than 26,000 lbs. operating in the compliance year than in the 2006 baseline fleet may claim a reduced requirement for the compliance year.

(A) Until January 1, 2014, the fleet may reduce the percent requirement in Table 3 by the same percent that the fleet was downsized. For example, a fleet that is 20 percent smaller than it was in 2006 would subtract 20 percent from the annual compliance requirement. If the compliance requirement for the year is 30 percent, the fleet would need to demonstrate that it had PM filters on the 10 percent of the existing fleet (30%-20%=10%).

(B) The number of vehicles that are not operated in the compliance year may be excluded from the existing fleet in determining the credit if:

1. The vehicle is not driven for the entire compliance year and

a. Either a planned non-operation certificate that has been filed with the DMV or a certificate of non-operation or,

b. An equivalent certificate filed with another state prior to the beginning of the compliance year; or

2. The vehicle is not operated for any other purpose during the compliance year except to demonstrate functionality of the vehicle to potential buyers, to move the vehicle short distances for maintenance, or to a storage facility while awaiting sale.

(C) Any fleet utilizing this provision must comply with the reporting requirements of section 2025(r)(13) and report information for all vehicles in the 2006 baseline fleet.

(E) The credits are not transferrable except with appropriate documentation of a change of business form such as sole proprietorship to partnership or partnership to corporation, or for mergers or acquisitions of the entire company and fleet.

(F) For purposes of determining the number of vehicle in the fleet on January 1 of the compliance year, all vehicles in the scope and applicability section 2025(b) must be included and all vehicles exempt from the regulation in the exemptions section 2025(c) must be excluded.

(j) *Credits for Early PM Retrofits, Hybrid Vehicles, Alternative Fueled Vehicles, and Vehicles with Heavy-Duty Pilot Ignition Engines*

(1) A fleet shall receive a credit to treat another vehicle with a GVWR greater than 26,000 lbs as compliant until January 1, 2017. The fleet can earn a credit for taking the following compliance action on a vehicle with a GVWR greater than 26,000 lbs. The fleet can also earn a credit to treat another vehicle with a GVWR greater than 26,000 lbs as compliant for taking the following action on a vehicle with a GVWR from 14,001 to 26,000 lbs if the action was taken between January 1, 2007 and July 1, 2011.

(A) For each vehicle the fleet has equipped with the highest level VDECS for PM by July 1, 2011. A fleet may also receive the same credit if the highest level VDECS is ordered and paid for by May 1, 2011 and installed by September 1, 2011.

(B) For each fuel efficient hybrid vehicle added to the fleet between January 1, 2007 and January 1, 2017.

(C) For each alternative fueled engine or heavy-duty pilot ignition engine added to the fleet between before January 1, 2011. A dual-fuel engine is not eligible.

(2) Credits under this section will not be given for vehicles that were purchased or retrofitted to comply with any other California in-use regulation. Credits will also not be given for partially state funded vehicle replacements or retrofits according to the funding program guidelines. Credits under this section are only valid for as long as the vehicle for which the compliance action has been taken remains operational in the fleet.

(3) A fleet using the credits under this section must report the information required in section 2025(r) about the vehicle for which the compliance action has been taken and the vehicle to be treated as compliant.

~~(f) Best Available Control Technology (BACT) Requirements~~

~~Starting and every January 1, 2011 thereafter, vehicles within a fleet in which the fleet owner has elected to utilize the provisions of section 2025(f) must comply with the definitions for PM BACT, and NOx BACT as set forth in the compliance schedule shown in Table 1. Each year the fleet must meet the requirements of all prior years shown in the schedule. If all vehicles in the fleet meet the requirements of this section the fleet is exempt from the reporting requirements of section 2025(e)(9).~~

~~*Table 2: Best Available Control Technology Compliance Schedule*~~

Compliance Deadline, as of January 1	*Engine Model Years*	*BACT Requirements*
2011	Pre-1994	PM BACT
2012	2003 – 2004	PM BACT
2013	2005 – 2006	PM BACT
	1994 – 1999	NOx and PM BACT
2014	2000 – 2002	NOx and PM BACT
	2007 and later that do not meet PM BACT	PM BACT
2015	Pre-1994	NOx and PM BACT
2016	2003 – 2004	NOx and PM BACT
2017	2005 – 2006	NOx and PM BACT
2018	All pre-2007	NOx and PM BACT
2019	All pre-2007	NOx and PM BACT
2020	All pre-2007	NOx and PM BACT
2021	2007 or equivalent	NOx and PM BACT
2022	2008	NOx and PM BACT
2023	2009	NOx and PM BACT

(g) *BACT Percentage Limits.*

A fleet owner who elects to utilize the provisions of this section must comply with the applicable requirements below and the reporting requirements of section 2025(r).

(1) By January 1 of each compliance year, the fleet must meet PM BACT for the percentage of propulsion engines in the fleet, including engines installed in motorcoaches, as set forth in Table 2.

(2) By January 1 of each compliance year, the fleet, excluding motorcoaches, must meet NOx BACT for the percentage of non-motorcoach propulsion engines in the fleet as set forth in Table 2. By January 1 of each compliance year, motorcoaches in the fleet must meet MC NOx BACT for the percentage of motorcoach engines in the fleet as set forth in Table 2.

(3) If the calculated number of engines in each model year group required to be brought into compliance with the BACT percentage limits is not equal to a whole number, the owner shall round up to a whole number when the fractional part of the required number of engines is equal to or greater than 0.5, and rou. id down if less than 0.5.

Table 2: Percent of Total Fleet That Must Comply with PM and NOx BACT

Compliance Deadline as of January 1	Percent of Total Fleet Complying with BACT		Percent of Total Motorcoach Fleet Complying with BACT
	PM BACT	NOx BACT	MC NOx BACT
2011	25%	NA	NA
2012	50%	NA	NA
2013	75%	25%	NA
2014	100%	50%	NA
2015	100%	50%	NA
2016	100%	60%	NA
2017	100%	80%	50%
2018	100%	80%	50%
2019	100%	80%	50%
2020	100%	90%	50%
2021	100%	90%	90%
2022	100%	90%	90%
2023	100%	100%	100%

(h) *Fleet Averaging Option*

(1) A fleet owner who elects to be subject to provisions of section 2025(h) for compliance with the fleet average requirement for PM, NOx, or both must comply with the applicable fleet averaging requirements of sections 2025(h)(2) and (3) below and the reporting requirements of section 2025(r).

(2) *NOx Fleet Average.*

(A) A fleet owner must demonstrate that on January 1 of each compliance year, starting in 2013 and ending on January 1, 2023, the calculated NOx Index of the applicable portion of the fleet was less than or equal to the calculated NOx Target Rate.

NOx exempt vehicles, as defined in section 2025(d)(56)need not be included in the calculation of the NOx Index or the NOx fleet average for those years that the vehicle is exempt.

(B) *NOx Index:* The following equation is to be used to calculate the NOx Index.

$$NOx\ Index = \frac{Sum\ of\ EF_{(HHD)} + Sum\ of\ EF_{(MHD)} + Sum\ of\ EF_{(MC)}}{Total\ number\ of\ vehicles\ subject\ to\ the\ NOx\ requirements}$$

Where:

$EF_{(HHD)}$ = The NOx emission factor as specified in Appendix A for each heavy heavy-duty (HHD) vehicle subject to the NOx requirements, including motorcoaches, or adjusted as applicable according to paragraphs 1. and 2. below.

$EF_{(MHD)}$ = The NOx emission factor as defined in Appendix A for each medium heavy-duty (MHD) vehicle subject to the NOx requirements, or adjusted as applicable, according to paragraphs 1. and 2. below.

1. Except for 2010 model year NOx emissions equivalent engines, for propulsion engines that have been retrofitted with VDECS, the NOx emission factor is reduced by the percentage NOx emission reductions that are verified. 2010 model year NOx emissions equivalent engines shall use the emissions factor for 2010 and newer engines in Table A-2 in Appendix A.
2. The fleet owner may exclude 2010 model year engines equipped with a diesel particulate filter (DPF) from the fleet average calculation for any compliance year, and may exclude 2007 model year engines equipped with a DPF from the fleet average calculation until January 1, 2017.

(C) *NOx Target Rate*: The following equation is to be used to calculate the NOx Target Rate.

$$NOx\ Target\ Rate = \frac{Sum\ of\ Target_{(HHD)} + Sum\ of\ Target_{(MHD)} + Sum\ of\ Target_{(MC)}}{Total\ number\ of\ vehicles\ subject\ to\ the\ NOx\ requirements}$$

Where:

$Target_{(HHD)}$ = The NOx target from Table 3 for each HHD vehicle subject to the NOx requirements.

$Target_{(MHD)}$ = The NOx target from Table 3 for each MHD vehicle subject to the NOx requirements.

$Target_{(MC)}$ = The NOx target from Table 3 for each MC vehicle subject to the NOx requirements.

Table 3: Fleet NOx Targets
to be Used to Calculate NOx Target Rates (g/mile)

Compliance Deadline, as of January1	*Fleet NOx Targets for each compliance deadline*		
	MHD	HHD	MC
2013	8.5	14.4	N/A
2014	5.8	9.8	N/A
2015	5.8	9.8	N/A
2016	4.6	7.8	N/A
2017	4.0	6.0	9.8
2018	4.0	6.0	9.8
2019	4.0	6.0	9.8
2020	3.2	4.4	9.8
2021	3.2	4.4	4.4
2022	1.6	3.0	3.0
2023	0.8	1.6	1.6

(3) *PM Fleet Average.*

(A) A fleet owner must demonstrate that on January 1 of each year starting in 2011 and ending on January 1, 2023, the PM Index of the applicable portion of the fleet was less than or equal to the calculated PM Target Rate.

(B) *PM Index.* The following equation is to be used to calculate the PM Index:

$$PM\ Index = \frac{Sum\ of PMEF_{(HHD)} + Sum\ of PMEF_{(MHD)}}{Total\ number\ of\ vehicles\ subject\ to\ the\ PM\ fleet\ averaging\ requirement}$$

Where:

$PMEF_{(HHD)}$ = The PM emission factor (g/mile) as specified in Appendix A for each heavy heavy-duty (HHD) vehicle, including motorcoaches, or adjusted according to paragraph 1. below, as applicable.

$PMEF_{(MHD)}$ = The PM emission factor (g/mile) as specified in Appendix A for each medium heavy-duty (MHD) vehicle or adjusted as applicable according to paragraph 1. below.

1. For a propulsion engine that has been retrofitted with a VDECS, the PM Emission Factor is reduced 50 percent for a level 2 VDECS, and 85 percent for a level 3 VDECS; the PM Emission Factor is not reduced for a level 1 VDECS

(C) *PM Target Rate:* The following equation is to be used to calculate the

~~PM Target Rate~~

$$PM\ Target\ Rate = \frac{Sum\ of\ PM\ Target_{(HHD)} + Sum\ of\ PM\ Target_{(MHD)}}{Total\ number\ of\ vehicles\ subject\ to\ the\ PM\ fleet\ averaging\ requirement}$$

~~Where:~~

~~$PMTarget_{(HHD)}$ = The PM target (g/mile) from Table 4 for each HHD vehicle subject to the PM fleet averaging requirements.~~

~~$PMTarget_{(MHD)}$ = The PM target (g/mile) from Table 4 for each MHD vehicle subject to the PM fleet averaging requirements.~~

~~*Table 4: Fleet PM Targets to be Used to Calculate PM Target Rates (g/mile)*~~

~~*Compliance Deadline, as of January 1*~~	~~*Fleet PM Targets for each compliance deadline*~~	
	~~MHD~~	~~HHD~~
~~2011~~	~~0.38~~	~~0.710~~
~~2012~~	~~0.29~~	~~0.530~~
~~2013~~	~~0.17~~	~~0.320~~
~~2014~~	~~0.06~~	~~0.110~~
~~2015~~	~~0.06~~	~~0.110~~
~~2016~~	~~0.06~~	~~0.110~~
~~2017~~	~~0.06~~	~~0.110~~
~~2018~~	~~0.06~~	~~0.110~~
~~2019~~	~~0.06~~	~~0.110~~
~~2020~~	~~0.06~~	~~0.110~~
~~2021~~	~~0.06~~	~~0.110~~
~~2022~~	~~0.06~~	~~0.110~~
~~2023~~	~~0.06~~	~~0.110~~

~~(i) *Optional Requirements for Small Fleets*~~

~~(1) For any compliance deadline, small fleet owners may comply with the requirements of section 2025(e)(1), which includes the requirement to comply with BACT in section 2025(f), the BACT percentage limits of 2025(g), or the fleet averaging option of 2025(h), or by complying with the following optional compliance requirements.~~

~~(2) Small fleets must comply with the general requirements of section 2025(e) except that in lieu of the requirements of sections 2025(e)(1), the owner of a small fleet may comply by having the following:~~

~~(A) Fleets with One Vehicle~~

~~Beginning January 1, 2014, a fleet consisting of one vehicle must have that vehicle equipped with a 2004-2006 model year NOx emissions~~

~~equivalent or newer engine that has the highest level VDECS for reducing PM emissions installed. By January 1, 2019, the vehicle must meet the requirements of BACT in section 2025(f).~~

~~(B) Fleets with Two Vehicles~~

~~Fleets with two vehicles may meet the requirements of 1. or 2. below.~~

~~1. a. Beginning January 1, 2014, the fleet must have one vehicle equipped with a 2004-2006 model year NOx emissions equivalent or newer engine that has the highest level VDECS for reducing PM emissions installed and the second vehicle in the fleet must meet the requirements of BACT in section 2025(f); and~~

~~b. By January 1, 2019, the 2004-2006 model year vehicle identified in a. above must meet the requirements of BACT in section 2025(f).~~

~~2. a. Beginning January 1, 2014 the fleet must have one vehicle equipped with a 2010 NOx emissions equivalent or newer engine and the second vehicle equipped with the highest level VDECS for reducing PM emissions; and~~

~~b. By January 1, 2017, the second vehicle must meet the requirements of BACT in section 2025(f).~~

~~(C) *Fleets with Three Vehicles*~~

~~Fleets with three vehicles may meet the requirements of 1., 2., or 3. 2. below.~~

~~1. a. Beginning January 1, 2014, the fleet must have one vehicle equipped with a 2004-2006 model year NOx emissions equivalent or newer engine that has the highest level VDECS for reducing PM emissions installed and the other two vehicles in the fleet must meet the requirements of BACT in section 2025(f);~~

~~b. Beginning January 1, 2019, all three vehicles in the fleet must be in compliance with the requirements of section 2025(e).~~

~~2. a. Beginning January 1, 2014, the fleet must have one vehicle equipped with a 2010 model year emissions equivalent or newer engine, and a second vehicle equipped with a 2004-2006 model year NOx emissions equivalent or newer engine that has the highest level VDECS for reducing PM emissions; the third vehicle is exempt the requirements of sections 2025(f), (g), or (h) until January 1, 2016 when it must meet the requirements of BACT in section 2025(f).from the PM and NOx requirements.~~

~~b. Beginning January 1, 2019, all three vehicles in the fleet must be in compliance with the requirements of section 2025(e).~~

(k)~~(j)~~ *Requirements for ~~Schoolbuses~~School Buses*

This section applies to school buses as defined in section 2025(d)(52) with a GVWR greater than 26,000 lbs. Except school buses with a GVWR greater than 14,000 lbs manufactured before April 1, 1977, school buses less than 26,001 lbs are exempt from the requirements of section 2025(k).

(1) Phase-in Requirements for School Buses with a GVWR greater than 26,000 lbs

Fleets with school buses manufactured on or after April 1, 1977, with a GVWR greater than 26,000 lbs, must comply with PM BACT as defined in section 2025(d)(47), pursuant to the schedule set forth in Table 4 below.

Table 4: Compliance Schedule for School Buses with a GVWR greater than 26,000 lbs

Compliance Deadline, as of January 1	*Percent of Fleet Complying with PM BACT*
2012	33%
2013	66%
2014	100%

(2) Relief for School Bus Fleets that have Downsized

(A) Until January 1, 2014, a fleet having fewer school buses, with a GVWR greater than 14,000 lbs, on January 1 of the compliance year than it had in the 2006 baseline year may reduce the percent requirement in Table 4 by the same percentage that the fleet has downsized.

For example, a fleet that is 20 percent smaller than it was in 2006 would subtract 20 percent from the annual compliance requirement. If the compliance requirement for the year is 33 percent, the fleet would need to demonstrate that it had PM filters on the 13 percent of the existing fleet (33%-20%=13%).

(B) The credits are not transferrable except with appropriate documentation of a change of business form such as sole proprietorship to partnership or partnership to corporation, or for mergers or acquisitions of the entire company and fleet.

(3) Credits for Hybrid School Buses, Alternative Fueled School Buses, and School Buses with Pilot Ignition Engines

Fleets with fuel efficient hybrid school buses, alternative fueled school buses, or school buses with pilot ignition engines with a GVWR greater than 14,000 lbs shall receive a credit to treat another school bus as compliant until January 1, 2014. A school bus with a dual-fuel engine is not eligible. This credit is not available for school buses that were purchased or retrofitted to comply with any other California in-use regulation. This credit is not available if state funds where used to partially

or totally replace or retrofit any school bus unless allowed by the guidelines of the program that funded the bus replacement or retrofit.

(4) Credits for PM VDECS or Replacement School Buses between 14,001 and 26,000 lbs GVWR

For each school bus in the fleet, with a GVWR greater than 14,000 and less than or equal to 26,000 lbs, equipped with a PM VDECS or an OEM diesel particulate filter that replaced an older bus, the fleet may treat another school bus with a GVWR greater than 26,000 lb as compliant until January 1, 2014.

(5) Extension of Deadline for Unavailability of VDECS

If a school bus engine cannot be equipped with the highest level VDECS for PM the school bus owner must:

(A) Record and submit to the Executive Officer the information listed in section 2025(k)(5)(B) through (E) by January 31 of each compliance year through January 31, 2017. By January 1, 2018, this extension expires and all school buses must be replaced with a vehicle that is 2010 model year emissions equivalent or one that complies with the BACT compliance schedule (i.e., a 1998 model year engine or newer school bus equipped with the highest level VDECS for PM).

(B) Describe the reasons that a compliance extension is needed for each engine or engine-vehicle combination annually.

(C) If during the warranty period, the VDECS would void the engine warranty, provide a statement from the engine manufacturer, or authorized engine dealer, or vehicle dealer that explains why the warranty would be voided.

(D) If no verified VDECS is commercially available, provide a list of VDECS manufacturers that have been contacted and the manufacturers' responses to your requests to purchase a VDECS from them.

(E) If a verified VDECS is commercially available, but the VDECS manufacturer or an authorized VDECS installer does not deem the VDECS to be technologically feasible for the school bus, provide a statement from the VDECS manufacturer or authorized VDECS installer.

(6) Low-use School Buses

(A) School buses operating fewer than 1,000 miles during any compliance year are exempt from the Requirements for School buses in section 2025(k), but fleet owners must comply with the record keeping requirements of section 2025(s)(3). Such vehicles must have a properly functioning odometer installed at all times.

(B) A fleet owner of a school bus that exceeds 1,000 miles in any compliance year must immediately count the school bus as part of the fleet, bring the fleet into compliance with the requirements of 2025(k) in the current compliance year and notify the Executive Officer of the change in status within 30 days of exceeding the mileage limit.

(7) Any school bus, with a GVWR greater than 14,000 lbs, manufactured before April 1, 1977, must be retired from service no later than January 1, 2012.

(8) Title 13, CCR section 1272(c) requires that a schoolbus that has been retrofit with a VDECS must receive a safety inspection from an authorized employee of the department of the California Highway Patrol, prior to its return to service.

(9) School buses that were equipped on or before December 31, 2005, with a Level 2 VDECS, which was highest level VDECS at the time of installation, are considered in compliance with PM BACT.

(10) Section 2025(c)(10) exempts school buses meeting the definition in section 2025(d)(36) of a historic vehicle.

(11) Owners of school buses are subject to the recordkeeping requirements in section 2025(s)(3).

(12) Owners of school buses are subject to the applicable requirements of sections 2025(t) through (z).

~~Beginning with the applicable effective dates set forth below, a schoolbus fleet, as defined in section 2025(d)(34)(D), and a schoolbus sub-fleet as defined in section 2025(d)(34)(E) must comply with the following requirements of this regulation:. Schoolbuses within a schoolbus fleet or a schoolbus sub-fleet are exempt from meeting NOx BACT in section 2025(f), (g) and NOx fleet averaging in section 2025(h).~~

~~(1) Any schoolbus manufactured before April 1, 1977, must be retired from service no later than January 1, 2012.~~

~~(2) Each schoolbus fleet or schoolbus sub-fleet must comply with the best available control technology (BACT) requirements of section 2025(j)(4) or the PM BACT percentage limit requirements of 2025(g) or the PM fleet averaging option of 2025(h)(3).~~

~~(3) By January 1, 2014, all diesel-fueled schoolbuses shall be retrofitted with the highest level VDECS available. Engines equipped with a diesel particulate filter by the engine manufacturer as original equipment are considered in compliance with this requirement.~~

~~(4) Each schoolbus fleet or schoolbus sub-fleet owner who chooses the BACT option must meet the PM BACT as defined in section 2025(d)(62) according to the compliance schedule shown in Table 5.~~

~~(5) If a schoolbus engine cannot be retrofitted with highest level VDECS fc. . M then the engine shall be replaced with an engine that can be retrofitted with the highest level VDECS by January 1, 2018, subject to meeting the annual extension requirements of section 2025(p)(11). The schoolbus must be included in the compliance method calculation described in section 2025(j)(2) and the reporting and record requirements in section 2025(j)(9).~~

~~(6) After a schoolbus has been retrofitted with a VDECS, it must receive a safety inspection from an authorized employee of the department of the California~~

Highway Patrol, as required by title 13, California Code of Regulations (CCR) section 1272(c), prior to its return to service.

Table 5: Best Available Control Technology Compliance Schedule for Schoolbus Fleets

Compliance Deadline, As of January 1	*Engine Model Years*
2011	2000 and newer
2012	1994 – 1999
2013	1987 – 1993
2014	Pre-1987

(7) *Special Provisions for Schoolbuses*

(A) An owner of a schoolbus fleet or schoolbus sub-fleet may be granted credit for hybrid schoolbuses or alternative fuel schoolbuses according to the provisions of sections 2025(p)(8) and (9), respectively.

(B) *Low-use Schoolbuses*

1. Schoolbuses that meet the definition of a low-use schoolbus are exempt from the requirements of section 2025(j)(2) but the owner must keep records and meet the reporting requirements in accordance with sections 2025(j)(9) and 2025(s)(4).
2. Low-use schoolbuses need not be included when determining compliance with the BACT percent limits of section 2025(g) or when calculating PM fleet average indices or target rates for the fleet averaging option of section 2025(h)(3).
3. Schoolbuses that formerly met the low-use schoolbus definition, but for which mileage subsequently increases to 1,000 miles or greater, must immediately meet the requirements of Table 5 above or section 2025(g) or (h) as required for the immediately preceding compliance deadline.

(C) Schoolbuses that were retrofitted on or before December 31, 2005 with a level 2 VDECS, which was highest level VDECS at the time of installation, are considered in compliance with PM BACT.

(8) Schoolbuses registered as historic vehicles, as defined in section 2025(d)(41) are not subject to the regulation.

(9) *Reporting Requirements for Schoolbus Fleets and Schoolbus Sub-Fleets*

The owner of a schoolbus fleet or a schoolbus sub-fleet is subject to the reporting requirements in section 2025(r)(14) if complying with the PM BACT percentage limit requirements of 2025(g) or the PM fleet averaging option of 2025(h)(3) or any of the special provisions in section 2025(p).

(10) Schoolbus fleets and schoolbus sub-fleets are subject to the applicable requirements of sections 2025(t) through (z).

(l) Requirements for Drayage Trucks and Utility Vehicles

(A) Drayage trucks that are subject to the Drayage Truck regulation may be included in the fleet for purposes of complying with the requirements of section 2025(e) only if all drayage trucks are included. Fleets must include all drayage trucks when complying with the Phase-in Option for Large Fleets of section 2025(i).

(B) Starting January 1, 2017, all drayage truck owners must comply with the requirements of section 2025(e).

(C) Drayage trucks may not utilize any of the credits in section 2025(j) or exemptions and extensions in section 2025(p).

(D) Starting January 1, 2021, all private utility vehicle owners must comply with the requirements of section 2025(e).

~~(k) *Retired Vehicle Credit*~~

~~(1) Until January 1, 2014, a fleet may obtain credit equivalent to one 2010 engine for purposes of determining BACT in section 2025(g) or for calculating the PM and NOx indices and target rates in 2025(h). Any fleet utilizing the retirement credit provision must comply with the reporting requirements of section 2025(r) beginning March 31, 2010,by January 31, 2012, and report information for all vehicles in the 2008 baseline fleet.~~

~~(2) For purposes of calculating the BACT percentage limits in section 2025(g) credit will be given equal to a 2010 model year engine for each vehicle retired, that reduces the number of vehicles in the fleet compared to the baseline fleet as defined in section 2025(d)(3).~~

~~(3) For purposes of calculating the PM and NOx indices and target rates in fleet averaging 2025(h) the fleet shall use the following approach:~~

~~(A) If the number of MHD vehicles in the fleet has declined then the emissions factor used shall be the same as a 2010 model year engine emissions factor for each MHD vehicle retired up to the total number of vehicles reduced from the 2008 baseline fleet.~~

~~(B) If the number of HHD vehicles in the fleet has declined then the emissions factor used shall be the same as a 2010 model year engine emissions factor for each HHD vehicle retired up to the total number of vehicles reduced from the 2008 baseline fleet.~~

~~(4) Retirement credits will be retained upon appropriate documentation of a change of business form such as sole proprietorship to partnership or partnership to corporation, but not for mergers, acquisitions, sales or purchases.~~

~~(l) *Requirements for Motorcoaches*~~

~~Motorcoaches are exempt from meeting NOx BACT in sections 2025(f) or (g), or the NOx fleet averaging in section 2025(h) until January 1, 2017. Beginning January 1, 2017, fleets with motorcoaches complying with the BACT percentage limits of section 2025(g) or the fleet averaging requirements of section 2025(h), would include the MC NOx BACT emissions factor from Table 2 and the MC NOx target value from Table 3 when calculating the NOx target rate and fleet average NOx emissions for the fleet.~~

(m) *Requirements for Agricultural Fleets*

Beginning January 1, 2011, agricultural vehicles shall be exempt from the requirements of sections 2025(f) and (g) if they meet the definition of an agricultural vehicle and remain below the applicable mileage limits for the period specified. Vehicles meeting the specialty vehicle definition would have no mileage restrictions. Fleets must comply with the reporting and record keeping requirements of sections 2025(r) and (s).

(1) Beginning January 1, 2011 through January 1, 2017, any vehicle meeting the definition of an agricultural vehicle, as defined in section 2025(d)(5), that remains below the annual mileage limits in Table 5 below are exempt from the requirements of section 2025(f) and (g).

Table 5: Agricultural Vehicle Mileage Limits

Engine Model Year	Mileage Limits
1995 and earlier	15,000 miles
1996-2005	20,000 miles
2006 or newer	25,000 miles

(2) Agricultural vehicles that have not exceeded 10,000 miles per year between January 1, 2011 and January 1, 2017, shall continue to be exempt from the requirements of 2025(f) and (g) until January 1, 2023, so long as the 10,000 mile limit is not exceeded.

(3) Beginning January 1, 2017, all agricultural vehicles that have exceeded 10,000 miles in any calendar year since January 1, 2011, must comply wit the best available control technology (BACT) requirements of section 2025(f) and (g).

(4) Specialty agricultural vehicles, as defined in section 2025(d)(53), are exempt from the requirements of sections 2025(f) and (g) until January 1, 2023 regardless of annual miles traveled.

(5) A qualifying agricultural vehicle must be operational, functional, able to start without assistance, and be able to move under its own power. Vehicles that are being used for parts do not qualify as an agricultural vehicle subject to section 2025(m).

(6) Agricultural fleet owners utilizing the agricultural provisions of section 2025(m) must report and comply with the requirements of section 2025(r) and 2025(s).

(7) Within 30 days of replacing a qualifying agricultural or specialty agricultural vehicle, the agricultural fleet owner must report the required information in section 2025(r)(14)(I).

(8) The maximum number of qualifying agricultural vehicles in a fleet shall be established by the number of agricultural vehicles in the fleet as of January 1, 2009, as reported in section 2025(r)(14). This number shall not increase from one year to the next.

(9) An agricultural vehicle may be replaced by another vehicle so long as the replacement vehicle is equipped with an engine that is at least one model year newer than the engine in the vehicle it replaced, and provided the original vehicle is scrapped, rendered inoperable, sold out of the agricultural fleet, or will no longer meet the definition of an agricultural or specialty agricultural vehicle. This

requirement does not apply if just the engine is being replaced and not the entore vehilce.

(7) When a qualifying agricultural vehicle is replaced, the sum of the miles accrued on the original vehicle in that calendar year, up to the time of replacement, plus the mileage accrued on the replacement vehicle for the remainder of the calendar year (beginning with the date of replacement) must remain below the mileage thresholds based on the model year of the engine in the replacement vehicle.

(8) A merger of two or more agricultural fleets may not result in more agricultural vehicles after the merger occurs than the sum of the agricultural vehicles in the individual agricultural fleets included in the merger.

(9) Beginning January 1, 2017, all agricultural vehicles that have exceed 10,000 miles in any calendar since January 1, 2011, must comply with the best available control technology (BACT) requirements of section 2025(f) and (g).

~~(1) Beginning January 1, 2011, vehicles meeting the definitions of limited-mileage agricultural vehicles, or low-mileage agricultural vehicles, shall be exempt from the requirements of sections 2025(f), (g), and (h) for the periods specified in the definitions, provided that such vehicles meet the conditions set forth below. Provisions for specialty agricultural vehicles, as defined in section 2025(d)(69)(74), are provided below. To qualify for any of these provisions, such vehicles must be operational and functional, including being able to start without assistance and able to move under its own power. Vehicles that are being used for parts are not included in these provisions.~~

~~(2) For all other vehicles in the agricultural fleet, beginning January 1, 2011, the fleet owner must comply with the best available control technology (BACT) requirements of section 2025(f), the BACT percentage limits of section 2025(g) or the fleet average requirements of section 2025(h).~~

~~(3) Agricultural fleet owners utilizing the agricultural provisions of section 2025(m) must report and comply with the requirements of section 2025(r) and 2025(s) for all vehicles subject to this regulation for each compliance year, regardless of whether the vehicle is an agricultural vehicle or not.~~

~~(4) Within 30 days of replacing a low-mileage, limited-mileage, or specialty agricultural vehicle, the agricultural fleet owner must report the required information in section 2025(r)(15)(J).~~

~~(5) All vehicles must comply with the requirements of section 2025(e) for the next compliance date upon it being discovered that any vehicle in the agricultural fleet does not comply with any of the requirements of this agricultural fleet provision.~~

~~(6) Requirements for limited-mileage agricultural vehicles~~

~~(A) The maximum number of limited-mileage agricultural vehicles in any agricultural fleet shall be established by the number of limited-mileage vehicles in the agricultural fleet as of January 1, 2009, as reported in section 2025(r)(15). This number shall not increase.~~

(B) A limited-mileage agricultural vehicle may be replaced by another vehicle so long as the replacement vehicle is equipped with an engine that is at least one model year newer than the engine in the vehicle it replaced, and provided the original vehicle is scrapped, rendered inoperable, replaces a low-mileage agricultural vehicle according to section 2025(m)(7)(C), or is sold out of the agricultural fleet. This requirement does not apply to engine replacements.

(C) When a limited-mileage agricultural vehicle is replaced, the sum of the miles accrued on the original vehicle in that calendar year, up to the time of replacement, plus the mileage accrued on the replacement vehicle for the remainder of the calendar year (beginning with the date of replacement) must remain below the mileage thresholds established in section 2025(d)(44) based on the model year of the engine in the replacement vehicle.

(D) Beginning January 1, 2017, all limited-mileage agricultural vehicles that do not meet the definition of a low-mileage agricultural vehicle as defined in section 2025(d)(45) must comply with the best available control technology (BACT) requirements of section 2025(f) or the fleet average requirements of section 2025(h).

(E) A vehicle that formerly met the limited-mileage agricultural vehicle definition, but whose use increases above the mileage thresholds established in section 2025(d)(44) based on the model year of the engine, must immediately meet the requirements of section 2025(f) or (h) for the immediately preceding compliance deadline.

1. In addition, the vehicle may not be replaced and the number of limited-mileage agricultural vehicles in the agricultural fleet, as established in section 2025(m)(6)(A) above, shall be reduced by one.

(F) A merger of two or more agricultural fleets having designated limited mileage vehicles may not result in more designated limited mileage vehicles after the merger occurs than the sum of the total limited mileage vehicles from each individual agricultural fleet included in the merger.

(7) Requirements for low-mileage agricultural vehicles

(A) The maximum number of low-mileage agricultural vehicles in each agricultural fleet shall be established by the number of low-mileage vehicles in the agricultural fleet as of January 1, 2009, as reported in section 2025(r)(15). This number shall not increase.

(B) A low-mileage agricultural vehicle may be replaced with another vehicle if the replacement vehicle is equipped with an engine that is at least one model year newer than the engine in the vehicle being replaced, and provided the original vehicle is scrapped, rendered inoperable, or sold out of the agricultural fleet. This requirement does apply to engine replacements.

(C) When a low-mileage agricultural vehicle is replaced, the sum of the miles accrued on the original vehicle in that calendar year, up to the time of replacement, plus the mileage accrued on the replacement vehicle for the

~~remainder of the calendar year (beginning with the date of replacement) must remain below the mileage threshold established in section 2025(d)(45).~~

~~(D) Beginning January 1, 2023, all low-mileage agricultural vehicles must comply with the best available control technology (BACT) requirements of section 2025(f).~~

~~(E) Irrespective of section 2025(m)(7)(A) a vehicle that formerly met the low-mileage agricultural vehicle definition, but whose use increases above the mileage thresholds established in section 2025(d)(45), must immediately meet the requirements of section 2025(f) or (h) for the immediately preceding compliance deadline. The vehicle may not be replaced in the future with a substitute low-mileage agricultural vehicle, and the number of low-mileage agricultural vehicles in the agricultural fleet, as established in section 2025(m)(7)(A) above, shall be reduced by one.~~

~~(F) A merger of two or more agricultural fleets having designated low-mileage vehicles may not result in more designated low-mileage vehicles after the merger occurs than the sum of the total low-mileage vehicles from each individual agricultural fleet included in the merger.~~

~~(G) Until January 1, 2017, an agricultural fleet owner may change the status of a low-mileage vehicle to a limited-mileage vehicle provided the vehicle continues to meet the definition of a limited-mileage vehicle. The low-mileage vehicle may not be replaced and the number of low-mileage agricultural vehicles in the agricultural fleet, as established in section 2025(m)(7)(A) above, shall be reduced by one~~

~~(8)~~(10) Requirements for specialty agricultural vehicles

(A) Specialty agricultural vehicles, as defined in section 2025(d)~~(69)~~(53), are exempt from the requirements of sections 2025(f) and 2025(g)~~, (g), and (h)~~ until January 1, 2023.

(B) The Executive Officer will approve a vehicle as qualifying as a specialty agricultural vehicle under the following conditions:

1. The total number of specialty agricultural vehicles operating in the San Joaquin Valley Air Basin does not exceed 1,100, and
2. The total number of specialty agricultural vehicles in the state does not exceed 2,200.

(C) If more vehicles are reported than allowed by the limits, the Executive Officer will randomly approve one vehicle per eligible fleet until all fleets have one approved vehicle, then randomly approve another vehicle for the remaining eligible fleets until they all have one more vehicle approved. Vehicles will continue to be approved in this manner until the limits have been met. Vehicles reported by March 31, 2010 will be given priority should the limits identified in section 2025(m)(B) above be exceeded.

(D) All vehicles with the body types described in section 2025(d)~~(69)~~(53) that have not been approved must meet the requirements of section 2025(e) or the agricultural provisions of section 2025(m).

1. In such an instance, the agricultural fleet operator shall be notified in writing by the Executive Officer that the reported vehicle is not eligible as a specialty agricultural vehicle.

(E) A fleet that replaces an agricultural specialty vehicle will not affect the number of approved specialty vehicles in the fleet so long as the replacement vehicle meets the specialty vehicle body type and use requirements.

(11) *Optional Phase in for Log Trucks*

Beginning January 1, 2012, fleets with log trucks as defined in section 2025(d)(39) may opt to have the log trucks in the fleet comply by meeting all of the requirements as set forth below in lieu of meeting the requirements in sections 2025(g) or 2025(i).

(A) Fleet owners may phase in 2010 model year emission equivalent engines according to the compliance schedule shown in Table 6.

(B) If the calculated number of engines in each model year group required to be brought into compliance with the percentage limits is not equal to a whole number, the owner shall round up to a whole number when the fractional part of the required number of engines is equal to or greater than 0.5, and round down if less than 0.5.

(C) The number of log trucks and qualifying agricultural vehicles cannot exceed the number of vehicles in the fleet as of January 1, 2009.

(D) The total number of qualifying log trucks cannot increase from one year to the next.

(E) Fleets utilizing the log truck provision must comply with the reporting requirements of section 2025(r) for all log trucks.

(F) Qualifying log trucks may not utilize any of the credits of section 2025(j) or any of the extensions or exemptions of section 2025(p).

(G) The remaining vehicles in the fleet other than log trucks, must comply with the requirements of section 2025(e).

Table 6: Reported Percent of Log Trucks that Must have 2010 Model Year Emissions Equivalent

Compliance Deadline as of January 1	Percent of Total Fleet Complying with BACT
2011	0%
2012	0%
2013	0%
2014	10%
2015	20%
2016	30%
2017	40%
2018	50%
2019	60%
2020	70%
2021	80%
2022	90%
2023	100%

~~(9)~~(12) Labeling Requirements for Agricultural Vehicles and Log Trucks

(A) Within 30 days of the reporting date, fleet owners must permanently affix or paint an AG identification label on each low-mileage, limited-mileage, ~~and~~ specialty agricultural vehicle, and log truck reported in the fleet according to the following specification:

1. The letters AG shall be white block lettering on a black background. Both letters shall be at least three inches high on a five by eight inch background,
2. The label shall be located in clear view on the left and right door of the vehicle and be in clear view at all times.

(n) *Requirements for Two-Engine Sweepers*

(1) Two-engine sweepers with auxiliary engines 50 hp or greater must comply with section 2025(e). The propulsion engine is required to meet PM BACT and to upgrade to a 2010 model year emission equivalent engine. The auxiliary engine is required to meet PM BACT when the propulsion engine is required to meet PM BACT or be 2010 model year emissions equivalent.

~~(1) Two-engine sweepers must comply with section 2025(e) and must meet PM BACT on the auxiliary engine, 50 hp or greater, when the propulsion engine is required to meet PM BACT according to the compliance option chosen under section 2025(f), section 2025(g) or 2025(h).~~

(2) Regardless of fleet size, two-engine sweepers may not operate any Tier 0 auxiliary engine, 50 hp or greater, more than 450 hours per year starting January 1, 2010 until January 1, 2014 and no more than100 hours per year thereafter.

(3) Labeling Requirements for Two-Engine Sweepers with Tier 0 Auxiliary Engines

(A) Within 30 days of the reporting date, fleet owners must permanently affix or paint an SW identification label on each two engine sweeper in the fleet ~~if using BACT percentage limits or fleet averaging upon reporting~~ according to the following specification:

1. The letters SW shall be white block lettering on a black background. Both letters shall be at least three inches high on a five by eight inch background~~.~~; and

2. The label shall be located on the left and right door of the vehicle and be in clear view at all times.

(o) *Requirements for a New Fleet and ~~Adding Vehicles to a Fleet~~Change in Status of an Existing Fleet*

(1) *New Fleet Requirements.* Owners of new fleets must meet the requirements of section 2025(e) immediately upon purchasing vehicles subject to the regulation or bringing such vehicles into the State of California for the first time after ~~January 1, 2011~~January 1, 2012. New fleets meeting the requirements of sections 2025(h) or 2025(i) ~~2025(g) or (h)~~ must report vehicles subject to the regulation to ARB within 30 days of purchasing or bringing such vehicles into the State, in accordance with the requirements in section 2025(r).

(2) *Change in Status of an Existing Fleet*

(A) *Adding Vehicles to an Existing Fleet.* ~~If a fleet does not meet the BACT requirements of section 2025(f), before~~ Before a ~~the~~ fleet may operate a newly added vehicle in service, or operate a vehicle that was previously reported as non-operational, in California, it must ~~within 30 days of adding the vehicle,~~ file a report with the Executive Officer that it has added a new vehicle, and the Executive Officer shall approve the vehicle for service operation upon the fleet demonstrating ~~demonstrate~~ that the fleet, as newly constituted, complies with the requirements of sections 2025(o)(2)~~(A), (B), and~~ (C) below. The fleet shall file the report to the Executive Officer within 30 days of adding the vehicle. If the vehicle added can comply by meeting PM BACT, the vehicle may be operated prior to receiving Executive Officer approval for the purpose of having the vehicle's exhaust temperature data logged.

(B) *Removing Vehicles from an Existing Fleet.* If an existing fleet does not meet the requirements of section 2025(f) or 2025(g) when a vehicle is removed from the fleet, it must file a report with the Executive Officer that it has removed a vehicle and demonstrate that the fleet, as newly constituted, will comply with the requirements of sections 2025(o)(2)(C)1 and 2 within 30 days of removal of the vehicle.

(C) *Compliance Requirements for an Existing Fleet that has Changed Status*

~~(A)~~1. A fleet owner who elects to utilize the phase-in option ~~BACT percentage limits option~~ of section 2025~~(g)~~(i) may not add or remove vehicles that cause the percentage calculated for the fleet to fall below the percentage required for the previous compliance date.

~~(B) A fleet owner who elects to utilize the fleet averaging requirements of section 2025(h) may not add vehicles that cause the fleet to exceed the fleet average target rates for the immediately preceding compliance deadline.~~

~~(C)~~2. ~~Until January 1, 2017, the~~ The addition of vehicles with 2007 or newer ~~through 2009~~ model year engines need not be reported until the next compliance date unless;

~~1.~~ a. the addition will cause a fleet to increase its size to greater than three vehicles or, ~~a fleet with three or fewer vehicles changes to a fleet with four or more or~~,

~~2.~~b. a fleet is utilizing the relief for fleets that have downsized ~~retired vehicle credit~~ of section 2025~~(k)~~(i)(5).

~~(D) The addition of vehicles with 2010 model year or newer engines that meet PM BACT need not be reported until the next compliance date;~~

(p) *Exemptions and Extensions* ~~*Exemptions, Compliance Extensions, and Credits*~~

~~A fleet owner may be granted an extension to a compliance deadline if:~~

~~(1) *Exemption from Meeting NOx BACT.* Upon providing documentation demonstrating compliance with the conditions listed below in paragraphs (A) through (D), the Executive Officer will exempt the vehicles identified in those paragraphs from meeting NOx BACT in sections 2025(f) or (g), or the NOx fleet average in section 2025(h). If an exemption is granted, all such vehicles affected will continue to be subject to meeting PM BACT in sections 2025(f) or (g), or the PM fleet average in section 2025(h) and the record keeping and reporting requirements of this regulation.~~

~~*(A) A vehicle that meets the definition of NOx mileage exempt vehicle, as defined in section 2025(d)(58) , prior to January 1, 2021.*~~

~~If an emergency support vehicle is used both for emergency operation as defined in section 2025(d)(27), and for other purposes, the owner does not need to consider the hours of operation or the mileage the vehicle accrues when used for emergency operations in a compliance year, in determining whether the vehicle meets the definition of a NOx mileage exempt vehicle for that compliance year.~~

~~*(B) A vehicle that operates solely in the NOx exempt areas defined in section (d)(55) prior to January 1, 2021. A NOx-exempt vehicle is allowed to travel outside of the NOx-exempt area only for repairs or other service to the vehicle. The vehicle owner must obtain a work order from the facility that*~~

~~*describes the service and shows the date of the service and location of the facility.*~~

~~*(C) Schoolbuses as defined in section 2025(d)(67).*~~

~~*(D) Motorcoaches as defined in section 2025(d)(49) prior to January 1, 2017.*~~

~~(E) Early compliance action. If a fleet owner installs the highest level VDECS for PM on one or more vehicles before January 1, 2010, the owner is exempt from the NOx BACT requirements of sections 2025(f), the NOx BACT percent limits of section 2025(g) and the NOx fleet averaging requirements of section 2025(h) until January 1, 2014 for each vehicle that has been retrofitted early.~~

~~(2) *Exemption for Cab-Over-Engine Truck Tractors.* Upon providing documentation demonstrating compliance with the conditions listed below in paragraphs (A) through (E), the Executive Officer will not require the type of vehicle listed in paragraph (A) to be replaced in order to meet the fleet's NOx BACT prior to January 1, 2018, but the fleet owner will still be required to include the vehicle in the fleet if complying using the BACT percentage limits of section 2025(g) or the fleet averaging option of section 2025(h):~~

~~(A) The vehicle is a truck tractor where the cab sits over the engine on the chassis and it is used exclusively to pull 57 foot trailers~~

~~(B) The PM performance requirement for the vehicle has been met and,~~

~~(C) The engine installed in the vehicle is at least a 2004 model year NOx emissions equivalent and,~~

~~(D) On the compliance date, all vehicles in the fleet that do not qualify for the exemption under this section have met the requirements of section 2025(e) and,~~

~~(E) The law limiting the total length of a combination vehicle to 65 feet as described in section 35401(a) of the California Vehicle Code has not been amended prior to January 1, 2010 to increase the length restriction.~~

(1) *Exemption for 1997 and Older Model Year Engines in Vehicles with a GVWR Greater than 26,000 lbs Operating Exclusively in NOx Exempt Areas*

Fleets having vehicles with a GVWR greater than 26,000 lbs with model year engines 1997 or older that operate exclusively in the NOx exempt areas as defined in section(d)(45) may optionally have the vehicles meet PM BACT and upgrade to being 2010 model year emissions equivalent pursuant to the schedule set forth in Table 7 below.

(A) If the option is selected, the vehicles will be subject to the electronic tracking reporting requirements of section 2025(r)(16)(A)2, unless the fleet chooses to label the vehicles as described in section 2025(p)(1)(B) below. Fleet owners utilizing this exemption must comply with the reporting and record keeping requirements of section 2025(r) and (s). No reporting is required for fleets that choose the labeling option unless suitable VDECS is not available.

(B) Fleets using this exemption are allowed to have the vehilces travel outside of the NOx exempt area only for repairs or other services to the vehicle. The vehicle owner must obtain a work order from the facility that describes the service and it must show the date of the service and the location of the facility.

1. Optional Labeling Requirements for Vehicles Operating Exclusively in the NOx Exempt Areas – Fleet owners electing this option must affix or paint an NE identification label on each vehicle that operates exclusively in the NOx exempt areas according to the following specification:

a. The letters NE shall be white block lettering on a black background. Both letters shall be at least three inches high on a five by eight inch background.

b. The label shall be located in clear view on the left and right door of the vehicle and be in clear view at all times.

Table 7: NOx Exempt Area Compliance Schedule

Compliance Deadline, as of January 1	*Existing Engine Model Year*	*BACT Requirements*
2012	1998-2000	PM BACT
2013	2001-2004	
2014	2005 and newer	
2015	1993 and older	
2016	1994-1995	
2017	1996-1997	
2021	2004 and older	Replace with 2010 engine or equivalent emissions
2022	2005-2006	
2023	All vehicles	

(2) *Unique Vehicle Extension* - The fleet owner may apply for and the Executive Officer will grant a one year extension from requirement to upgrade to a 2010 model year emissions equivalent engine if by January 1, 2014, a used vehicle or suitable cab and chassis that performs a similar function with a 2010 emissions engine equivalent is not available and the highest level VDECS for PM has been installed.

~~(3) *Provisions for Unique Vehicles.* Upon providing documentation demonstrating that a vehicle meets the definition of a unique vehicle as defined in section 2025(d)(74), the Executive Officer will not require the vehicle to be replaced in order to meet NOx BACT prior to January 1, 2021, but the fleet owner will still be required to include the vehicle in the fleet if complying using the BACT percentage limits of section 2025(g) or the fleet averaging option of section 2025(h).~~

~~(4)~~(3) *Exemption for Low-Use Vehicles*

(A) Low-use vehicles are exempt from the requirements of section 2025(e)~~(1)~~ but the owner must keep records and meet the reporting requirements in accordance with sections 2025(r)(12) and (s). To be considered a low-use vehicle, the fleet owner must submit engine operation data from a properly functioning odometer or hubodometer and non-resettable hour-meter unless they have a three day pass. Low-use vehicles need not be included when determining compliance with the phase-in options of section 2025(h) and 2025(i). ~~BACT percent limits of section 2025(g) or when calculating fleet average indices and target rates for the fleet averaging option of section 2025(h).~~

(B) Vehicles used both as an emergency support vehicle as defined in section 2025(d)~~(27)~~(23), and for other purposes, do not need to consider the hours of operation or mileage the vehicle accrues when used for emergency operations in determining whether the vehicle meets the definition of a low-use vehicle. If the vehicle meets the ~~low-use~~ definition of a low-use vehicle in section 2025(d)~~(47)~~(40), it is exempt from the requirements of section 2025(e)~~(1)~~, but it is subject to the requirements of section 2025(p)~~(4)~~(3) for low-use vehicles.

(C) Vehicles that formerly met the low-use vehicle definition, but whose use increases to 100 PTO hours per year or greater or whose mileage increases to 1,000 miles or greater, must immediately meet the requirements of section 2025(f) or (g), ~~(g) or (h)~~ for the immediately preceding compliance deadline unless it takes advantage of one of the exemptions listed in section 2025(p).

~~(5)~~(4) *Exemption for Vehicles Operating with a Three Day Pass*

(A) Until January 1, 2021, a fleet that obtains a three-day pass for a vehicle will be allowed to operate one vehicle per calendar year in California without complying with section 2025(e) for the specified three day period per calendar year.

(B) A three-day pass must be obtained from the Executive Officer either online, email, or by fax. Prior to operating within California, the fleet must obtain written approval from the Executive Officer, which must be carried within the vehicle. The request for a three-day pass shall be filed with the Executive Officer at least seven days prior to the vehicle's planned entry into California. The request must identify the initial date that an out-of-state vehicle that does not meet the compliance requirements of this regulation will be traveling within the state, the name of the fleet owner, the state or country issuing the license plate of the vehicle, the license plate number, and the vehicle identification number. The Executive Officer will make every effort to respond to the request within three business days from the receipt of the request. The Executive Officer shall grant the request so long as it is the first request made by the fleet in the calendar year. If the Executive Officer fails to respond to the request by the date of the vehicle's planned entry into the

state, the vehicle may enter and operate in California for the requested three-day period, but if the vehicle's operator fails to present documentation to ARB enforcement personnel, upon request, that it has filed a request for a three-day pass and qualifies for operating in the state, the fleet may be cited and subject to penalties.

(C) Fleets using a three day pass must comply with the reporting requirements of section 2025(r).

~~(B) To obtain a three-day pass, a request to the Executive Officer, identifying the date that an out-of-state vehicle will be making a one-time annual visit to the state, the vehicle owner, company name, and vehicle identification number, and must obtain written approval, which must be carried within the vehicle, prior to operating in the state.~~

~~(C) A three-day pass must be obtained from the Executive Officer either online, email, or by fax. The Executive Officer will have three business days to respond from receipt of the request.~~

~~(6)~~(5) *Exemption for Vehicles Awaiting Sale* – Vehicles in the possession of dealers, financing companies, or other entities that do not intend to operate the vehicle in California or offer the vehicle for hire for operation in California, and that are operated only to demonstrate functionality to potential buyers or to move short distances while awaiting sale for purposes such as maintenance or storage, are exempt from all requirements in section 2025.

~~(7)~~(6) *Exemption for Vehicles Used Solely on San Nicolas or San Clemente Islands* - Vehicles used solely on San Nicolas or San Clemente Islands are exempt from all requirements in section 2025. If the land use plans for the islands are changed to allow use by the general public of the islands, this exemption shall no longer be applicable.

~~(8) *Credit for Hybrid Vehicles*~~

~~(A) Prior to January 1, 2018, upon presentation of proper documentation, the Executive Officer shall grant an owner credit, as set forth in (B) below, towards compliance with the fleet average for using hybrid vehicles defined in section 2025(d)(42) if the owner can demonstrate that the manufacturer has improved the fuel economy of the hybrid vehicle by at least 20 percent compared to a diesel vehicle of the same model year that performs a similar function and has a similar configuration to that of the hybrid vehicle.~~

~~(B) Upon approval by the Executive Officer, the fleet shall receive for each compliance year prior to 2018, a credit that double counts the number of hybrid vehicles in the fleet that may be used to calculate the PM and NOx indices and target rates for the percent limits requirements of section 2025(g) and for the fleet averaging option of section 2025(h). The emissions factor from Appendix A will be based on the engine model year or standard to which the engine was certified.~~

~~(9) *Credit for Alternative Fuel Vehicles* – Upon presentation of proper documentation, the Executive Officer will grant a fleet credit for using vehicles equipped with~~

~~alternative fuel or heavy-duty pilot ignition engines, in calculating the NOx and PM fleet averages under section 2025(h). Upon approval, the fleet is allowed to use the NOx emission factor for the engine model year to which the alternative or heavy-duty pilot ignition engines have been certified in calculating the NOx index and zero for the PM index.~~

~~(10)~~(7) *Compliance Extension for Emissions Control Device Manufacturer Delays~~:~~* ~~-~~ An owner who has purchased, but has not received~~,~~ a VDECS, a replacement engine, or vehicle in order to comply with this regulation will be excused from immediate compliance if the VDECS or vehicles have not been received due to manufacturing delays as long as all the conditions below are met:

(A) Except for VDECS purchased to replace a failed or damaged VDECS, the fleet owner who has purchased the VEDCS or vehicle or has entered into contractual agreement with the seller for the purchase, at least 4 months prior to the required compliance date; in the case of VDECS replace a failed or damaged VDECS, the fleet owner has purchased, or has entered into contractual agreement with the seller for the purchase within 60 days of the VDECS failure.

(B) The owner has identified the vehicle to be equipped with the VDECS or replaced upon receipt of the replacement VEDCS or vehicle.

(C) Proof of purchase, such as a purchase order, down payment, or signed contract for the sale, including specifications for each VDECS, must be maintained by the owner and provided to an agent or employee of ARB upon request.

(D) The new or retrofitted vehicles are immediately placed into operation upon receipt and any replaced vehicles are removed from service within 30 days.

(E) Proof of the date that the new or retrofitted vehicles were placed into service and proof of the date that any replaced vehicles were removed from service.

~~(11)~~(8) *Extension of the PM BACT Compliance Deadline Based on Unavailability of Highest Level VDECS~~:~~* ~~-~~ If an engine that is required to meet PM BACT cannot be equipped with the highest level VDECS for PM, the Executive Officer may grant a one-year extension of the compliance deadline, which may be extended annually through January 1, 2017, based on an evaluation of information submitted pursuant to section 2025(r)(11) that the engine cannot be equipped with the highest level VDECS for PM provided that all other engines in the fleet are in compliance with the ~~PM BACT~~ requirements for the compliance year. By January 1, 2018, any vehicle that is not equipped with the highest level VDECS for PM must be replaced with a vehicle that is 2010 model year emissions equivalent or ~~have~~ one that complies with the BACT compliance schedule which would be a 1998 model year engine or newer equipped with the highest level VDECS for PM. ~~its engine replaced with one that is equipped with the highest level VDECS for PM.~~ This includes auxiliary engines in two engine sweepers.

~~(12)~~(9) *Change in Exemption Status~~.~~* ~~-~~ A fleet owner of a vehicle that formerly qualified for any of the compliance extensions or exemptions granted in section

2025(n) or 2025(p) but whose status has changed so that it no longer meets the applicable definition, must immediately bring the fleet into compliance with requirements of section 2025(f) or 2025(g), ~~(g), or (h)~~ for the immediately preceding compliance deadline, and must notify the Executive Officer of the change in status within 30 days from the date of the change.

(q) *Special Provisions for VDECS and Experimental Diesel Emission Control Strategies*

(1) VDECS *Requirements*

(A) *VDECS Installation.* Before installing a VDECS on a vehicle, the owner must ensure that:

1. The VDECS is verified for use ~~with~~on the engine and vehicle, as described in the Executive Order for the VDECS.
2. Use of the vehicle is consistent with the conditions of the Executive Order for the VDECS.
3. The VDECS is installed in a verified configuration.
4. The engine to be retrofitted must be in its original certified configuration, free of excess oil consumption, must not have malfunctioning fuel delivery systems, or any other mechanical condition that may impair the proper function of the VDECS. ~~meets engine manufacturer's specifications for installation of the VDECS.~~
5. The VDECS label will be visible after installation.

(B) *VDECS Maintenance.* If a fleet owner installs a VDECS to meet the requirements of section 2025(e), the VDECS must remain installed until the VDECS fails or is damaged or is replaced with a similar or higher level VDECS. Requirements for VDECS failure or damage are in section 2025(q)(2). The owner of a vehicle retrofitted with a VDECS must ensure that the VDECS and engine are properly maintained as recommended by the respective manufacturers.

(2) *Failure or Damage of a VDECS.*

In the event of a failure or damage of a diesel emission control strategy, the following conditions apply:

(A) Failure or Damage During the Warranty Period. If a VDECS fails or is damaged within its warranty period, and the VDECS manufacturer or authorized dealer determines that it cannot be repaired, the owner must replace the VDECS with the same level or higher level VDECS for the vehicle within 90 days of the failure.

(B) Failure or Damage Outside of Warranty Period. If a VDECS fails or is damaged outside of its warranty period and cannot be repaired, and if the fleet could not meet an applicable target for the most recent compliance date without the failed VDECS, then within 90 days of the failure, the owner must

replace the failed VDECS with the highest level VDECS available for the engine at time of failure.

(3) *Fuel-Based Strategy VDECS.*

(A) If a fleet owner determines that the highest level VDECS for a large percentage of the fleet would be a level 2 fuel verified as a diesel emission control strategy, and implementation of this VDECS would require installation of a dedicated storage tank, then the owner shall request prior approval from the Executive Officer to allow use of the level 2 fuel-based strategy across its fleet.

(B) Waiver for Discontinuation of Fuel Verified as a Diesel Emission Control Strategy. If a fleet owner has relied upon a fuel verified as a diesel emission control strategy to meet an applicable requirement and has to discontinue use of the fuel due to circumstances beyond the fleet owner's control, the fleet owner shall apply to the Executive Officer no later than 30 days after discontinuing use of the fuel for a compliance waiver of up to two years to provide the fleet owner time to return to compliance with the applicable requirements. The Executive Officer shall respond to the request within 30 days and grant the request upon finding that the application is complete, outlines the compliance strategy to be used, and that all reporting requirements have been met.

(4) *Use of Experimental Diesel Emission Control Strategies*

(A) If a fleet owner wishes to use an experimental or non-verified diesel emission control strategy to support the verification of a non-verified diesel emission control strategy, the owner must first obtain approval from the Executive Officer for a compliance extension. To obtain approval, the owner must demonstrate either that (1) a VDECS is not available or not feasible for their vehicle or application, or (2) that use of the non-verified strategy is needed to generate data to support verification of the strategy.

1. The application must include the following: emissions data and a detailed description of the control technology that demonstrates that the experimental control strategy achieves at least a Level 2 diesel PM emission reduction, vehicle and engine data, and odometer or hubodometer readings as described in sections 2025(r)(8), 2025(r)(9), and 2025(r)(12)(B).
2. The Executive Officer will treat the strategy as a:
    a. Level 2 VDECS if the application demonstrates that the strategy achieves at least 50 percent reduction in diesel PM.
    b. Level 3 VDECS if the application demonstrates that the strategy achieves at least 85 percent reductions in diesel PM.
3. ~~If the application demonstrates that the strategy achieves a NOx reduction of over 15 percent, the NOx reduction will be counted.~~

(B) Upon approval by the Executive Officer, each vehicle engine retrofitted with the experimental strategy will be allowed to operate for a specified time period necessary to make a determination that the experimental strategy can achieve the projected emissions reductions. The vehicle equipped with the experimental strategy will be considered to be in compliance under section 2025(f) or 2025(g), ~~(g), or (h)~~ during the specified time period. The fleet owner shall keep documentation of this use in records as specified by the Executive Officer.

(C) The fleet owner must bring the fleet into compliance under section 2025(f) or 2025(g), ~~(g), or (h)~~ prior to the expiration of the experimental diesel emission control strategy extension.

(5) *VDECS That Impairs Safe Operation of Vehicle* - A fleet owner may request that the Executive Officer find that a VDECS should not be considered the highest level VDECS available because: ~~(A) it cannot be safely installed or operated in a particular vehicle application, or (B) its use would make compliance with occupational safety and health requirements, or an ongoing local air district permit condition impossible.~~

(A) it cannot be safely installed or operated in a particular vehicle application; or

(B) its use would make compliance with occupational safety and health requirements, federal highway safety regulations, or an ongoing local air district permit condition impossible.

If a VDECS manufacturer states that there is no safe or appropriate method of mounting its VDECS on the requesting party's vehicle, then the VDECS will not be considered safe. In the absence of such a declaration by the VDECS manufacturer, the requesting party shall provide other documentation to support its claims.

Documentation may include published reports and other findings of federal, state or local government agencies, independent testing laboratories, engine manufacturers, or other equally reliable sources. The request will only be approved if the requesting party has made a thorough effort to find a safe method for installing and operating the VDECS, including various locations for VDECS mounting, and use of an actively regenerated VDECS. The Executive Officer shall review the documentation submitted and any other reliable information that he or she wishes to consider and shall make his or her determination based upon the totality of the evidence.

Upon finding that a VDECS cannot be installed without violating the safety standards prescribed under title 8, CCR by the California Department of Industrial Relations, Division of Occupational Safety and Health, ~~or~~ comparable federal or state health and safety laws where the vehicle operates, or federal highway safety laws, the Executive Officer shall issue a determination that there is no highest level VDECS available. The Executive Officer shall inform the requesting party, in writing, of his or her determination, within 60 days of receipt of the request.

Parties may appeal the Executive Officer's determination as described in ~~(A)~~(C) and ~~(B)~~(D) below. During the appeal process described in ~~(A)~~(C) and ~~(B)~~(D) below, the requesting party may request the administrative law judge to stay compliance until a final decision is issued. If the stay is granted and the Executive Officer denies the requesting party's request, the requesting party has six months from the date of the Executive Officer's final written decision to bring his or her fleet back into compliance.

~~(A)~~(C) *Appeals – Hearing Procedures*

1. Any party whose request has been denied may request a hearing for the Executive Officer to reconsider the action taken by sending a request in writing to the Executive Officer. A request for hearing shall include, at a minimum, the following:
   a. name of the requesting party;
   b. copy of the Executive Officer's written notification of denial;
   c. a concise statement of the issues to be raised, with supporting facts, setting forth the basis for challenging the denial (conclusory allegations will not suffice);
   d. a brief summary of evidence in support of the statement of facts required in c. above; and
   e. the signature of an authorized person requesting the hearing
2. A request for a hearing shall be filed within 30 days from the date of issuance of the notice of the denial.
3. A hearing requested pursuant to this section shall be heard by a qualified and impartial hearing officer appointed by the Executive Officer. The hearing officer may be an employee of the ARB, but may not be any employee who was involved with the denial at issue. In a request for reconsideration, the hearing officer, after reviewing the request for hearing and supporting documentation provided under paragraph 1.d. above, shall grant the request for a hearing if he or she finds that the request raises a genuine and substantial question of law or fact.
4. If a hearing is granted, the hearing officer shall schedule and hold, as soon as practicable, a hearing at a time and place determined by the hearing officer.
5. Upon appointment, the hearing officer shall establish a hearing file. The file shall consist of the following:
   a. the determination issued by the Executive Officer which is the subject of the request for hearing;
   b. the request for hearing and the supporting documents that are submitted with it;

c. all documents relating to and relied upon by the Executive Officer in making the initial determination to deny the requesting party's original claim; and

d. correspondence and other documents material to the hearing.

6. The hearing file shall be available for inspection by the applicant at the office of the hearing officer.

7. An applicant may appear in person or be represented by counsel or by any other duly-authorized representative.

8. The ARB may be represented by staff or counsel familiar with the regulation and may present rebuttal evidence.

9. Technical rules of evidence shall not apply to the hearing, except that relevant evidence may be admitted and given probative effect only if it is the kind of evidence upon which reasonable persons are accustomed to relying in the conduct of serious affairs. No action shall be overturned based solely on hearsay evidence, unless the hearsay evidence would be admissible in a court of law under a legally recognized exception to the hearsay rule.

10. Declarations may be used upon stipulation by the parties.

11. The hearing shall be recorded either electronically or by a certified shorthand reporter.

12. The hearing officer shall consider the totality of the circumstances of the denial, including but not limited to, credibility of witnesses, authenticity and reliability of documents, and qualifications of experts. The hearing officer may also consider relevant past conduct of the applicant including any prior incidents involving other ARB programs.

13. The hearing officer's written decision shall set forth findings of fact and conclusions of law as necessary.

14. Within 30 days of the conclusion of a hearing, the hearing officer shall submit a written proposed decision, including proposed finding as well as a copy of any material submitted by the hearing participants as part of that hearing and relied on by the hearing officer, to the Executive Officer. The hearing officer may recommend to the Executive Officer any of the following:

    a. uphold the denial as issued;

    b. modify the denial; or

    c. overturn the denial in its entirety.

15. The Executive Officer shall render a final written decision within 60 working days of the last day of hearing. The Executive Officer may do any of the following based on substantial evidence in the record:

    a. adopt the hearing officer's proposed decision;

    b. modify the hearing officer's proposed decision; or

c. render a decision without regard to the hearing officer's proposed decision.

~~(B)~~(D) *Appeals – Hearing Conducted by Written Submission.*

In lieu of the hearing procedure set forth in ~~A~~(C)above, an applicant may request that the hearing be conducted solely by written submission. In such case the requestor must submit a written explanation of the basis for the appeal and provide supporting documents within 20 days of making the request. Subsequent to such a submission the following shall transpire:

1. ARB staff shall submit a written response to the requestor's submission and documents in support of the Executive Officer's action no later than 10 days after receipt of the requestor's submission;
2. The applicant may submit one rebuttal statement which may include supporting information, as attachment(s), but limited to the issues previously raised;
3. If the applicant submits a rebuttal, ARB staff may submit one rebuttal statement which may include supporting information, as attachment(s), but limited to the issues previously raised; and
4. The hearing officer shall be designated in the same manner as set forth in section 2025(q)(5)~~(A)~~(C)(3) above. The hearing officer shall receive all statements and documents and submit a proposed written decision and such other documents as described in section 2025(q)(5)~~(A)~~(C)(13) above to the Executive Officer no later than 30 working days after the final deadline for submission of papers. The Executive Officer's final decision shall be mailed to the applicant no later than 60 days after the final deadline for submission of papers.
5. The Executive Officer shall render a final written decision within 60 working days of the last day of hearing. The Executive Officer may do any of the following:
   a. adopt the hearing officer's proposed decision;
   b. modify the hearing officer's proposed decision; or
   c. render a decision without regard to the hearing officer's proposed decision.

(r) *Reporting Requirements*

(1) The owner of a fleet is subject to reporting requirements for the vehicles in the fleet as defined in section 2025(d)(28) if the owner has elected to utilize the phase-in option of section 2025(g)(3) and (4), 2025(f)(3), 2025(h) or 2025(i), the credit for early PM retrofits; hybrid vehicles, and alternative fueled vehicles of section 2025(j), the agricultural provisions of section 2025(m), two-engine sweeper provision of section 2025(n), and the exemptions and extensions provisions of section 2025(p). Fleets utilizing the relief for fleets that have downsized provided in section 2025(i)(5) must report information for all vehicles with a GVWR greater

than 26,000 lbs in the 2006 baseline fleet and in the fleet for each compliance year. Except as required in section 2025(k)(5), school buses are not required to comply with the reporting requirements.

~~(1) The owner of a fleet is subject to the reporting requirements of section 2025(r) for the vehicles in the fleet as defined in section 2025(d)(34) if the owner has elected to utilize the BACT percent limits option of section 2025(g), the fleet averaging option of section 2025(h), the optional requirements for small fleets of section 2025(i), the retired vehicle credit provision of section 2025(k), the special provisions and compliance extensions of section 2025(p), or the agricultural provisions of section 2025(m).~~

(2) All fleet owners utilizing any of the credits in section 2025(j) or any of the exemptions or extensions in section 2025(p) ~~exemptions, compliance extensions, or credit in section 2025(p)~~ must report according to ~~and comply with~~ the requirements of section 2025(r) and maintain records according to section 2025(s) for all of their vehicles in the fleet as defined in section 2025(d)~~(34)~~(28).~~,~~ ~~regardless of whether the vehicle is utilizing of the special provisions or not.~~

(3) The owner of a fleet that ~~has elected to comply~~ complies by using the BACT compliance schedule set forth in sections 2025(f) and 2025(g) and also utilizes the low-use vehicle provision of section 2025(p)(3) is ~~not subject to the~~ only required to ~~reporting~~ follow the reporting requirements of section 2025(r) for the low-use vehicles meeting the definition in section 2025(d)(40).

(4) Fleet owners may submit reporting information using forms (paper or electronic) approved by the Executive Officer.

(5) The fleet owner must notify the Executive Officer in writing by the first applicable reporting date and by January 31 of every subsequent compliance year, if applicable, with the name of the responsible official and the location where the records will be kept, and whether any information has changed since its last reporting. If the records will be kept outside California, the owner must also comply with section 2025(t). ~~If a fleet owner opts to comply with fleet averaging requirements of section 2025(h) separately for different divisions or subsidiaries according to section 2025(e)(5), then the company or agency may report separately for the different portions of the fleet.~~

(6) Each year, fleet owners subject to the reporting requirement must report on their fleet as it was on ~~January 1~~ the compliance date of the current compliance year. They must submit the applicable information set forth in sections 2025(r)(~~3~~) through ~~(14)~~(10) by January 31 ~~following~~ of each compliance ~~date~~year. Owners must report annually until ~~the reporting requirement expires or fleets may stop reporting~~ the year after the BACT requirements of section 2025(f) and 2025(g) have been completely met. ~~Fleets may submit information by mail or electronically.~~

(7) *Owner Contact Information*: Compliance reports must include the following information: ~~in (A) through (M) below.~~

(A) Fleet owner's name~~,~~;

(B) Name of company or agency~~,~~;

(C) Motor carrier identification number~~,~~;

(D) Corporate parent name (if applicable)~~,~~;

(E) Corporate parent taxpayer identification number (if applicable)~~,~~;

(F) Company taxpayer identification number~~,~~;

(G) Street address and mailing address~~,~~;

(H) Name of responsible person~~,~~;

(I) Title of responsible person~~,~~;

(J) Contact name~~,~~;

(K) Contact telephone number~~,~~;

(L) Contact email address (if available)~~,~~; and

(M) License number issued by the Public Utilities Commission (if applicable).

(8) *Vehicle Information*

Fleet owners must provide to the Executive Officer a list of all vehicles subject to the reporting requirements along with the information listed in (A) through ~~(P)~~(R) below for each vehicle:

(A) Vehicle type~~,~~;

(B) Whether the vehicle is a schoolbus, agricultural vehicle, log truck, ~~as defined in section 2025(d)(67) that transports pupils, a motorcoach,~~ truck-tractor, ~~shuttle vehicle,~~ two-engine sweeper, or yard truck;

(C) If the vehicle was added after January 1, 2012, the ~~D~~date the vehicle was added or first reported~~,~~;~~or retired,~~

(D) Date that a vehicle was retired, sold, or scrapped after January 1, 2012;

~~(D)~~(E) Vehicle identification number~~,~~;

~~(E)~~(F) Vehicle manufacturer~~,~~;

~~(F)~~(G) Vehicle model~~,~~;

~~(G)~~(H) Gross vehicle weight rating;

~~(H)~~(I) Vehicle model year~~,~~;

~~(I)~~(J) License plate number~~,~~;

~~(J)~~(K) ~~Where t T~~he state, providence, or country where the vehicle is or was registered and type of registration plate;

~~(K)~~(L) Whether the vehicle will be designated as a low-use vehicle and if so:

1. ~~For vehicles designated as low-use, fleet owners must report the~~ The information listed in section 2025(r)(12)~~,~~;

2. ~~Report w~~Whether the low-use status is based on mileage or hours of operation~~.~~;

3. Whether the vehicle has PTO for performing work in stationary mode~~.~~;

~~(L)~~4. Whether the vehicle is used as an emergency support vehicle as defined in section 2025(d)(23); and, if so,

~~1~~a. ~~For low-use or mileage exempt vehicles used in emergency operations, fleet owners must report t~~The information ~~listed~~ required in section 2025(r)(16)~~.~~;

~~(M) Whether the vehicle is a sweeper, specialty agricultural vehicle, cab-over-engine truck tractor, or unique vehicle as defined in sections 2025(n) and 2025(p);~~

(~~N~~)(M) Whether the vehicle is a fuel efficient hybrid vehicle as defined in section 2025(d)~~(42)~~(31)~~.~~;

(~~O~~)(N) Whether the vehicle is propelled by an alternative-fueled engine as defined in section 2025(d)~~(9)~~(8)~~.~~;

(~~P~~)(O) Fuel type~~.~~;

(P) Does the fleet contain more that three vehicles subject to the regulation with a GVWR greater than 14,000 lbs; and

(Q) Whether the vehicle is a log truck utilizing the Optional Phase in for Log Trucks provision in section 2025(m)(11).

(9) *Engine Information Reporting*

Except as provided in section 2025(r)(13)(A) below, ~~T~~the following information for each engine that propels a vehicle reported per section 2025(r)(8) and for each sweeper engine that operates auxiliary equipment must be reported to the Executive Officer:

(A) Engine manufacturer~~,~~;

(B) Engine model~~,~~;

(C) Engine family except if reporting information about vehicles in the 2006 baseline fleet that are no longer in the fleet;~~,~~

(D) Engine serial number~~,~~; ~~and~~

(E) Engine model year~~,~~;

(F) Whether the engine meets an on-road or off-road emissions standard~~,~~;

(G) Whether the engine is used to propel the vehicle or to operate auxiliary equipment~~,~~; and

(H) The emissions standard to which the engine was certified if lower than required for the engine model year.

(10) *Verified Diesel Emission Control Strategies Reporting.*

Except as provided in section 2025(13)(A) below, ~~F~~for each VDECS that is installed on an engine listed per section 2025(r)(9), the fleet owner must report the following information to the Executive Officer~~.~~:

(A) ~~Type~~ Description of VDECS installed~~,~~;

(B) VDECS manufacturer~~,~~;

(C) VDECS family name~~,~~;

(D) Serial numbe~~r~~, or experimental part numbe~~r~~, or aftermarket part number~~,~~; and

(E) Date installed.

(11) *~~Availability of~~ Reporting for Extension for Unavailability of Highest Level VDECS*

If appropriate, the following information must be submitted to the Executive Officer with a request for an extension based on the unavailability of highest level VDECS:

(A) Owner contact information, vehicle, and engine information listed in sections 2025 (r)(7), (8), and (9)~~.~~;

(B) Description of the reason for the compliance extension request for each engine or engine-vehicle combination~~.~~;

(C) If the VDECS would void the engine warranty, provide a statement from the engine manufacturer or authorized engine or vehicle dealer~~.~~;

(D) If no verified VDECS is commercially available, provide a list of manufacturers that have been contacted and the manufacturers' responses to a request to purchase~~.~~; and

(E) Documentation must be submitted on January 31 following the compliance deadline for each year that the owner is claiming non-availability of the highest VDECS.

(12) *Low-Use Vehicles Reporting*

For vehicles that are designated as low-use, the fleet owner must report the following information to the Executive Officer annually for as long as the fleet owns or operates the vehicle:

(A) Owner, vehicle, and engine information identified in sections 2025 (r)(5) through (9);

(B) Mileage ~~from odometer~~ readings from a properly functioning odometer or hubodometer taken on January 1 and December 31 of the compliance year~~.~~;

(C) If the vehicle has power take off, ~~H~~hour-meter readings from a properly functioning non-resettable hour-meter taken on January 1 and December 31 of the compliance year~~.~~;

(D) The dates of the odometer or hubodometer and non-resettable hour-meter readings. In the event that the odometer or hubodometer ~~meter~~ is replaced,

the original odometer or hubodometer reading and the new odometer or hubodometer reading and the date of replacement must be reported within 30 days of replacing the odometer or hubodometer. In the event that the hubodometer is removed, the hubodometer reading and the odometer reading on the day of removal;

(E) The owner of a vehicle operating both inside and outside of California must provide records from a electronic tracking system as defined in section 2025(d)~~(26)~~(21) that can acquire date, time, engine-on, and location data. The owner may use other documentation of operation and location, such as IRP records.

(13) ~~*Fleets Claiming Vehicle Retirement Credit*~~ *Relief for Fleets that have Downsized Reporting*

Fleets requesting credits under section 2025(i)(5) for fleets that have downsized must report the following:

(A) The information required in sections 2025(r)(5) through (9) for all vehicles in the 2006 baseline fleet. Information about vehicles registered on October 1, 2006 that are no longer in the fleet do not have to report engine and VDECS information required in sections 2025(r)(9) and (10).

(B) The information required in sections 2025(r)(5) through (10) for all vehicles in the fleet in the applicable compliance year that were registered or have been certified as non-operational with the California Department of Motor Vehicles equivalent agency in another state.

~~(A) By March 31, 2010, fleets requesting vehicle retirement credits must report the information required in sections 2025(r)(5) through (9) for all vehicles in the fleet that were registered on July 1, 2008. Beginning 2011 and every year thereafter until 2014, the reporting date shall be January 31.~~

~~(14) *Schoolbus Fleets or Sub-Fleets*~~

~~(A) For schoolbus fleet or sub-fleets that comply using the PM BACT percentage limits of section 2025(g) or the PM fleet averaging of section 2025(h)(3) or any of the special provisions in section 2025(p), the schoolbus fleet owner must report the information required in section 2025(r), except for the information required under subsections 2025(r)(12)(C), (r)(12)(E) or (r)(16)(C).~~

~~(15)~~(14) *Agricultural Fleet Reporting ~~Vehicles in Agricultural Fleets~~*

Until January 1, 2023, fleet owners of all agricultural vehicles that will utilize the provisions of section 2025(m) that are owned as of January 1, 2009, must report the following information to the Executive Officer by March 31, 2011 and every January 31 thereafter:

~~For all vehicles owned as of January 1, 2009, an agricultural fleet owner must report the information in this section to the Executive Officer for all vehicles (including vehicles that do not qualify as agricultural vehicles) by March 31, 2010. For subsequent years, the reporting date shall be January 31. For each vehicle in~~

~~an agricultural fleet, the agricultural fleet owner must report the following information until January 1, 2023:~~

(A) Information required in sections 2025)(r) (5) through(9)~~.~~;

(B) Whether the vehicle is a specialty agricultural vehicle or a log truck;

~~(B) Whether the vehicle is a low-mileage, limited-mileage, or specialty agricultural vehicle, or is none of these.~~

~~(C) Whether the vehicle will operate as a low-mileage or limited-mileage vehicle should it not qualify as a specialty agricultural vehicle.~~

~~(D)~~(C) Whether the vehicle is being added or deleted to the fleet and the date of that the addition or deletion occurred~~.~~;

~~(E)~~(D) The vehicle body type if one of the four body types described in the definition of specialty agricultural vehicle in section 2025(d)~~(69)~~(53)~~.~~;

~~(F)~~(E) If eligible to be considered for the specialty vehicle exemption, the priority status of the vehicle in case not all specialty vehicles in the fleet can be approved~~.~~;

~~(G)~~(F) Whether the specialty vehicle will operate exclusively outside the San Joaquin Valley Air Basin~~.~~ ;

~~(H)~~(G) Whether the vehicle is operated for compensation outside a farming business owner's farm~~.~~;

~~(I)~~(H) Mileage from a properly functioning odometer or hubodometer taken on January 1, 2011~~2010~~ and every January 1 thereafter. In the event that the odometer or hubodometer is replaced, the fleet owner shall report the original odometer or hubodometer reading, the new odometer or hubodometer reading, and the date the original odometer or hubodometer was replaced~~.~~; and

~~(J)~~(I) For ~~a low, limited, or specialty~~ an agricultural vehicle being replaced the owner, vehicle, and engine information set forth in sections 2025(r)(5) through (10), the mileage of both the vehicle being replaced and added, and the date the mileage readings were taken.

~~(16)~~(15) *Vehicles used as emergency support vehicles in emergency operations.*

A fleet owner must provide the following information to the Executive Officer to qualify a vehicle's usage as emergency operation:

(A) Owner, vehicle, and engine information identified in sections 2025(r)(5) through (10);

(B) Odometer or hubodometer readings from a properly functioning odometer or hubodometer to document use at an emergency event and to document travel to and from the emergency event. In the event that the odometer or hubodometer meter is replaced, the fleet owner shall report the original odometer or hubodometer reading and the new odometer or hubodometer reading and the date ~~of replacement~~ that the original odometer or

hubodometer was replaced ~~must be reported~~. Vehicles used exclusively for emergency use that are not authorized emergency vehicles do not need to have an hour meter and do not need to report hours. Authorized emergency vehicles are exempt per section 2025(c); and

(C) Records to document dispatch by the local, state, or federal agency or other responsible emergency management entity as approved by the Executive Officer.

~~(17)~~(16) ~~*Vehicles Exempt from NOx BACT.*~~ *Reporting of Vehicles Utilizing the Exemption and Extensions Provision*

~~(A) *Exemption Based on Early Action.*~~ Fleet owners utilizing the exemption and extensions provision of section 2025(p) must provide the following information to the Executive Officer by January 31, 2012:

~~The owner must provide the following information to the Executive Officer by March 31, 2010.~~

1. Owner, vehicle, and engine information listed in sections 2025(r)(5) through (9)~~.~~; and
2. Information listed in section 2025(r)(10) for the VDECS.

~~(B) NOx *Mileage Exempt Vehicles.*~~

~~The owner must provide the following information to the Executive Officer by January 31 of the compliance year to demonstrate compliance with the requirements of section 2025(p)(1).~~

~~1. Owner, vehicle, and engine information listed in sections 2025(r)(5) through (11).~~

~~2. Mileage and hours of use readings on January 1 and December 31 of the compliance year taken from a properly functioning odometer and hour meter for vehicles meeting the definition of sections 2025(d)(58)(A) or (B) and mileage only readings for vehicles meeting the definitions of 2025(d)(58)(C) or (D). The owner must keep on record the mileage and usage records to meet the record keeping requirements of section 2025)(s).~~

~~(C)~~(A) *Vehicles Operating Exclusively in NOx-exempt areas.*

The owner must provide the following information to the Executive Officer by January 31 of each compliance year to demonstrate compliance with the requirements of section 2025(p)(1):

1. Owner, vehicle, engine information, and VDECS listed in sections 2025(r)(5) through ~~(11)~~(10)~~;~~.
2. Records from an electronic tracking system that tracks usage and location in a monthly report format approved by ARB. The system must at a minimum meet the requirements as defined in section 2025(d)~~(26)~~(21) and provide the information listed therein~~.~~ ~~A~~

~~fleet may use an alternative method to demonstrate compliance if approved by the Executive Officer.~~

3. Whether the vehicle is labeled.

~~(D)~~(B) Unique Vehicle Extension ~~*Unique Vehicles.*~~

The owner must provide the following information to the Executive Officer by January 31 of each compliance year to demonstrate compliance with the requirements of section 2025(p)~~(3)~~(2).

1. Owner, vehicle, and engine information listed in sections 2025(r)(5) through ~~(11)~~(10).
2. Photos and a complete description of the vehicle and its function.
3. A complete explanation of why the vehicle qualifies as a unique vehicle.
4. Names and phone numbers of sources contacted during the search for a replacement vehicle.
5. Letters from contacted VDECS vendors stating that retrofit technology is unavailable for the unique vehicle.

~~(E)~~(17) *Two Engine Sweepers*

The owner must provide the following information for both the propulsion and auxiliary engine to the Executive Officer by March 31, 2010 to demonstrate compliance with the requirements of section 2025(n):~~.~~

~~1.~~(A) Owner, vehicle, and engine information listed in sections 2025(r)(5) through (11)~~.~~;

~~2.~~(B) Engine tier level of the auxiliary engine, model year, and engine family number~~.~~; and

~~3.~~(C) For Tier 0 auxiliary engines, the hours of use readings taken January 1 and December 31 of each year ~~staring~~starting 2010.

(18) *Vehicles Purchased or Retrofitted Using Public Funds.*

For owners of vehicles that were purchased or retrofitted using public funds and where funding program guidelines are used to determine compliance with the requirements of this regulation, the fleet owner must provide the following information to the Executive Officer for all vehicles that were purchased or retrofitted using public funds:

(A) Owner, vehicle, and engine information listed in sections 2025(q)(5) through (11);

(B) Date the public funding contract began;

(C) Program providing the funding; and

(D). Information about the contract terms to determine eligibility.

(19) *Vehicles Requesting a Three Day Pass*

Information listed in sections 2025(r)(7) and (8) must be provided for all vehicles requesting a three day pass.

~~(18)~~(20) *Compliance Certification.* All reports submitted to ARB, must be accompanied with a certification signed by a responsible official or a designee thereof that the information reported is accurate and that the fleet is in compliance with the regulation. If a designee signs the compliance certification, a written statement signed by the responsible official designating the designee must be attached to the compliance certification and submitted to the Executive Officer.

~~(19)~~(21) *Changes Since Last Reporting* – The fleet owner or responsible person must report to the Executive Officer any additions, deletions, or changes to the fleet since the last annual report filed. Such changes shall include, among other things, changes in the fleet's compliance option, vehicles removed from the fleet, vehicles added to the fleet through purchase or by bringing into California, and vehicles newly defined as low-use, or recently repowered or retrofitted. If there are no changes, the fleet owner shall indicate there have been no changes.

~~(20)~~(22) *New Fleet Reporting.* New fleets that elect to utilize the BACT percent limits option of section 2025(g) or the fleet averaging option of section 2025(h) must submit the information in section 2025(r)(5) through (9) to the Executive Officer within 30 days of purchasing or bringing such vehicles into the State. Beginning the first January 1 that is more than 30 days after the date of purchase or bringing a vehicle into the State, new fleets must comply with the reporting requirements in section 2025(r).

~~(21)~~(23) *Claiming Compliance Extension for Manufacturer Delays*

The fleet owner must provide the following information to the Executive Officer by January 31, each year to demonstrate compliance with the requirements of section 2025(p)~~(10)~~(7):

(A) The date of purchase or the date the contractual agreement for purchase of VDECS, replacement engine, or vehicle was entered~~.~~;

(B) The date the VDECS or vehicle was placed into service~~.~~;

(C) The date the existing vehicle was removed from service~~.~~; and

(D) Identification of the vehicle that was replaced.

(s) *Record Keeping.*

(1) The owner of a fleet shall maintain the following records specified in sections 2025(s)(4) through (14) as applicable. The owner shall provide these records to an agent or employee of the ARB within five business days upon request. If the records will be kept outside California, the owner must also comply with section 2025(t).

(2) The owner of a fleet subject to the reporting requirements of section 2025(r) shall maintain copies of the information reported under section 2025(r), as well as the records described in sections 2025(s)~~(5)~~(4) through (14) below.

~~(3) *Motor Carrier or Broker*~~

~~(A) Bills of lading and other documentation identifying the motor carrier or broker who hired or dispatched the vehicle and the vehicle dispatched.~~

~~(4)~~(3) School Buses~~*Schoolbus Fleets and Sub-Fleets*~~

~~(A) The owner of a schoolbus fleet or a schoolbus sub-fleet shall maintain copies of the information reported under section 2025(r)(14) and the records specified in section 2025(s) as applicable.~~

(A) Fleet owners of school buses shall maintain records of all the information specified in sections 2025(r)(7) through 2025(r)(10).

(B) Fleet owners using the downsize credits of section 2025(k)(2) must maintain records of all the information specified in sections 2025(r)(7) through 2025(r)(10) for all vehicles in the 2006 baseline fleet and for all buses in the fleet on January 1 of the compliance year that were registered. Information about vehicles registered on October 1, 2006 that are no longer in the fleet do not have to report engine and VDECS information required in sections 2025(r)(9) and (10).

(C) Fleet owners using the PM credits for replacement buses of section 2025(k)(4) must maintain records of all the information specified in sections 2025(r)(7) through 2025(r)(10) for all the buses that were replaced with buses receiving the credit and the buses to be treated as compliant.

(E) Fleet owners with low-use buses must maintain records of all the information specified in section 2025(r)(12) for each low-use bus.

(F) Fleet owners must comply with record keeping requirements for VDECS failures and maintenance as required in sections 2025(s)(10) and (14).

(4) *Motor Carrier or Broker*

(A) Bills of lading and other documentation identifying the motor carrier or broker who hired or dispatched the vehicle and the vehicle dispatched.

(5) *Agricultural Fleets*

(A) Fleets utilizing the agricultural fleet provision must keep and make available upon request proof that all agricultural vehicles were used exclusively in agricultural operations. This may include records used to support proof to other governmental agencies that the primary business function was agricultural. Such documentation may include IRS or Board of Equalization tax forms or bills of lading.

(B) Records must be maintained for each agricultural vehicle demonstrating that the vehicle was operational, functional and capable of performing the duty for which it was designed. This could include maintenance records, mileage

records, or licensing records, emissions testing records, or any other source of data approved by the Executive Officer.

(C) The agricultural fleet owner must keep bills of lading for delivery of fertilizer or crop protection products by an agricultural vehicle to a farm. Such records must demonstrate that the operation of the vehicle for the preceding calendar year was used exclusively to deliver such products to farms.

(D) Proof of transference of ownership of any ~~low or limited mileage~~ qualifying agricultural vehicles that is added to or removed from the fleet.

(E) Proof of ownership of the vehicles including title, registration, or bills of sale.

(6) *Proof of Operation* – Owners of fleets must keep records showing that any vehicle used to demonstrate compliance using the phase-in options of section 2025(h) and section 2025(i) was~~under section 2025(g) or section 2025(h)~~ operated in California for that applicable compliance year. Records could include IRP records, GPS tracking records, or DMV or law enforcement permits.

(7) *Fleets that have Downsized ~~Claiming Retirement Credit~~* – Fleets utilizing the relief for fleets that have downsized provision of section 2025(i)(5) ~~claiming retirement credit as defined in 2025(k)~~ must keep the following records at the business office or terminal location identified in the reports filed with the Executive Officer:

For all vehicles in the fleet on October 1, 2006 a,

(A) Copy of the ~~retired~~ vehicle's registration; or

(B) Copy of the vehicle's ownership documentation.

~~(C) Copy of the bill of sale showing the date the transaction occurred of the retired vehicle or any form of vehicle transference approved by the Executive Officer.~~

~~(D) All documentation related to any change in business form such as a change from a sole proprietorship to partnership, partnership to corporation, etc.~~

For all vehicles in the fleet on January 1 of the compliance year:

(C) A copy of the certificate of non-operation filed with the Department of Motor Vehicles or equivalent documentation from the state, providence, or country where the vehicle is registered.

(D) If scrapped, a copy of a nonrepairable vehicle certificate issued from the California Department of Motor Vehicles or equivalent documentation from the state, providence, or country where the vehicle is registered; or

(E) If not registered with the California Department of Motor Vehicles, proof that all retired vehicles in the fleet drove at least 1,000 miles in California in the year 2006.

(8) *Changes Since Last Reporting Period* – Document any additions, deletions, or changes to the fleet since the last reporting. Documentation may include bills of sale, purchase orders, or other documentation.

For each vehicle removed from the fleet, a copy of the bill of sale, or other documentation showing transference of ownership from the former owner and the current owner and the date of the transaction or any other form of vehicle transference approved by the Executive Officer.

(9) *Electronic Tracking* – For fleets using electronic tracking systems as defined in section 2025(d)~~(26)~~(21) summary and detailed records must be kept at the business office or terminal location for the fleet. The records must provide;

(A) Vehicle identification number of the vehicle being tracked;

(B) Monthly and annual mileage accrued in California;

(C) Monthly and annual mileage accrued in the NOx Exempt Areas if claiming the vehicle operates exclusively in NOx-exempt areas, and

(D) Monthly and annual hours of engine operation accrued in California except for vehicles that do not use PTO to perform work in a stationary mode.

(10) *VDECS Failure* – Maintain records of any VDECS failure and replacement including:~~.~~

(A) Date of failure;

(B) Description of failure;

(C) Description of resolution of failure; and

(B) Date of resolution of failure.

(11) *Fuel-based Strategy* – Documentation of any approval from ARB Executive Officer to use a fuel strategy as in section 2025(q)(3) and the most recent two years' worth of records of purchase that demonstrate usage.

(12) *Experimental Diesel Emission Control Strategy* – For fleets using an experimental diesel PM control strategy, record of approval from the Executive Officer for use of the experimental diesel control strategy, the test plan and test data used in the experimental diesel control strategy application, and other records as specified in the approval.

(13) *Manufacturer Delay* – For any vehicle or VDECS for which the fleet owner is utilizing the equipment manufacturer delay provision in section 2025(p)(10), proof of purchase, such as a purchase order or signed contract for the sale, including engine specifications for each applicable piece of equipment or vehicle.

(14) *Maintenance of VDECS Records*

(A) VDECS Documentation. For each engine requiring a VDECS to comply with the regulation, the owner shall keep the following documentation in the vehicle and provide it upon request to an agent or employee of the ARB.~~:~~

1. A statement signed by the installer at the time of installation of the VDECS affirming that the installation was performed by an~~VDECS was installed by an authorized~~ installer authorized by the VDECS manufacturer; ~~and, providing the following information for each engine:~~

2. ~~a.~~ The name of the person installing the device~~,~~;

3. ~~b.~~ The date the device was installed~~,~~;

4. ~~c. Type~~ Description of VDECS installed~~,~~;

5. ~~d.~~ VDECS Manufacturer;

6. ~~e.~~ VDECS family name~~,~~;

7. ~~f.~~ Serial number of installed VDECS~~,~~; and

8. g. Its verification Verification level and year of verification of the installed VDECS.

(15) *Emergency Support Vehicles* – Fleet owners of emergency support vehicles utilizing the provisions of section 2025(p)(1) or 2025(p)(3) shall keep records to document dispatch by a local, state, or federal agency or other responsible emergency management entity as approved by the Executive Officer.

(t) *Audit of Records*

The vehicle owner must make records available to ARB at its request for audit to verify the accuracy of the records. In the event the records are not made available within 30 days of the request, the ARB may assess penalties for non-compliance.

(u) *Record Retention*

The fleet owner or responsible person shall maintain the records for each vehicle subject to the reporting and record keeping requirements of sections 2025(r) and (s) for 3 years after it is retired, and for the overall fleet, for as long as the owner has a fleet, or January 1, 2025, whichever is earlier. If fleet ownership is transferred, the seller shall transfer the fleet records to the buyer. Dealers must maintain records of the disclosure of regulation applicability required by section 2025(w) for three years after the sale.

(v) *Right of Entry*

For the purpose of inspecting vehicles subject to this regulation and their records to determine compliance with this regulation, an agent or employee of ARB, upon presentation of proper credentials, has the right to enter any facility (with any necessary safety clearances) where vehicles are located or vehicle records are kept.

(w) *Disclosure of Regulation Applicability*

Any person residing in California selling a vehicle with an engine subject to this regulation must provide the following disclosure in writing to the buyer on the bill of sale, sales contract addendum, or invoice, "An on-road heavy-duty diesel or alternative-diesel vehicle operated in California may be subject to the California Air Resources Board Regulation to Reduce Particulate Matter and Criteria Pollutant Emissions from In-Use Heavy-Duty Diesel Vehicles. It therefore could be subject to exhaust retrofit or accelerated turnover requirements to reduce emissions of air pollutants. For more information, please visit the California Air Resources Board website at http://www.arb.ca.gov/dieseltruck."

(x) *Compliance Requirement.*

(1) The vehicle owner shall comply with all applicable requirements and compliance schedules set forth in this regulation.

(2) Any in-state or out-of-state motor carrier, California broker, or any California resident who operates or directs the operation of any vehicle subject to this regulation shall verify that each hired or dispatched vehicle is in compliance with the regulation and comply with the record keeping requirements of section 2025(s)(4).

(3) Compliance may be accomplished by keeping ~~on-site~~ at the business location, a copy of the Certificate of Reported Compliance with the In-Use On-Road Diesel Vehicle Regulation for each fleet, or in the vehicle.

(4) Any contract that a lessor and lessee enter into that has an effective date of January 1, 2010 or later shall clearly specify whether or not the leased vehicle is to be excluded from the lessor's fleet for the duration of the lease, or the responsibility will be that of the lessee.

(y) *ARB Certificate of Reported Compliance*

After the required reporting and compliance certification are received by ARB staff, ARB will provide the fleet with a Certificate of Reported Compliance with the In-Use On-road Diesel Vehicle Regulation. ARB staff will also post on the website for this regulation the name and motor carrier number for fleets that have reported compliance.

(z) *Non-Compliance.*

Any person who fails to comply with the general requirements of this regulation, who fails to submit any information, report, or statement required by this regulation, or who knowingly submits any false statement or representation in any application, report, statement, or other document filed, maintained, or used for the purposes of compliance with this regulation may be subject to civil or criminal penalties under sections 39674, 39675, 42400, 42400.1, 42400.2, 42402.2, and 43016, of the Health and Safety Code. In assessing penalties, the Executive Officer will consider factors, including but not limited to the willfulness of the violation, the length of time of noncompliance, whether the fleet made an attempt to comply, and the magnitude of noncompliance.

(aa) *Severability*

If Any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

Note: Authority Cited: Sections 39600, 39601, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42402.2., 42410, 43013, 43016, 43018, 43023, 43600, California Health and Safety Code. Reference: Sections 39650, 39658,

39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42402.2, 42410, 40717.9, 43013, 43016, 43018, 43023, 43600, and 43701(b), California Health and Safety Code.

APPENDIX A

Table A-1

PM Emissions Factors by Engine Model Year (g/mile)

Engine Certification Standard Model Year	Medium Heavy-Duty Diesel Vehicle (MHD)	Heavy Heavy-Duty Diesel Vehicle (HHD)
Pre-1991	1.65	3.36
1991-1993	0.84	1.25
1994-2006	0.43	0.81
2007-2009*	0.06	0.11
2010 and newer*	0.06	0.11

* If the engine is not equipped by the manufacturer with a diesel particulate filter, use the emission factor for the 1994-2006 model years

Table A-2

NOx Emissions Factors by Engine Model Year (g/mile)

Engine Certification Standard Model Year	Medium Heavy-Duty Diesel Vehicle (MHD)	Heavy Heavy-Duty Diesel Vehicle (HHD)
2003 and older	14.2	22.0
2004-2006	6.7	12.0
2007-2009	4.0	7.0
2010 and newer	0.8	1.6

Appendix B

Proposed Regulation Order
Amendments to the Drayage Truck Regulation

PROPOSED REGULATION ORDER

REGULATION TO CONTROL EMISSIONS FROM IN-USE ON-ROAD DIESEL-FUELED HEAVY-DUTY DRAYAGE TRUCKS

Note: Proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions, compared to the preexisting regulatory language.

Amend section 2027, title 13, California Code of Regulations to read as follows.

§ 2027. **In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Trucks.**

(a) Purpose. The purpose of this regulation is to reduce emissions and public exposure to diesel particulate matter (diesel PM), oxides of nitrogen (NOx), and other air contaminants by setting emission standards for in-use, heavy-duty diesel-fueled vehicles that transport cargo to and from California's ports and intermodal rail facilities.

(b) Applicability. This section shall apply to entities listed below through December 31, 2016. Starting January 1, 2017, drayage trucks are subject to the provisions of title 13, California Code of Regulations, section 2025, the Regulation to Reduce "Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy Duty Diesel-Fueled Vehicles (Truck and Bus Regulation)."

(1) This regulation applies to owners and operators of on-road diesel-fueled, alternative diesel-fueled and dual-fueled heavy-duty drayage trucks that operate~~ed at~~ in California, ~~ports and intermodal rail yard facilities. This regulation also applies to~~ , "motor carriers" that dispatch drayage trucks that operate in California, "marine or port terminals," "intermodal rail yards," and "rail yard and port authorities,"

(2) This regulation does not apply to:

(A) dedicated use vehicles;

(B) vehicles operating under an ARB authorized emergency decree;

(C) authorized emergency vehicles;

(D) military tactical support vehicles;

(E) vehicles that operate at port or intermodal rail yard properties in which the ARB Executive Officer has granted an annual exemption under the provisions of subsection (f) to local port or rail yard authorities; and

(F) yard trucks.

(c) Definitions. For purposes of this section, the definitions of Health and Safety Code section 39010 through 39060 apply except to the extent that such definitions may be modified by the following definitions that apply specifically to this regulation.

(1) "Alternative Diesel Fuel" means any fuel used in diesel engines that is not a reformulated diesel fuel as defined in sections 2281 and 2282 of title 13, of the California Code of Regulations, and does not require engine or fuel system modifications for the engine to operate, other than minor modifications (e.g., recalibration of the engine fuel control) that may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer-Trosch fuels, and emulsions of water in diesel fuel. Natural gas is not an alternative diesel fuel. An emission control strategy using a fuel additive will be treated as an alternative diesel fuel based strategy unless:

(A) the additive is supplied to the engine fuel by an on-board dosing mechanism, or

(B~~b~~) the additive is directly mixed into the base fuel inside the fuel tank of the engine, or

(C) the additive and base fuel are not mixed until engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.

(2) "ARB" means the California Air Resources Board.

(3) "ARB Designees" are defined as those entities that ARB designates or contracts with to perform certain functions or provide specific services on its behalf under this regulation.

(4) "Authorized Emergency Vehicle" is as defined in Vehicle Code section 165.

(5) "Average Daily Drayage Truck Visits" is determined by dividing the total number of truck visits within a calendar month by the total number of

intermodal rail yard open days for that same calendar month as represented by the following equation:

$$\left(\frac{\text{Total number of truck visits}}{\text{Total number of intermodal rail yard open days}} = \text{Average daily truck count} \right)$$

Where:

(A) a 'truck visit' is defined as each occurrence of a drayage truck transgressing from outside intermodal rail yard property onto intermodal rail yard property; and,

(B) an 'open day' is defined as a calendar day in which an intermodal rail yard has drayage truck traffic.

(6) "Beneficial Cargo Owner" is a cargo owner, the person for whose account the ocean or rail transportation is provided, the person to whom delivery is to be made, a shippers' association, or an ocean or rail transportation intermediary that accepts responsibility for payment of all applicable charges.

(7) "Bill of Lading" is a document that states the terms of the contract between a shipper and a transportation company. It serves as a document of title of the goods shipped, a contract of carriage, and a receipt for goods.

(8) "CARB Diesel Fuel" is diesel fuel certified by ARB as meeting the fuel specification standards set forth at title 13, California Code of Regulations (CCR) section 2280 et seq.

(9) "Class I Railroad" is a freight railway based on large revenues ($250 million or more) in comparison to the revenues of Class II (which ranges from greater than $20 million but less than $250 million) and Class III (less than $20 million) railways, as defined by the Surface Transportation Board (STB).

(10) "Compression Ignition Engine" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

(11) "Dedicated Use Vehicles" are uni-body vehicles that do not have separate tractor and trailers and include but are not limited to:

(A) Dedicated auto transports;

(B) Dedicated fuel delivery vehicles;

(C) Concrete mixers;

(D) On-road mobile cranes

(12) "Diesel Fuel" means any fuel that is commonly or commercially known, sold, or represented by the supplier as diesel fuel, including any mixture of primarily liquid hydrocarbons (HC) - organic compounds consisting exclusively of the elements carbon and hydrogen - that is sold or represented by the supplier as suitable for use in an internal combustion, compression - ignition (CI) engine.

(13) "Diesel-Fueled" means a CI engine fueled by diesel fuel, CARB diesel fuel, or alternative diesel fuel, in whole or part.

(14) "Diesel particulate matter (diesel PM)" means the particles found in the exhaust of diesel-fueled compression ignition engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties. ARB has identified diesel PM as a toxic air contaminant.

~~(15) "Drayage Truck" means any in-use on-road vehicle with a gross vehicle weight rating (GVWR) greater than 33,000 pounds operating on or transgressing through port or intermodal rail yard property for the purpose of loading, unloading or transporting cargo, such as containerized, bulk or break-bulk goods.~~

(15) "Drayage Truck" means any in-use on-road vehicle with a gross vehicle weight rating (GVWR) greater than 26,000 pounds that pulls a trailer or chassis that is used for transporting cargo, such as containerized, bulk, or break-bulk goods, that operates:

(A) on or transgresses through port or intermodal rail yard property for the purpose of loading, unloading or transporting cargo, including transporting empty containers and chassis;

or,

(B) off port or intermodal rail yard property transporting cargo or empty containers or chassis that originated from or is destined to a port or intermodal rail yard property .

Drayage trucks are not:

(C) Vehicles operating off of port or intermodal rail yard properties that transport cargos that have originated from a port or rail yard property but have been off-loaded from the equipment (e.g., a trailer or container) that transported the cargo from the originating port or rail yard

or

(D) Vehicles operating off of port or intermodal rail yard properties that transport cargos destined for a port or rail yard but which the cargos are to be subsequently transferred into or onto different equipment (e.g., a trailer or container) before being delivered to a port or intermodal rail yard.

(16) "Drayage Truck Owner" means:

(A) the person registered as the owner of a drayage truck as shown by the Department of Motor Vehicles, or its equivalent in another state, province, or country; or the International Registration Plan.

or

(B) the lessee of the truck, as indicated on the drayage truck's registration pursuant to Vehicle Code section 4453.5.

(17) "Drayage Truck Operator" means the driver of the vehicle or any person, party or entity that controls the operation of a drayage truck ~~at a port or intermodal rail yard facility~~.

(18) "Drayage Truck Registry (DTR)" is an ARB database that contains information on all trucks that conduct business at California ports and intermodal rail yards.

(19) "Drayage Truck Registry Number" is a unique identifier issued to the owner of a drayage truck upon registering in the DTR and corresponds to the truck registered.

(20) "DTR Compliant" means that a drayage truck is currently compliant with the requirements of the regulation, including the requirements for the DTR and emission standards.

(21) "Dual-Fuel Engine" means any compression ignition engine that is engineered and designed to operate on a combination of alternative fuels, such as compressed natural gas (CNG) or liquefied petroleum gas (LPG) and diesel fuel or an alternative diesel fuel. These engines have two separate fuel systems, which inject both fuels simultaneously into the

engine combustion chamber. A dual-fuel engine is not an alternative-fuel engine.

(22) "Emergency Event" means any situation arising from sudden and reasonably unforeseen natural disaster such as earthquake, flood, fire, or other acts of God, or other unforeseen events beyond the control of drayage truck owners and operators that threatens public health and safety or the reasonable flow of goods movement.

(23) "Emergency Decree" means a determination by the Executive Officer that an emergency event has occurred that requires the immediate temporary operation of drayage trucks at ports and intermodal rail yard facilities.

(24) "Executive Officer" is the Executive Officer of ARB or his/her authorized representative.

(25) "Gross Vehicle Weight Rating (GVWR)" is as defined in Vehicle Code Section 350.

(26) "Heavy-Duty" is a manufacturer's ~~gross vehicle weight rating~~ GVWR of greater than ~~33,000~~ 26,000 pounds.

(27) "Intermodal Rail Yard" is any rail facility owned or operated by a Class I railroad where cargo is transferred from drayage truck to train or vice-versa that:

(A) is within 80 miles of a port;

or,

(B) is located more than 80 miles from the nearest port and having, on or after January 2008, 100 or more average daily drayage truck visits in any one calendar month.

Once a rail yard, identified in (B) above, has 100 or more average daily drayage truck visits in any one month, the rail yard will be considered an intermodal rail yard and will be subject to all provisions of this regulation regardless of the size of future average daily drayage truck visits. Intermodal rail yards include, but are not limited to, the following facilities: Union Pacific (UP) Oakland, Burlington Northern Santa Fe (BNSF) Hobart, LATC Union Pacific, Commerce UP, Richmond BNSF, Commerce Eastern BNSF, ICTF UP, San Bernardino, Stockton Intermodal BNSF, Lathrop Intermodal UP, and BNSF Oakland.

(28) "International Registration Plan" is a registration reciprocity agreement among states of the United States and provinces of Canada providing for payment of license fees on the basis of total distance operated in all jurisdictions.

(29) "Lessee" has the same meaning as in Vehicle Code section 371.

(30) "Liquid Natural Gas (LNG) Fueled Trucks" are drayage trucks that utilize a heavy-duty pilot ignition engine that is designed to operate using an alternative fuel, except that diesel fuel is used for pilot ignition at an average ratio of no more than one part diesel fuel to ten parts total fuel on any energy equivalent basis. An engine that can operate or idle solely on diesel fuel at any time does not meet this definition.

(31) "Marine or Port Terminals" means wharves, bulkheads, quays, piers, docks and other berthing locations and adjacent storage or adjacent areas and structures associated with the primary movement of cargo or materials from vessel to shore or shore to vessel including structures which are devoted to receiving, handling, holding, consolidating and loading or delivery of waterborne shipments or passengers, including areas devoted to the maintenance of the terminal or equipment. For the purposes of this regulation, the term includes but is not limited to production or manufacturing areas, warehouses, storage facilities, and private or public businesses or entities located on or surrounded by port property.

(32) "Military Tactical Support Vehicles" is as defined in title 13, CCR, section 1905.

(33) "Motor Carrier" is a business intermediary that contracts with beneficial cargo owners, ship companies, port terminals or Class I railroads, and with drayage truck owners whom it dispatches for pick-up and delivery of goods ~~and with drayage truck owners, who it dispatches to~~ that are destined for or originated from ports and/or intermodal rail yards ~~to pick up and deliver such goods~~.

(34) "On-road" means a vehicle that is designed to be driven on public highways and roadways and that is registered or is capable of being registered by the California Department of Motor Vehicles (DMV) under Vehicle Code sections 4000 et seq. - or DMV's equivalent in another state, province, or country; or the International Registration Plan. A vehicle covered under ARB's In-Use Off-Road Regulation, title 13, CCR, section 2449 is not an on-road vehicle.

(35) "Oxides of nitrogen (NOx)" means compounds of nitric oxide, nitrogen dioxide, and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition.

(36) "Port" is the port property where marine and port terminals are typically located for the loading and unloading of water-borne commerce onto and from ocean-going vessels. For purposes of this regulation, port does not include port property that is not related to or primarily used to engage in water-borne commerce. Ports covered by this regulation include, but are not limited to, the Port of Long Beach, Port of Los Angeles, Port of Humboldt Bay, Port of San Diego, Port of Hueneme, Port of Oakland, Port of San Francisco, Port of Sacramento, Port of Stockton, Port of Redwood City, Port of Crockett, Port of Richmond, Port of Pittsburg, and the Port of Benicia.

(37) "Port Authority" means those entities, either public or private, that are responsible for the operation of the ports.

(38) "Port Property" means publicly or privately owned property where a port is located. It is the property that includes the physical boundaries, either contiguous or non-contiguous, of the port and may include other properties owned by the port. For the purposes of this regulation, port property includes privately owned property located within a publicly or privately owned port property's boundaries.

(39) "Rail Yard Authority" means those entities, either public or private, that are responsible for the operation of Class I rail yards.

(40) "Rail Yard Property" means the property constituting the physical boundaries of intermodal rail yards. For the purposes of this regulation, rail yard property also includes privately owned property located within intermodal rail yard boundaries.

(41) "Uni-Body Vehicles" are vehicles that do not have a separate tractor and trailer and include but are not limited to:

(A) concrete mixers;

(B) on-road mobile cranes;

(C) on-road construction equipment.

(42) "Vehicle" is as defined in Vehicle Code Section 670.

(43) "Verified Diesel Emission Control Strategy (VDECS)" is an emission control strategy that has been verified pursuant to the "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines" in Title 13, California Code of Regulations, commencing with section 2700, and incorporated by reference.

(44) "Yard Truck" means an off-road mobile utility vehicle used to carry cargo containers with or without chassis; also known as a utility tractor rig (UTR), yard tractor, yard goat, yard hustler, or prime mover.

(d) Requirements and Compliance Deadlines. Drayage trucks subject to this regulation must meet the following requirements by the compliance deadlines detailed in both Phase 1 AND Phase 2.

(1) Phase 1:

(A) By December 31, 2009, all drayage trucks with a GVWR of greater than 33,000 pounds must be equipped with:

1. 1994-2003 model year engine certified to California or federal emission standards and a level 3 VDECS for PM emissions;

or,

2. 2004 or newer model year engine certified to California or federal emission standards;

~~or,~~

~~3. a 1994 or newer model year engine that meets or exceeds 2007 model year California or federal emission standards.~~

(B) After December 31, 2011, all drayage trucks with 2004 model year engines with a GVWR of greater than 33,000 pounds must be equipped with a ~~the highest~~ level 3 VDECS for PM emissions.

(C) After December 31, 2012, all drayage trucks with 2005-2006 model year engines with a GVWR of greater than 33,000 pounds must be equipped with a ~~the highest~~ level 3 VDECS for PM emissions.

(2) Phase 2: After December 31, 2013, all drayage trucks with a GVWR of greater than 26,000 pounds, must be equipped with a level 3 VDECS for

PM emissions. ~~1994 or newer model year engine that meets or exceeds 2007 model year California or federal emission standards.~~

(3) Drayage Truck Owner Requirements

(A) Drayage truck owners shall:

1. meet all applicable requirements and deadlines set forth in Phases 1 and 2 above;

2. if an aftermarket level 3 VDECS is installed, be able to demonstrate that:

a. the VDECS has been verified by ARB for use with the engine and vehicle, as described in the Executive Order for the VDECS;

b. use of the vehicle must be consistent with the conditions of the Executive Order for the VDECS;

c. the VDECS is installed in a verified configuration;

d. the engine met the engine manufacturer's operational specifications prior to the VDECS installation;

e. the VDECS label is visible;

f. the level 3 VDECS is mounted in a safe and secure manner on the vehicle consistent with provisions in (3)(A)(2)(c) above, and the fixed position of the level 3 VDECS does not obscure vehicle rear view or side mirror visibility in any way.

g. all emission control devices are functioning properly and maintained per manufacturer's specifications;

h. in the event of a failure or damage of an aftermarket level 3 VDECS or an OEM equivalent diesel emissions control system while the device is still under warranty, it has taken prompt action to repair or replace the device by the manufacturer or authorized dealer with the same level of VDECS or OEM equivalent diesel emissions control system

within 45 days of first noticing or being notified of the failure or damage to the device.

i. it has adhered to the terms and conditions in the aftermarket manufacturer or OEM warranty governing the use of the device.

j. if the failure or damage to the level 3 VDECS or OEM equivalent diesel emissions control system occurs after expiration of the warranty period, it has taken prompt action to personally repair or replace the failed or damaged device with the same level VDECS or OEM equivalent diesel emissions control system available for the engine within 90 days of first noticing or being notified of the failure or damage to the device.

k. it has not misused, dismantled, or tampered with any components of the level 3 VDECS or OEM equivalent diesel emissions control system, except for purposes of recommended periodical maintenance by an authorized agent, or when it is necessary to detach the device to service the vehicle.

3. register with the DTR, according to subsection (e);

4. be able to demonstrate that the drayage truck operator has been informed about the information required under subsection (d)(5)(A)(4) for the dispatching motor carrier and instructed to provide such information to any enforcement personnel listed in subsection (i), upon request.

(B) Phase 1 compliance deadline extension:

1. Drayage truck owners may apply for a one-time, one-year, per-truck Phase 1 compliance deadline extension. The compliance deadline application must be either electronically filed or postmarked by June 1, 2009. To receive the Phase 1 compliance deadline extension, a drayage truck owner must demonstrate all of the following:

a. the engine installed on his/her current truck is a California or federally certified 1994 - 2003 model year engine;

b. the truck was registered with the DTR prior to June 1, 2009;

c. no Level 3 diesel emission control technology verified by ARB for use on that combination of truck and engine was available at the time the extension was filed.

2. Compliance extension applications shall be submitted to ARB at:

CALIFORNIA AIR RESOURCES BOARD
DRAYAGE TRUCK PHASE 1 EXTENSION, SSD
P.O. BOX 2815
SACRAMENTO, CA, 95812

or electronically through ARB's drayage truck website; http://www.arb.ca.gov/drayagetruck

3. If after the one-year extension ARB verified technology is still unavailable, the truck owner must comply with the regulation within 90 days of the expiration of the extension by replacing the existing heavy duty truck and/or engine with a truck or engine that meets or exceeds the Phase 1 requirements.

(4) Drayage Truck Operator Requirements

(A) Drayage truck operators shall, upon request:

1. provide the dispatching motor carrier's contact information as detailed in subsection (d)(5)(A)(4) to authorized enforcement personnel as set forth in subsection (i);

2. identify and provide documentation on the origin and destination of the cargo, chassis, and intermodal equipment (container etc.) to authorized enforcement personnel as set forth in subsection (i). Documentation can include a Delivery Receipt, Pick Up Receipt, Equipment Interchange Receipt (J-1), Release Number, Bill of Lading or other documentation

that identifies the origin and destination of the cargo and pick up / termination destination of the chassis and intermodal equipment.

(5) Motor Carrier Requirements

(A) Each motor carrier shall:

1. provide a copy of this regulation or an ARB approved summarized version to each drayage truck owner that it contracts with for deliveries to ports and intermodal rail yards;

2. only dispatch drayage trucks ~~to a port or intermodal rail yard~~ that meet emission standards and compliance deadlines set forth in Phases 1 and 2 in subsection (d);

3. only dispatch drayage trucks to ports and intermodal rail yards that are registered and in good standing with the Drayage Truck Registry (DTR) and are DTR compliant;

4. demonstrate that it has only dispatched drayage trucks whose operators have been informed to provide the motor carrier information listed below, upon request, to enforcement personnel, as listed in subsection (i).

a. the motor carrier's business name;

b. contact person's name;

c. motors carrier's street address, state, and zip code;

d. contact person's business phone number.

5. keep a record of all dispatched drayage trucks to a port or intermodal rail yard containing the information set forth in (a) through (d) below for a minimum of five years from the dispatch date. Dispatch records are to be made available to enforcement personnel within 72 hours of an official written or oral request.

a. truck dispatch date and time;

b. bill of lading or tracking number;

c. truck license plate number and issuing state;

d. Drayage Truck Registry number.

(6) Marine or Port Terminals and Intermodal Rail Yard Requirements

(A) Starting September 30, 2009, marine or port terminals and intermodal rail yards shall collect the following information for each drayage truck subject to this regulation that enters the facility that is not DTR compliant as determined by information contained within the Drayage Truck Registry.

1. Dispatching motor carrier:

a. business name of dispatching motor carrier;

b. contact person's name;

c. street address, state, zip code of the dispatching motor carrier;

d. phone number of the dispatching motor carrier;

e. bill of lading or tracking number.

2. Drayage truck:

a. entry date and time;

b. registered owner's name;

c. operator's name;

d. operator's license number;

e. drayage truck's license plate number and state of issuance;

f. drayage truck's vehicle identification number (VIN).

All information collected in subsection (d)(6) shall be kept for a period of not less than five years from the truck entry date and is to be made available to enforcement personnel within 72 hours of an official written or oral request.

(B) Marine or port terminals and intermodal rail yards shall report the information collected in subsection (A) above to their respective authorities according to schedule (A) below and in a format acceptable to their respective authority.

Schedule A: Terminal and Intermodal Rail Yard Reporting Schedule

Date Truck Enters Terminal or Intermodal Rail Yard	Date by which Information is to be Reported to Port or Rail Authority
January 1 – March 31	April 15
April 1 – June 30	July 15
July 1 – September 30	October 15
October 1 – December 31	January 15

(7) Port Authorities and Rail Yard Authorities Requirements

(A) Port and rail yard authorities shall respectively report the information collected by the port terminals and intermodal rail yards, as detailed in subsection (d)(6), to, and in a manor and format prescribed by, ARB according to Schedule B below. ARB reporting parameters are detailed on ARBs website http://www.arb.ca.gov/drayagetruck

Schedule B: Port and Rail Yard Authority Reporting Schedule

Date by which Information is to be Reported to the California Air Resources Board
May 15
August 15
November 15
February 15

(B) Port and rail yard authorities shall ensure their respective terminals and/or intermodal rail yards abide by all Schedule A reporting deadlines.

(C) Rail yard authorities operating rail yards located greater than 80 miles from the nearest port with less than 100 average daily drayage truck visits for each calendar month starting January 2008, must complete and submit quarterly verification reports according to Schedule B and in a format approved by ARB.

The first quarterly verification report shall include average daily drayage truck visits for each calendar month starting with the effective date of the regulation and submitted to ARB according to schedules A and B above. Subsequent quarterly verification reports shall include average daily drayage truck visits for the three calendar months prior to each reporting date. Quarterly verification reports shall include, but are not limited to, the following information;

1~~a~~. reporting rail yard authority contact information;

2~~b~~. rail yard name and address;

3~~c~~. average daily drayage truck visits by calendar month.

Quarterly verification applications and additional guidelines can be obtained by contacting ARB at:

CALIFORNIA AIR RESOURCES BOARD
RAIL YARD DAILY TRUCK VERIFICATION, SSD
P.O. BOX 2815
SACRAMENTO, CA, 95812

or electronically through ARB's drayage truck website;
http:// www.arb.ca.gov/drayagetruck

(e) Drayage Truck Registry Requirements.

(1) Truck Owner Requirements

(A) Owners of all drayage trucks doing business at a port or intermodal rail yard prior to September 30, 2009 and intending to continue operations after that date must register with the DTR database by September 30, 2009.

(B) Drayage trucks intending to begin operations at a port or intermodal rail yard after September 30, 2009 must be registered with the DTR database prior to commencing operations.

(C) Owners of all drayage trucks covered by the regulation and doing business at a port or intermodal rail yard must provide the following information to ARB or its designee by mail to the address in subsection (e)(2) or electronically through ARB's DTR website http:// www.arb.ca.gov/drayagetruck. The information shall include but may not be limited to:

1. truck owner name, address, and contact information (e.g. phone number, email address, fax number);

2. engine make, model, and model year;

3. vehicle identification number (VIN);

4. vehicle license number and state of issuance;

5. compliance status, which shall include:

a. identifying whether the drayage truck has complied with the requirements of Phases 1 and 2, set forth in subsection (d) above;

b. if so, how was compliance achieved (e.g. new compliant truck or description of the level 3 VDECS that was used), who did the installation work, and when was it completed;

c. if not, identifying when the drayage truck is scheduled to come into compliance under Phases 1 or 2.

(D) After filing the initial application, the drayage truck owner shall within 30 days of bringing a truck into compliance with Phase 1 or Phase 2, update the DTR with the vehicle's compliance status information and any other changes to the vehicle's ownership, DMV registration status, or participation status in IRP.

(2) Mailing Address for Filing Initial Applications and Updates. Drayage truck owners shall submit DTR applications and any updated information to ARB at:

CALIFORNIA AIR RESOURCES BOARD
C/O DRAYAGE TRUCK REGISTRY, SSD
P.O. BOX 2815
SACRAMENTO, CA, 95812

(3) Failure to register with the DTR or submittal of false information is a violation of state law and subject to civil or criminal penalty.

(f) Annual Port or Rail Yard Exemption.

(1) Annual Exemption. An annual exemption may be granted, under limited circumstances, by the ARB Executive Officer to ports or rail yards. An exemption may cover a clearly defined portion or the entirety of a port or rail yard. The Executive Officer will exempt a port or rail yard that is able to demonstrate one or more of the following:

(A) port or rail yard land is not typically used for truck traffic and its primary function or location does not include or attract drayage trucks covered under this regulation (e.g. a shoreline animal sanctuary);

(B) the overwhelming majority of trucks accessing the port or rail yard are exempted under this regulation (e.g. a port where only dedicated auto transports are in service).

(2) The Exemption Request

(A) a port or rail yard requesting an exemption shall mail the request to:

CALIFORNIA AIR RESOURCES BOARD
PORT / RAIL YARD EXEMPTION, SSD
P.O. BOX 2815
SACRAMENTO, CA, 95812

or may send it electronically to ARBs' website http://www.arb.ca.gov/drayagetruck using the request form available on the site.

(B) the request must be completed and submitted annually (via the same website or address listed above) no later than January 1 of the year prior to the exemption year (e.g. a 2010 year exemption application must be completed and submitted by January 1, 2009);

(C) the request will be approved or disapproved by the Executive Officer no later than July 1, of the year prior to the exemption year.

The Executive Officer will then issue an exemption to be valid for the specified port or rail yard for the specified exemption year.

(g) Penalties. Any person who fails to comply with the performance requirements of this regulation, who fails to submit any information, report, or statement required by this regulation, or who knowingly submits any false statement or representation in any application, report, statement, or other document filed, maintained, or used for the purposes of compliance with this regulation may be subject to civil or criminal penalties under sections 39674, 39675, 42400, 42400.1, 42400.2, 42402,.2, and 43016 of the Health and Safety Code. In assessing penalties, the Executive Officer will consider factors, including but not limited to the willfulness of the violation, the length of time of noncompliance, whether compliance was attempted, and the magnitude of noncompliance.

(h) Right of Entry. For the purpose of inspecting on-road vehicles covered in this regulation, and their records to determine compliance with these regulations, an agent or employee of ARB, upon presentation of proper credentials, has the right to enter any facility (with any necessary safety clearances) where on-road vehicles are located or on-road vehicle records are kept.

(i) Enforcement. Enforcement of this section may be carried out by authorized representatives of ARB, port and rail yard authorities; peace officers as defined in California Penal Code, Title 3, chapter 4.5, sections 830 et seq. and their respective law enforcement agencies; and authorized representatives of air pollution control or air quality management districts.

(j) Sunset. Provisions of section 2027 shall sunset on December 31, 2016. Starting January 1, 2017, drayage trucks are subject to the provisions of section 2025 (Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants, from In-Use Heavy-Duty Diesel-Fueled Vehicles).

(jk) Relationship to Other Law. Nothing in this section allows drayage trucks to operate in violation of other applicable law, including, but not limited to:

(1) California Vehicle Code;

(2) California Health and Safety Code;

(3) division 3, title 13, California Code of Regulations;

(4) any applicable ordinance, rule, or requirement as stringent as, or more stringent than, than the requirements of subsection (d) of this regulation.

(kl) Severability. If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

Note: Authority cited: Sections 39002, 39003, 39500, 39600, 39601, 39602, 39602.5, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 41511, 42400, 42400.1, 42400.2, 42402.2, 42410, 43000, 43000.5, 43013, 43016, 43018, 43023 and 43600, Health and Safety Code. Reference: Sections 39002, 39003, 39500, 39600, 39601, 39602, 39602.5, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 41511, 42400, 42400.1, 42400.2, 42402.2, 42410, ~~40717.9,~~ 43000, 43000.5, 43013, 43016, 43018, 43023 and 43600, Health and Safety Code.

Appendix C

Proposed Regulation Order
Amendments to the Tractor-Trailer
Greenhouse Gas Regulation

PROPOSED REGULATION ORDER

REGULATION TO TO REDUCE GREENHOUSE GAS EMISSIONS FROM HEAVY-DUTY VEHICLES

Note: Proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions, compared to the preexisting regulatory language.

Amend subarticle 1, sections 95300 to 95312, title 17, California Code of Regulations, to read as follows.

Subarticle 1: Heavy-Duty Vehicle Greenhouse Gas Emission Reduction ~~Measure~~Regulation

95300 Purpose.

The purpose of this subarticle is to reduce greenhouse gas emissions from heavy-duty (HD) tractors and 53-foot or longer box-type semitrailers (trailers) that transport freight on a highway within California.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95301. Applicability.

(a) This subarticle applies to owners and drivers of the following equipment when driven on a highway within California, as well as motor carriers, California-based brokers, and California-based shippers that use, or cause to be used, the following equipment on a highway within California:

(1) HD tractors that pull 53-foot or longer box-type trailers; and

(2) 53-foot or longer box-type trailers that are pulled by HD tractors.

(b) The requirements in this subarticle do not apply to the following vehicles:

(1) drop-frame trailers;

(2) chassis trailers;

(3) curtain-side trailers;

(4) livestock trailers;

(5) refuse trailers;

(6) box-type trailers less than 53 feet in length;

(7) emergency vehicles; and

(8) military tactical support vehicles.

(c) In accordance with the provisions of section 95305, *Exemptions,* specified requirements of this subarticle do not apply to:

(1) local-haul trailers and the tractors pulling local-haul trailers,

(2) local-haul tractors and the trailers pulled by local-haul tractors,

(3) short-haul tractors and the trailers pulled by short-haul tractors, ~~and~~

(4) drayage tractors and the trailers pulled by drayage tractors~~.~~, and

(5) storage trailers.

~~(d) Disclosure of Regulation Applicability: Any person residing in California selling a HD tractor or 53-foot or longer box-type trailer subject to this regulation mustprovide the following disclosure in writing to the buyer on the bill of sale:~~

~~*"A heavy-duty tractor and 53-foot or longer box-type trailer operated in California may be subject to the California Air Resources Board Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure. These vehicles may be required to use low-rolling resistance tires and meet aerodynamic equipment requirements to reduce greenhouse gas emissions. For more information, please visit the California Air Resources Board website at http://www.arb.ca.gov/cc/hdghg/hdghg.htm."*~~

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95302. Definitions.

(a) The following definitions apply to this subarticle:

(1) *"Aerodynamic technologies"* means components designed to reduce wind resistance on the tractor or trailer resulting in improved overall tractor fuel economy and reduced carbon dioxide emissions. There are two types of aerodynamic technologies: fairings and flow control devices.

(2) *"Box-type trailer"* means a dry-van trailer or refrigerated-van trailer that is not a drop-frame trailer.

(3) *"Broker"* means a person who, for compensation, arranges or offers to arrange the transportation of property by a motor carrier. A motor carrier, or person who is an employee or bona fide agent of a carrier, is not a broker within the meaning of this section when it arranges or offers to arrange the transportation of shipments which it is authorized to transport and which it has accepted and legally bound itself to transport.

(4) *"Cab side extender"* means a flow control device placed vertically on the rear side of the tractor that reduces the space between the tractor and trailer.

(5) *"California-based broker"* means a broker that maintains a business location in California.

(6) *"California-based shipper"* means a shipper that operates a facility in California where freight is located prior to its transportation.

(7) *"Chassis trailer"* means a trailer composed of a simple chassis for the mounting of a containerized load.

(8) *"Compliance year"* means the calendar year in which a fleet owner may bring trailers into compliance to meet the minimum fleet conformance threshold that takes effect on January 1 of the following year.

(9) *"Compliant trailer"* means a trailer that complies with the equipment requirements set forth in ~~sub~~section 95303(b). For the purposes of the optional trailer fleet compliance schedules, to bring a trailer into compliance means to either retrofit the trailer with the necessary aerodynamic technology or technologies ~~equipment~~ to comply with the equipment requirements set forth in ~~sub~~section 95303(b), ~~as applicable,~~or remove the trailer from the owner's fleet~~replace the trailer with another trailer that meets the equipment requirements set forth in subsection 95303(b), as applicable~~.

(10) "*Conformance" means* meeting or exceeding the minimum fleet conformance thresholds defined in section 95307, Optional Trailer Fleet Compliance Schedules, Tables 1, ~~and~~ 2, and 3. A conformance threshold defines the percentage of trailers in a fleet that are required to be compliant in accordance with a large fleet compliance schedule or a small fleet compliance schedule.

(11) *"Curtain-side trailer"* means a trailer with tarp sides that can be loaded from the sides, top, or rear.

(12) *"Delayed compliance trailer"* means a trailer for which compliance may be delayed pursuant to ~~sub~~section 95307(b)(4).

(13) *"Dispatch"* means to coordinate delivery, pickup, and drop-off schedules of vehicles; and monitor the delivery of freight from these vehicles.

(14) *"Dispatch driver"* means the driver of a HD tractor that has been dispatched by a motor carrier or broker.

~~(15) "DOORS" (Diesel On-road and Off-road Reporting System) is the on-line reporting tool for this subarticle. DOORS is also the reporting tool for the regulation for in-use on-road diesel vehicles and the regulation for in-use off-road diesel vehicles.~~

(16~~5~~) *"Drayage tractor"* means any in-use on-road tractor with a gross vehicle weight rating of greater than ~~33~~26,000 pounds ~~or greater~~ operating on or transgressing through port or intermodal rail-yard property for the purpose of loading, unloading or transporting freight~~cargo, such as containerized, bulk or break-bulk goods~~.

(17~~6~~) *"Driver"* means a person who physically operates a HD tractor.

(18~~7~~) *"Drop-frame trailer"* means an enclosed rectangular trailer with a deck that is lower to the ground in the area between the trailer hitch and the trailer wheels, to create more cargo space.

(19~~8~~) *"Dry-van trailer"* means an enclosed rectangular ~~non-climate controlled~~ trailer that is not a refrigerated-van trailer.

(~~20~~19) *"Early compliance trailer"* means a trailer that has been brought into compliance with the equipment requirements set forth in ~~sub~~section 95303(b)(3) as applicable, before January 1, 2010, and for which the owner receives credit, in accordance with the *early compliance option* set forth in ~~sub~~section 95307(b)(4), that may be used to delay the compliance of delayed compliance trailers.

(21~~0~~) *"Emergency vehicle"* means a vehicle as defined in California Vehicle Code ~~S~~section 165.

(21) *"Empty trailer"* means a trailer that does not contain freight. A trailer that contains only items used for the handling or securing of freight, such as moving blankets, straps, moving dollies, and tool kits that are used in the transport of other items in the trailer, or to maintain the tractor or trailer on the road, is considered an empty trailer.

(22) *"Fairing"* means a structure with smoothly contoured solid surfaces that reduces the wind resistance of the objects ~~they~~it covers.

(23) *"Fleet"* means one or more trailers owned by a person, business, or government agency. A fleet consists of the total number of 53-foot or longer box-type trailers under common ownership or control even if they are part of different subsidiaries, divisions, or other organizational structures of a company or agency.

(24) *"Flow control device"* means a design element that manipulates the air flow around an object by changing the air flow characteristics in order to reduce the pressure force exerted on the vehicle.

(25) *"Freight"* means any item being transported for delivery in a 53-foot or longer box-type trailer. Items that remain in the trailer after all freight is delivered are not considered freight. These include items that are used exclusively to secure items being transported in the trailer, protect items being transported in the trailer, load items being transported in the trailer, or repair the tractor or trailer. Items that are not considered freight could include moving blankets, straps, tool kits, and moving dollies.

(2~~5~~6) *"Fuel tank fairing"* , also known as a chassis skirt, means a fairing located at the base of the cab between the front wheel of the tractor and the forward-most rear wheel, covering the open space and streamlining the fuel tank.

(2~~6~~7) *"Good operating condition"* means the condition of a HD tractor or box-type trailer that meets the applicable standards in section 95304, *Good Operating Condition Requirements* for continued aerodynamic efficiency.

(2~~7~~8) *"Gross vehicle weight rating"* or *"GVWR"* means the "GVWR" as defined in California Vehicle Code ~~S~~section 350.

(2~~8~~9) *"Heavy-duty tractor"* or *"HD tractor"* means a class 7 or class 8 motor vehicle designed to pull a semitrailer on a highway by means of a fifth wheel mounted over the rear axle(s).

(~~29~~30) *"Highway"* means a "highway" as defined in California Vehicle Code section 360.

(3~~0~~1) *"Integrated sleeper cab roof fairing"* means a fairing located on the roof of a sleeper-cab-equipped tractor that extends from the front windshield of the tractor cab to the rear edge of the sleeper cab, with enclosed sides that line up with the sides of the sleeper cab.

(32) *"Intermodal railyard"* means any rail facility where trailers are transferred from drayage tractor to train or vice-versa.

(~~31~~3) *"Livestock trailer"* means a semitrailer designed to transport live animals.

(~~32~~4) *"Local–haul base"* means the location where a local-haul tractor or local-haul trailer is garaged~~, maintained, and~~or from which it is routinely dispatched.

(~~33~~5) *"Local-haul tractor"* means a HD tractor that travels exclusively within a 100-mile radius of its local-haul base.

(~~34~~6) *"Local-haul trailer"* means a 53-foot or longer box-type trailer that travels exclusively within a 100-mile radius of its local-haul base.

(~~35~~7) *"Low-rolling-resistance tire"* means a tire that is designed to improve fuel efficiency of a tractor pulling a trailer by minimizing its rolling resistance, which consists of the energy lost as heat within the rubber itself, as well as aerodynamic drag of the tire, and friction between the tire and the road and between the tire and the rim when the tire is rolling under load; rolling resistance is expressed as the energy consumed per unit distance as the tire rolls under load.

(~~36~~8) *"Military tactical support vehicle"* means a "Military Tactical Support Vehicle" as defined in title 13, California Code of Regulations (CCR), section 1905.

(~~37~~9) *"Motor carrier"* means a "Motor carrier" as defined in California Vehicle Code ~~S~~section 408.

(40) *"Non-compliant Tractor Pass"* means a temporary permit issued by the Executive Officer in accordance with the requirements of section 95305(i) that allows a HD tractor to pull a 53-foot or longer box-type trailer on a highway within California without meeting the requirements of sections 95303(a) and 95305(b) for a defined time period not to exceed three consecutive days.

(41) *"Ocean-going vessel"* means a commercial, government, or military vessel meeting any one of the following criteria:

(A) A vessel greater than or equal to 400 feet in length overall (LOA) as defined in 50 Code of Federal Regulations (CFR) § 679.2, as adopted June 19, 1996;

(B) A vessel greater than or equal to 10,000 gross tons (GT ITC) pursuant to the convention measurement (international system) as defined in 46 CFR § 69.51-.61, as adopted September 12, 1989; or

(C) A vessel propelled by a marine compression ignition engine with a per-cylinder displacement of greater than or equal to 30 liters.

(42) *"Open-shoulder tire"* means a tire that is constructed such that the two outer tread ribs, located where the tread and sidewalls meet, are separated into individual tread blocks and is designed to improve traction when traveling on mud or snow covered highways.

(~~38~~43) *"Owner"* of a tractor or trailer means the person or persons registered as the owner of the tractor or trailer by the California Department of Motor Vehicles or its equivalent in another state, province, or country (presumed at the time of any citation to be the person or persons identified as the owner on the registration document or title carried on the vehicle), except in the following circumstances:

~~(A) a person who is financially and contractually responsible for maintaining the tractor or trailer is the owner for purposes of this subarticle if the registered owner of the vehicle clearly demonstrates the person's maintenance responsibilities include responsibility for installing and maintaining the tires and aerodynamic technologies required by this subarticle. Subsections (C), (D) and (E) and not this subsection apply to tractors or trailers that are leased.~~

(~~B~~A) for a tractor or trailer owned by the federal government and not registered in any state or local jurisdiction, the owner means the branch, agency or other organization within the federal government that operates the tractor or trailer, that is required to maintain accountability for the vehicle, or that is shown by the accountable entity to be responsible for the tractor's or trailer's maintenance.

(~~C~~B) for a leased tractor, the person or persons registered as the owner of the tractor or trailer by the California Department of Motor Vehicles or its equivalent in another state, province, or country (usually the lessor) is the owner for purposes of this subarticle, except that the lessee of the tractor is the owner for purposes of this subarticle if the lessor demonstrates that either the lessor provided the lessee with the following statement on a document separate from the lease agreement, or the lease includes the following statement:

> *"The lessee of this heavy-duty tractor understands that when using a heavy-duty tractor to pull a 53-foot or longer box-type trailer on a highway within California, the heavy-duty tractor must*

be compliant with sections 95300 – 953112, title 17, California Code of Regulations, and that it is the responsibility of the lessee to ensure this heavy-duty tractor is compliant. The regulations may require this heavy-duty tractor to have low-rolling-resistance tires that are U.S. Environmental Protection Agency (U.S. EPA) ~~Verified~~ SmartWay Verified Technologies prior to current or future use in California, or may entirely prohibit use of this tractor in California if it is a model year 2011 or later tractor and is not a U.S. EPA ~~Certified~~ SmartWay Certified Tractor."

(~~D~~C) for a leased trailer that is leased prior to January 1, 2013, the person or persons registered as the owner of the tractor or trailer by the California Department of Motor Vehicles or its equivalent in another state, province, or country (usually the lessor) is the owner for purposes of this subarticle, except that the lessee of the trailer is the owner for purposes of this subarticle if both of the following requirements are met:

1. The lessor demonstrates that the lessor provided the lessee with actual written notice that clearly informed the lessee about the requirements of this subarticle and about the lessee's obligation under terms of the lease to ensure the trailer complies with those requirements prior to use of the trailer in California. This requirement may be satisfied if either the lessee is provided with the following statement on a document separate from the lease agreement, or ~~by inclusion of~~ the following statement is included in the lease agreement:

   "The lessee of this box-type trailer understands that when using a heavy-duty tractor to pull a 53-foot or longer box-type trailer on a highway within California, the box-type trailer must be compliant with sections 95300 – 953112, title 17, California Code of Regulations, and that it is the responsibility of the lessee to ensure this box-type trailer is compliant. The regulations may require this trailer to have low-rolling-resistance tires and aerodynamic technologies that are U.S. Environmental Protection Agency ~~Verified~~ SmartWay Verified Technologies prior to current or future use in California."

2. The lessor demonstrates and informs the lessee that either:

   a. the lease agreement ~~permits~~ does not prohibit the lessee from modifying the trailer ~~to modify the trailer~~ to be compliant with the requirements of this subarticle; or

b. the lessor provides a reasonable method to exchange the trailer for one that is compliant with this subarticle.

(~~E~~D) for a leased trailer that is leased on or after January 1, 2013, the person or persons registered as the owner of the tractor or trailer by the California Department of Motor Vehicles or its equivalent in another state, province, or country (usually the lessor) is the owner for purposes of this subarticle, except that the lessee of the trailer is the owner for purposes of this subarticle if either the lessor demonstrates that the lessor provided the lessee with the following statement on a document separate from the lease agreement prior to entering the lease agreement, or the lease agreement includes the following statement:

> *"The lessee of this box-type trailer understands that when using a heavy-duty tractor to pull a 53-foot or longer box-type trailer on a highway within California, the box-type trailer must be compliant with sections 95300 – 9531~~1~~2, title 17, California Code of Regulations, and that it is the responsibility of the lessee to ensure this box-type trailer is compliant. The regulations may require this trailer to have low-rolling-resistance tires and aerodynamic technologies that are U.S. Environmental Protection Agency ~~Verified~~ SmartWay Verified Technologies prior to current or future use in California."*

(~~F~~E) For purposes of this subarticle, the terms "lease agreement," "leased," "lessor," and "lessee" mean the same as "rental agreement," "rented," "owner of the rented vehicle," and "renter," respectively.

(~~39~~44) "*Person*" means an individual, corporation, business trust, estate, trust, partnership, limited liability company, association, joint venture, government, governmental subdivision, agency, or instrumentality, public corporation, or any other legal or commercial entity.

(45) *"Port"* means the port property where marine and port terminals are typically located for the loading and unloading of water-borne commerce onto and from ocean-going vessels. Ports covered by this regulation include, but are not limited to, the Port of Long Beach, Port of Los Angeles, Port of Humboldt Bay, Port of San Diego, Port of Hueneme, Port of Oakland, Port of San Francisco, Port of Sacramento, Port of Stockton, Port of Redwood City, Port of Crockett, Port of Richmond, Port of Pittsburg, and the Port of Benicia.

(~~40~~6) *"Rear trailer fairing"* means a fairing that attaches to the perimeter outer edges of the trailer's rear-facing surface to provide a continuous surface for the air passing over the side and top surfaces of the trailer.

(~~41~~7) *"Refrigerated-van trailer"* means a rectangular trailer van that has a refrigeration or heating unit built into the front of the trailer to maintain precise temperatures and is designed to haul freight that requires climate control, such as ~~used to haul~~ frozen food, fresh produce, hot or warm food, and other perishable items.

(~~42~~8) *"Refuse trailer"* means a trailer that is used to haul solid waste material. Solid waste includes garbage, construction debris, commercial refuse, and other discarded materials.

(49) *"Relocation Pass"* means a temporary permit issued by the Executive Officer in accordance with the requirements of section 95305(f) that allows a local-haul trailer to relocate to either a new local-haul base or to an out-of-state location while hauling freight; a storage trailer to relocate to a new storage location or to an out-of-state location while hauling freight; or an out-of-state trailer to relocate to either a local-haul base or storage location while hauling freight without meeting all of the applicable requirements of sections 95303(b).

(~~43~~50) *"Semitrailer"* means a "Semitrailer" as defined in section 550 of the California Vehicle Code.

(~~44~~51) *"Shipper"* means a person that has possession of freight prior to its transportation. This may include, but is not limited to, owners of freight, distribution centers, and temporary freight storage facilities.

(~~45~~52) *"Short-haul tractor"* means a HD tractor that travels less than 50,000 miles per year, including all miles accrued both inside and outside of California.

(~~46~~53) *"Sleeper cab"* means a HD tractor body that has a compartment, typically containing a bed, located behind the driving compartment.

(54) *"Storage trailer"* means a trailer that is used for the storage of items at a fixed location.

(~~47~~55) *"Tractor"* means a "Truck Tractor" as defined in section 655 of the California Vehicle Code.

(~~48~~56) *"Trailer"* means a semitrailer.

(57) *"Transfer of Ownership Pass"* means a temporary permit issued by the Executive Officer in accordance with the requirements of section 95305(g) that allows a HD tractor to pull a non-compliant 53-foot or longer box-type trailer on a highway within California without meeting all of the applicable

requirements of sections 95303(b) for the purpose of delivering that trailer from its current location to the transferee's location.

(4958) *"Transport refrigeration unit"* or *"TRU"* means a refrigeration system powered by an integral internal combustion engine designed to control the environment of temperature sensitive products that are transported in ~~trucks and~~ refrigerated-van trailers. TRUs may be capable of both cooling and heating.

(59) *"TRUCRS (Truck Regulation Upload, Compliance, and Reporting System)"* is the on-line reporting tool for this subarticle.

(5060) *"U.S. EPA ~~Certified~~ SmartWay Certified Tractor"* means a tractor that has been certified by the United States Environmental Protection Agency (U.S. EPA) to meet the technical specifications and requirements of the U.S. EPA SmartWay Transport Partnership Program.

(5161) *"U.S. EPA ~~Certified~~ SmartWay Certified Trailer"* means a 53-foot or longer box-type trailer that has been certified by the U.S. EPA to meet the technical specifications and requirements of the U.S. EPA SmartWay Transport Partnership Program.

(5262) *"U.S. EPA SmartWay Transport Partnership Program"* means the U.S. EPA's voluntary program that is a collaboration between the U.S. EPA and the transportation industry to improve energy efficiency, reduce greenhouse gas and air pollutant emissions, and improve energy security. This program establishes incentives for improving freight movement efficiency and the fuel efficiency of freight moving equipment. ~~Information on the U.S. EPA SmartWay Transport Partnership Program is available from the SmartWay program office at 2000 Traverwood, Ann Arbor, Michigan 48105; and at the U.S. EPA SmartWay website at http://www.epa.gov/smartway/.~~

(5363) *"U.S. EPA ~~Verified~~ SmartWay Verified Technology"* or *"U.S. EPA ~~Verified~~ SmartWay Verified Technologies"* means one or more aerodynamic technologies or low-rolling-resistance tire models that have been identified by the U.S. EPA as meeting the technical specifications and requirements of the U.S. EPA SmartWay Transport Partnership Program.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95303 Requirements and Compliance Deadlines.

(a) Tractor Requirements.

(1) Except as provided in ~~sub~~section 95305, *Exemptions,* beginning January 1, 2010, no 2011 or subsequent model year sleeper-cab HD tractor pulling a 53-foot or longer box-type trailer shall operate on a highway within California unless such tractor is a U.S. EPA ~~Certified~~ SmartWay Certified Tractor.

(2) Except as provided in ~~sub~~section 95305, *Exemptions,* beginning January 1, 2010, no 2011 or subsequent model year HD tractor, including but not limited to sleeper-cab HD tractors, pulling a 53-foot or longer box-type trailer shall operate on a highway within California unless such tractor's tires are U.S. EPA ~~Verified~~ SmartWay Verified Technologies.

(3) Except as provided in ~~sub~~section 95305, *Exemptions,* beginning January 1, 201~~2~~3, no 2010 or previous model year HD tractor, pulling a 53-foot or longer box-type trailer shall operate on a highway within California unless such tractor's tires are U.S. EPA ~~Verified~~ SmartWay Verified Technologies.

(b) Trailer Requirements.

(1) *2011 and Subsequent Model Year Dry-Van Trailer Requirements.*

Except as provided in ~~sub~~section 95305, *Exemptions,* beginning January 1, 2010, no 2011 or subsequent model-year 53-foot or longer dry-van trailer shall travel on a highway within California unless such trailer is either:

(A) a U.S. EPA ~~Certified~~ SmartWay Certified Trailer, or,

(B) equipped with both:

1. tires that are U.S. EPA ~~Verified~~ SmartWay Verified Technologies; and

2. ~~any combination of~~a dry-van trailer aerodynamic technology~~ies~~ or combination of technologies that is either ~~has been demonstrated to the U.S. EPA to meet or exceed a 5 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program.~~

a. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that has been demonstrated to the U.S. EPA to meet or exceed a 5 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program, or

b. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that met the

criteria defined in section 95303(b)(1)(B)2.a.,but has been modified in any manner from the U.S. EPA SmartWay Verified Technology configurations. Only modifications that are required to enable a particular SmartWay technology to be installed on a trailer are allowed. Such modifications must not significantly increase the aerodynamic drag of the base, unmodified SmartWay Verified configuration, and the modifications may only be used if prior written approval is obtained from the Executive Officer. The Executive Officer will base his or her approval on information submitted that describes the modification, the need therefore, and any test data or other information that demonstrates the proposed modifications would not significantly increase the aerodynamic drag of the SmartWay Verified configuration, and on good engineering judgment.

(2) *2011 and Subsequent Model Year Refrigerated-Van Trailer Requirements.*

Except as provided in ~~sub~~section 95305, *Exemptions,* beginning January 1, 2010, no 2011 or subsequent model year 53-foot or longer refrigerated-van trailer shall travel on a highway within California unless such trailer is either:

(A) a U.S. EPA ~~Certified~~ SmartWay Certified Trailer, or,

(B) equipped with both:

1. tires that are U.S. EPA ~~Verified~~ SmartWay Verified Technologies; and

2. a dry-van trailer or refrigerated-van trailer aerodynamic technology ~~any~~ or combination of ~~dry van trailer aerodynamic~~ technologies that is either ~~has been demonstrated to the U.S. EPA to meet or exceed a 4 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program.~~

   a. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that has been demonstrated to the U.S. EPA to meet or exceed a 4 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program, or

   b. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that met the criteria defined in section 95303(b)(2)(B)2.a.,but has been modified in any manner from the U.S. EPA SmartWay

Verified Technology configurations. Only modifications that are required to enable a particular SmartWay technology to be installed on a trailer are allowed. Such modifications must not significantly increase the aerodynamic drag of the base, unmodified SmartWay Verified configuration, and the modifications may only be used if prior written approval is obtained from the Executive Officer. The Executive Officer will base his or her approval on information submitted that describes the modification, the need therefore, and any test data or other information that demonstrates the proposed modifications would not significantly increase the aerodynamic drag of the SmartWay Verified configuration, and on good engineering judgment.

(3) *2010 or Previous Model Year Dry-Van and Refrigerated-Van Trailer Requirements.*

~~(A)~~

Except as provided in section 95305, *Exemptions,* ~~A~~ a 2010 or previous model year 53-foot or longer box-type trailer pulled by a HD tractor may not travel on a highway within California unless all of the following requirements are met by the compliance dates specified. ~~after the compliance deadlines in subsection (b)(3)(B) unless such trailer is either a dry-van trailer that meets the requirements of subsections (b)(1)(A) or (b)(1)(B), or a refrigerated-van trailer that meets the requirements of subsections (b)(2)(A) or (b)(2)(B).~~

(A) By January 1, 2017, a 2010 or previous model year 53-foot or longer box-type trailer not identified in section 95303(b)(3)(F) must be equipped with tires that are U.S. EPA SmartWay Verified Technologies.

(B) For dry-van trailers not participating in an optional trailer fleet compliance schedule as defined in section 95307, *Optional Trailer Fleet Compliance Schedules,* by January 1, 2013, a 2010 or previous model year 53-foot or longer dry-van trailer must either be

1. a U.S. EPA SmartWay Certified Trailer, or

2. equipped with a dry-van trailer aerodynamic technology or combination of technologies that is either

   a. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that has been

demonstrated to the U.S. EPA to meet or exceed a 5 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program, or

b. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that met the criteria defined in section 95303(b)(3)(B)2.a.,but has been modified in any manner from the U.S. EPA SmartWay Verified Technology configurations. Only modifications that are required to enable a particular SmartWay technology to be installed on a trailer are allowed. Such modifications must not significantly increase the aerodynamic drag of the base, unmodified SmartWay Verified configuration, and the modifications may only be used if prior written approval is obtained from the Executive Officer. The Executive Officer will base his or her approval on information submitted that describes the modification, the need therefore, and any test data or other information that demonstrates the proposed modifications would not significantly increase the aerodynamic drag of the SmartWay Verified configuration, and on good engineering judgment.

(C) For refrigerated-van trailers not participating in an optional trailer fleet compliance schedule as defined in section 95307, *Optional Trailer Fleet Compliance Schedules*, and not identified in section 95303(b)(3)(F), by January 1, 2013, a 2010 or previous model year 53-foot or longer refrigerated-van trailer must either be

1. a U.S. EPA SmartWay Certified Trailer, or

2. equipped with a dry-van or refrigerated-van trailer aerodynamic technology or combination of technologies that is either

a. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that has been demonstrated to the U.S. EPA to meet or exceed a 4 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program, or

b. a U.S. EPA SmartWay Verified Technology or combination of U.S. EPA SmartWay Verified Technologies that met the criteria defined in section 95303(b)(3)(C)2.a.,but has been modified in any manner from the U.S. EPA SmartWay Verified Technology configurations. Only modifications that are required to enable a particular SmartWay technology to be installed on a trailer are allowed. Such modifications

must not significantly increase the aerodynamic drag of the base, unmodified SmartWay Verified configuration, and the modifications may only be used if prior written approval is obtained from the Executive Officer. The Executive Officer will base his or her approval on information submitted that describes the modification, the need therefore, and any test data or other information that demonstrates the proposed modifications would not significantly increase the aerodynamic drag of the SmartWay Verified configuration, and on good engineering judgment.

(D) For dry-van trailers participating in an optional trailer fleet compliance schedule as defined in section 95307, *Optional Trailer Fleet Compliance Schedules*, a 2010 or previous model year 53-foot or longer dry-van trailer must either meet the requirements defined in section 95303(b)(3)(B)1. or the requirements defined in section 95303(b)(3)(B)2. by the applicable compliance dates in section 95307, *Optional Trailer Fleet Compliance Schedules*.

(E) For refrigerated-van trailers participating in an optional trailer fleet compliance schedule as defined in section 95307, *Optional Trailer Fleet Compliance Schedules*, a 2010 or previous model year 53-foot or longer refrigerated-van trailer must either meet the requirements defined in section 95303(b)(3)(C)1. or the requirements defined in section 95303(b)(3)(C)2. by the applicable compliance dates in section 95307, *Optional Trailer Fleet Compliance Schedules*.

(F) A refrigerated-van trailer that is a model year 2003 through 2009 53-foot or longer trailer equipped with 2003 or subsequent model year transport refrigeration unit engine must be equipped with tires that are U.S. EPA SmartWay Verified Technologies and either meet the requirements defined in section 95303(b)(3)(C)1. or the requirements defined in section 95303(b)(3)(C)2. by:

1. January 1, 2018 for a 2003 or 2004 model year trailer
2. January 1, 2019 for a 2005 or 2006 model year trailer
3. January 1, 2020 for a 2007, 2008, or 2009 model year trailer

~~Compliance deadlines: A 2010 or previous model year 53-foot or longer box-type trailer must meet the requirements in subsection (b)(3)(A) by the following applicable dates:~~

~~1. For a dry-van trailer or refrigerated-van trailer not identified in subsection (b)(3)(B)2 before January 1, 2013, or by the applicable compliance dates in section 95307, *Optional Trailer Fleet Compliance Schedules*, if such trailer is included in the fleet of trailers participating~~

~~in, and remains eligible to participate in, an optional trailer fleet compliance schedule.~~

~~2. For a refrigerated-van trailer that is a model year 2003 through 2008trailer equipped with 2003 or subsequent model year transport refrigeration unit engine: either by~~

~~a. January 1, 2018 for a 2003 or 2004 model year trailer; or~~
~~b. January 1, 2019 for a 2005 or 2006 model year trailer; or~~
~~c. January 1, 2020 for a 2007 or 2008 model year trailer.~~

(c) Requirements for Drivers.

(1) A driver ~~can~~may not operate a HD tractor to pull a 53-foot or longer box-type trailer on a highway within California unless both the tractor and the trailer:

(A) comply with the applicable requirements and compliance deadlines set forth in ~~sub~~sections 95303(a) and 95303(b); and

(B) are in good operating condition as defined in section 95304, *Good Operating Condition Requirements* .

(2) A driver must, upon ~~demand~~request, provide the following ~~available~~ information to authorized enforcement personnel identified in section 95308:

(A) driver's license;

(B) vehicle odometer reading, if the tractor is an exempt short-haul tractor;

(C) tractor registration;

(D) trailer registration;

(E) origin of freight ~~being transported, or to be transported~~;

(F) destination of freight ~~being transported, or to be transported~~;

(G) if dispatched by a motor carrier, the motor carrier information set forth in ~~sub~~section 95303(g)(1)(B); ~~and~~

(H) if dispatched by a broker, the broker information set forth in ~~sub~~section 95303(f)(1)(B)~~.~~;

(I) if operating a drayage tractor that is exempt pursuant to the requirements of section 95305(d), documentation indicating the port or intermodal railyard of origin or destination, as applicable; and

(J) if operating a HD tractor pulling a 53-foot or longer box-type trailer that is operating under either a Relocation Pass pursuant to section 95305 (f), Transfer of Ownership Pass pursuant to section 95305(g), or Non-compliant Tractor Pass pursuant to section 95305(i); the pass approval number, as applicable.

(3) A driver of a HD tractor pulling a trailer that has been registered as a storage trailer pursuant to section 95306(e) and is traveling pursuant to section 95306(e)(1)(A) or a local-haul trailer pursuant to section 95306(c) and is traveling pursuant to section 95306(c)(1)(B) or 95306(c)(2)(B) must upon request allow authorized enforcement personnel to directly view the inside of the trailer.

(~~3~~4) A driver shall not operate a HD tractor to pull a 53-foot or longer box-type trailer on a highway within California if the the tractor or the trailer has aerodynamic technologies that are not deployed or not in their operational configuration.

(d) Requirements for Owners of HD Tractors.

(1) An owner of a HD tractor ~~cannot~~ may not use or ~~authorize the use of~~ cause to be used a HD tractor to pull a 53-foot or longer box-type trailer on a highway within California unless both the HD tractor and the box-type trailer:

(A) comply with the applicable requirements and compliance deadlines set forth in ~~sub~~sections 95303(a) and 95303(b); and

(B) are in good operating condition as defined in section 95304.

(e) Requirements for Owners of Box-Type Trailers.

(1) An owner of a 53-foot or longer box-type trailer must ensure that the 53-foot or longer box-type trailer will not be pulled by a HD tractor on a highway within California unless the 53-foot or longer box-type trailer:

(A) complies with the requirements and compliance deadlines set forth in ~~sub~~section 95303(b); and

(B) is in good operating condition as defined in section 95304.

(2) An owner of one or more 2010 or previous model year 53-foot or longer box-type trailers that are subject to the requirements of ~~sub~~section 95303(b)(3) may elect to follow an alternative compliance schedule, if applicable. Owners that choose to follow an alternative compliance

schedule must meet the requirements of section 95307, *Optional Trailer Fleet Compliance Schedules.*

(f) Requirements for California-based Brokers.

(1) A California-based broker must:

(A) only dispatch a HD tractor or a 53-foot or longer box-type trailer for travel on a highway within California if the tractor ~~or~~ and trailer compli~~es~~y with the operating requirements and compliance deadlines set forth in ~~sub~~sections 95303(a) and 95303(b);

(B) provide the following information to a dispatched driver who will be travelling on a highway within California:

1. broker's business name;

2. broker's street address, state, zip code;

3. broker contact person's name; and

4. broker contact person's business phone number.

(g) Requirements for Motor Carriers.

(1) A motor carrier must:

(A) only dispatch a HD tractor or a 53-foot or longer box-type trailer for travel on a highway within California if the tractor ~~or~~ and trailer compli~~es~~y with the operating requirements and compliance deadlines set forth in ~~sub~~sections 95303(a) and 95303(b);

(B) provide the following information to a dispatched driver who will be travelling on a highway within California:

1. motor carrier's business name;

2. motor carrier's street address, state, zip code;

3. motor carrier contact person's name; and

4. motor carrier contact person's business phone number.

(h) Requirements for California-based Shippers.

~~(A)~~(1) A California-based shipper must not ship freight from its California facility or facilities in a 53-foot or longer box-type trailer pulled by a HD tractor on a highway within California unless the HD tractor and the 53-foot or longer box-type trailer comply with the operating requirements and compliance deadlines set forth in ~~sub~~sections 95303(a) and 95303(b).

(i) Requirements for California-licensed Vehicle Dealers.

(1) Any California-licensed vehicle dealer selling a HD tractor or 53-foot or longer box-type trailer subject to this regulation must provide the buyer with the following disclosure in writing:

"A heavy-duty tractor and 53-foot or longer box-type trailer operated in California may be subject to the Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Regulation set forth under sections 95300 to 95312, title 17, California Code of Regulations. These vehicles may be required to use low-rolling-resistance tires and meet aerodynamic equipment requirements to reduce greenhouse gas emissions."

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95304 Good Operating Condition Requirements.

(a) Good Operating Condition Criteria for U.S. EPA ~~Certified~~ SmartWay Certified Tractor Aerodynamic Technologies.

(1) An aerodynamic technology such as an aerodynamic mirror, a cab side extender, a fuel tank fairing, and an integrated sleeper cab roof fairing on a U.S. EPA Certified SmartWay Tractor must meet the following criteria:

(A) Each must be installed in accordance with manufacturer's specifications;

(B) Each must be securely fastened to the tractor; and

(C) Each must not be used if it is damaged to such an extent as to compromise its aerodynamic effectiveness.

(b) Good Operating Condition Criteria for ~~U.S. EPA Certified SmartWay~~ Trailer Aerodynamic Technologies.

(1) An Aaerodynamic technology~~ies~~ installed on a box-type trailer must meet the following criteria:

(A) The aerodynamic technologyies must either be installed: ~~in accordance with the aerodynamic technology manufacturer's specifications;~~

1. in accordance with the aerodynamic technology manufacturer's specifications such that the technology continues to maintain its verified status in accordance with the requirements of the U.S. EPA SmartWay Transport Partnership Program, or

2. in a configuration approved by the Executive Officer.

(B) The aerodynamic technologyies must be securely fastened to the trailer;

(C) The aerodynamic technologyies must not be used with missing sections; and

(D) The aerodynamic technologyies must not be used if damaged to such an extent as to compromise ~~their~~ its aerodynamic effectiveness.~~; and~~

~~(E) The rear trailer aerodynamic technology must be capable of being folded back against the trailer sides or otherwise be readily compacted to allow normal functioning of doors.~~

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95305 Exemptions.

(a) *Short-Haul Tractor Exemption Requirements.* To qualify, the following must be met: ~~A short-haul tractor is exempt from the requirements of subsections 95303 (a)(1), 95303 (a)(2), and 95303(a)(3) if it's owner complies with the requirements in section 95306, *Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements.*~~

(1) A short-haul tractor pulling a 53-foot or longer box-type trailer on a California Highway is exempt from the requirements of sections 95303(a)(1), 95303(a)(2), and 95303(a)(3) upon its owner's submittal of the applicable information identified in section 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration Requirements.*

(2) A 53-foot or longer box-type trailer is exempt from the requirements of section 95303(b) while it is being pulled by an exempt short-haul tractor.

(3) The use of an exempt short-haul tractor in excess of 50,000 miles traveled during the one year period from the date the owner submitted the applicable information identified in sections 95306(b) through (f) is a violation of this subarticle.

(4) The driver of an exempt short-haul tractor must, upon request, provide the following information to authorized enforcement personnel identified in section 95308, *Enforcement*:

(A) Driver's license;

(B) Odometer reading of tractor;

(C) Tractor registration;

(D) Origin of freight;

(E) Destination of freight;

(F) If dispatched by a motor carrier, the motor carrier information listed in section 95303(g)(1)(B);

(G) If dispatched by a broker, the broker information listed in section 95303(f)(1)(B); and

(H) Vehicle identification number.

(5) The driver of an exempt short-haul tractor must, upon request, allow authorized enforcement personnel identified in section 95308 to directly view the odometer of the exempt short-haul tractor.

(6) For an exempt short-haul tractor that is removed from an owner's exempt short-haul tractor fleet, taken out of service, or is otherwise no longer exempt, the owner must notify the Executive Officer and update the short-haul tractor information submitted in accordance with sections 95306(d) to reflect this change in status prior to change in ownership of the tractor or prior to the tractor traveling on a highway within California, whichever occurs first, or within 30 days of the tractor being taken out of service. A tractor that is removed from the owner's short-haul tractor fleet or that for any other reason loses its exempt status is ineligible for the short-haul exemption under that owner for 36 months from the date its exempt status was lost.

(7) A short-haul tractor exemption remains in effect for a period of one year from the date that the information required in sections 95306(b) through 95306(d) and 95306(f) is submitted to the Executive Officer if the owner and the exempt tractor are in continuing compliance with the requirements of

this section. To extend the exemption for an additional one year from the expiration date of the exemption, the owner must submit to the Executive Officer the tractor's odometer reading taken at the end of the one year period no more than 15 days after the expiration date of the exemption.

(8) The owner of more than one short-haul tractor may consolidate the dates to apply for an extension with approval of the Executive Officer.

(b) *Local-Haul Tractor Exemption Requirements.* To qualify, the following must be met: ~~A local-haul tractor is exempt from the requirements of subsections 95303 (a)(1), but still must comply with the requirements of subsections 95303 (a)(2) and 95303 (a)(3), if its owner complies with the requirements of section 95306, *Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements*.~~

(1) A local-haul tractor pulling a 53-foot or longer box-type trailer is exempt from the requirements of sections 95303(a)(1), but still must comply with the requirements of sections 95303(a)(2) and 95303(a)(3), if the the local-haul tractor has been registered in accordance with the requirements of section 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration Requirements* and the tractor-trailer combination is traveling within a 100 miles of the local-haul tractor's local-haul base.

(2) A 2011 and subsequent model year 53-foot or longer box-type trailer is exempt from the requirements of sections 95303(b)(1)(A), 95303(b)(1)(B)2, 95303(b)(2)(A), and 95303(b)(2)(B)2, but still must comply with the requirements of sections 95303(b)(1)(B)1 and 95303(b)(2)(B)1, while it is being pulled by an exempt local-haul tractor.

(3) A 2010 and previous model year 53-foot or longer box-type trailer is exempt from the requirements of sections 95303(b)(3)(B), 95303(b)(3)(C), but still must comply with the requirements of sections 95303(b)(3)(A) while it is being pulled by an exempt local-haul tractor.

(4) The driver of an exempt local-haul tractor must, upon request, provide the information listed in section 95305(a)(4) to authorized enforcement personnel identified in section 95308, *Enforcement.*

(5) A local-haul tractor exemption will remain in effect as long as the owner and the exempt tractor remain in compliance with the requirements of this section.

(6) The owner of an exempt local-haul tractor must notify the Executive Officer if the information submitted in accordance with sections 95306(b) through section 95306(d) and section 95306(f) has changed, and must submit the

updated information to the Executive Officer within 15 days of change.

(7) For a local-haul tractor that is removed from an owner's local-haul fleet, taken out of service, or is otherwise no longer exempt, the owner must notify the Executive Officer and update the local-haul tractor information submitted in accordance with sections 95306(d) to reflect this change in status prior to change in ownership of the tractor or prior to the tractor traveling on a highway within California, whichever occurs first, or within 30 days of the tractor being taken out of service.

(c) *Local-Haul Trailer Exemption Requirements.* To qualify, the following must be met: ~~A local-haul trailer is exempt from the requirements of sections 95303(b)(1)(A), 95303(b)(1)(B)2, 95303(b)(2)(A), and 95303(b)(2)(B)2, but still must comply with the requirements of sections 95303(b)(1)(B)1 and 95303(b)(2)(B)1 if its owner complies with the requirements of section 95306, *Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements.*~~

(1) A 2011 or subsequent model year local-haul trailer is exempt from the requirements of sections 95303(b)(1)(A), 95303(b)(1)(B)2, 95303(b)(2)(A), and 95303(b)(2)(B)2, but still must comply with the requirements of sections 95303(b)(1)(B)1 and 95303(b)(2)(B)1 if the trailer has been registered in accordance with the requirements of section 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration Requirements* and the following conditions are met:

(A) the local-haul trailer is being pulled by a HD tractor on a California highway within a 100 miles of the local-haul trailer's local-haul base, or

(B) the local-haul trailer is being pulled by a HD tractor further than 100 miles from the vehicle's local-haul base for purposes of relocating the local-haul trailer to another local-haul base and the local-haul trailer is empty, or

(C) the local-haul trailer is traveling under a valid Relocation Pass.

(2) A 2010 or previous model year local-haul trailer is exempt from the requirements of sections 95303(b)(3)(B) and 95303(b)(3)(C), but still must comply with the requirements of sections 95303(b)(3)(A) if the trailer has been registered in accordance with the requirements of section 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration Requirements* and the following conditions are met:

(A) the local-haul trailer is being pulled by a HD tractor on a California highway within a 100 miles of the local-haul trailer's local-haul base, or

(B) the local-haul trailer is being pulled by a HD tractor further than 100 miles from the vehicle's local-haul base for purposes of relocating the local-haul trailer to another local-haul base and the local-haul trailer is empty, or

(C) the local-haul trailer is traveling under a valid Relocation Pass.

(3) A local-haul trailer exemption will remain in effect as long as the owner and the exempt trailer are in compliance with the requirements of this section.

(4) The owner of an exempt local-haul trailer must notify the Executive Officer if the information submitted in accordance with sections 95306(b), 95306(c), and 95306(e) has changed, and must submit the updated information to the Executive Officer within 15 days of change.

(5) For an exempt local-haul trailer that is removed from an owner's exempt local-haul fleet, taken out of service, or is otherwise no longer exempt, the owner must notify the Executive Officer and update the local-haul trailer information submitted in accordance with section 95306(e) to reflect this change in status prior to change in ownership of the trailer, or prior to the trailer traveling on a highway within California, whichever occurs first, or within 30 days of the trailer being taken out of service.

(6) The driver of a HD tractor pulling an empty, exempt local-haul trailer traveling further than 100 miles from the trailer's local-haul base must, upon request, allow authorized enforcement personnel to directly view the inside of the trailer.

(d) *Drayage Tractor Trailer Exemption Requirements.* To qualify, the following must be met:~~.A 53-foot or longer box-type trailer is exempt from the requirements of subsection 95303(b) while it is being pulled by a short-haul HD tractor that is exempt under subsection 95305(a).~~

(1) A drayage tractor pulling a 53-foot or longer box-type trailer on a California highway within 100 miles of a port or intermodal railyard and the trailer it pulls, are exempt from sections 95303(a) and 95303(b) provided:

(A) the trailer was off-loaded from an ocean-going vessel or rail car at the port or intermodal railyard prior to being pulled by the drayage tractor, and the driver has documentation indicating the port or intermodal railyard of origin; or

(B) the drayage tractor is transporting the trailer to the port or intermodal railyard to be loaded onto an ocean-going vessel or rail car, and the driver has documentation indicating the port or intermodal railyard of destination.

(e) *Storage Trailer Exemption Requirements.* To qualify, the following must be met: ~~A 53-foot or longer box-type trailer is exempt from the requirements of subsections 95303(b)(1)(A), 95303(b)(1)(B)2, 95303(b)(2)(A), and 95303(b)(2)(B)2, but still must comply with the requirements of subsections 95303(b)(1)(B)1 and 95303(b)(2)(B)1, while it is being pulled by a local-haul tractor that is exempt under subsection 95305(b).~~

(1) A storage trailer is exempt from the requirements of sections 95303(b) if the storage trailer has been registered in accordance with the requirements of section 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration Requirements* and the following conditions have been met:

(A) the storage trailer is being pulled by a HD tractor on a California highway for purposes of relocating the storage trailer to another storage location and the storage trailer is empty, or

(B) the storage trailer is traveling under a valid Relocation Pass.

(2) A storage trailer exemption will remain in effect as long as the owner and the exempt storage trailer are in compliance with the requirements of this section.

(3) The owner of an exempt storage trailer must notify the Executive Officer if the information submitted in accordance with sections 95306(b) and 95306(e) has changed, and must submit the updated information to the Executive Officer within 15 days of the change.

(4) For an exempt storage trailer that is removed from an owner's exempt storage trailer fleet, taken out of service, or is otherwise no longer exempt, the owner must notify the Executive Officer and update the exempt storage trailer information submitted in accordance with section 95306(e) to reflect this change in status prior to change in ownership of the trailer, or prior to the trailer traveling on a highway within California, whichever occurs first, or within 30 days of the trailer being taken out of service.

(5) The driver of a HD tractor pulling an empty, exempt storage trailer must, upon request, allow authorized enforcement personnel to directly view the inside of the trailer.

(f) *Relocation Pass for Exempt Local-Haul Trailers and Exempt Storage Trailers.* ~~A 2011 or subsequent model year sleeper cab HD tractor is exempt from the requirements of subsection 95303(a)(1), but still must comply with the requirements of subsection 95303 (a)(2), while it is pulling a local-haul trailer that is exempt under subsection 95305(c).~~

(1) An owner that obtains a Relocation Pass for an exempt local-haul trailer or an exempt storage trailer may operate that vehicle in accordance with the provisions of sections 95305(f)(1)(A) or 95305(f)(1)(B) for a specified period, as determined by the Executive Officer, not to exceed three consecutive days.

(A) An exempt local-haul trailer traveling under a Reloction Pass may transport freight on a California highway further than 100 miles from its local haul base while either en route to a new local haul base where it will operate as an exempt local-haul trailer or en route to an out-of-state location.

(B) An exempt storage trailer traveling under a Relocation Pass may transport freight on a California highway while either en route to a new storage location where it will operate as an exempt storage trailer or en route to an out-of-state location.

(2) An owner that obtains a Relocation Pass for a 53-foot or longer box-type trailer located out-of-state may operate that vehicle on a California highway in accordance with the provisions of section 95305(f)(2)(A) for a specified period, as determined by the Executive Officer, not to exceed three consecutive days.

(A) A 53-foot or longer box-type trailer traveling under a Relocation Pass is exempt from the requirements of this section 95303(b) while either en route from an out-of-state location to a local-haul base where it will operate as a registered local-haul trailer, or en route from an out-of-state location to a storage location where it will operate as a registered storage trailer

(3) If traveling to a local-haul base or storage location under Relocation Pass, within 48 hours after arrival at the local-haul base or storage location, the owner of the 53-foot or longer box-type trailer must register the trailer in accordance with the requirements of section, 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration Requirements* and operate the trailer as a local-haul trailer or storage trailer for at least 30 consecutive days after arrival.

(4) To obtain a Relocation Pass, a request to the Executive Officer must be made prior to the trailer's relocation. In the request, the owner must provide the Executive Officer the following information:

(A) Owner contact information, as specified in section 95306(b).

(B) Trailer vehicle identification number (VIN).

(C) For a trailer relocating to new local-haul base, the street address of the new local-haul base.

(D) For a trailer relocating to a new storage location, the street address of new storage trailer location.

(E) Date trailer will begin relocation travel.

(5) No trailer will be granted more than four Relocation Passes per year.

(6) The Executive Officer will respond to a request for a Relocation Pass within 15 days of receiving the information identified in section 95305(f)(4) and notify the owner in writing of the decision.

(A) If approved, the Executive Officer will provide the owner with a Relocation Pass in electronic or written format that will contain the following information:

1. Effective dates of the Relocation Pass which shall not exceed three consecutive days beginning with the date the trailer will begin travel.

2. Relocation Pass Approval Number.

(g) *Transfer of Ownership Pass for Trailers.* ~~A drayage tractor pulling a 53-foot or longer box-type trailer within 100 miles of the port or intermodal rail yard of origin or destination and the trailer it pulls, are exempt from sections 95303(a) and (b).~~

(1) Either party (the transferor or transferee) involved in the transfer of ownership of a 53-foot or longer box-type trailer may obtain a Transfer of Ownership pass for that trailer up to 30 days prior of the transfer of ownership.

(2) A 53-foot or longer box-type trailer traveling under a Transfer of Ownership Pass for the purpose of delivering such trailer from the transferor to the transferee is temporarily exempt from the requirements of sections 95303(b).

(3) To obtain a Transfer of Ownership Pass, a request to the Executive Officer must be made prior to the start of trailer delivery from the transferor to the transferee. The request must be made by whomever is the trailer's registered owner at the time of delivery, either the transferor or transferee. In the request, the transferor must provide the Executive Officer the following information for each trailer :

(A) Transferor's contact information:

1. Transferor's name, and if a corporate entity or governmental agency is selling the trailer, the responsible official and title (if applicable);

2. Name of transferor's company, corporation, or governmental agency (if applicable);

3. Corporate parent (if applicable);

4. Motor carrier identification number and type (if applicable);

5. Vehicle dealer license number and state where it was issued (if applicable);

6. Street address of transferor or transferor's company including city, state or province, zip code, colonia (Mexico only), and country;

7. Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

8. Physical address of location where records pertaining to the applicable sale will be maintained including city, state or province, zip code, colonia (Mexico only), and country;

9. Transferor's name;

10. Telephone number of contact person;

11. Email address of contact person (if available);

12. Company taxpayer identification number (if applicable); and

13. TRUCRS identification number of corporate parent (if one has been obtained).

(B) Transferee's contact information:

1. Transferee's name, and if a corporate entity or governmental agency is selling the trailer, the responsible official and title (if applicable);

2. Name of transferee's company, corporation, or governmental agency (if applicable);

3. Corporate parent (if applicable);

4. Motor carrier identification number and type (if applicable);

5. Vehicle dealer license number and state where it was issued (if applicable);

6. Street address of transferee or transferee's company including city, state or province, zip code, colonia (Mexico only), and country;

7. Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

8. Physical address of location where records pertaining to the applicable sale will be maintained including city, state or province, zip code, colonia (Mexico only), and country;

9. Transferee's contact person's name;

10. Telephone number of contact person;

11. Email address of contact person (if available);

12. Company taxpayer identification number (if applicable); and

13. TRUCRS identification number of corporate parent (if one has been obtained).

(C) Trailer identification number (VIN).

(D) Address of location of trailer prior to start of delivery.

(E) Address of location of trailer when delivery is complete.

(F) Date when trailer is scheduled to begin travel on a California highway under the Transfer of Ownership Pass.

(G) Date when trailer is scheduled to end travel on a California highway under the Transfer of Ownership Pass.

(H) If the total length of time from when the trailer is scheduled to begin travel on a California highway under the Transfer of Ownership Pass to when the trailer is scheduled to end travel on a California highway under the Transfer of Ownership Pass is greater than three consecutive days, then the Executive Officer may request additional

information from the transferor.

(4) For transfers of ownership where the transferor or transferee is not a licensed vehicle dealer, once a Transfer of Ownership Pass has been approved for a trailer, the transferor and transferee are no longer jointly eligible for another Transfer of Ownership Pass for that same trailer until one year has passed from the last effective date of the approved Transfer of Ownership Pass.

(5) For transfers of ownership where the transferor or transferee is a licensed vehicle dealer, once a Transfer of Ownership Pass has been approved for a trailer, the transferor and transferee are jointly eligible for only one additional Transfer of Ownership Pass for that same trailer within the one year period that begins with the last effective date of the first approved Transfer of Ownership Pass.

(6) The Executive Officer will respond to a request for a Transfer of Ownership Pass within 15 days of receiving the information identified in section 95305(g)(3) and notify the transferor in writing of the decision.

(A) If approved, The Executive Officer will provide the transferor with a Transfer of Ownership Pass in electronic or written format that will contain the following information:

1. Effective dates of the Transfer of Ownership Pass.

2. Transfer of Ownership Pass Approval Number.

(h) *Non-compliant Tractor Pass*

(1) Until January 1, 2015, a HD tractor traveling under a Non-compliant Tractor Pass while pulling a 53-foot or longer box-type trailer on a highway within California is temporarily exempt from the requirements of section 95303(a) for a specified period, as determined by the Executive Officer, not to exceed three consecutive days.

(2) A 53-foot or longer box-type trailer pulled by a HD tractor traveling under a Non-compliant Tractor Pass on a highway within California is temporarily exempt from the requirements of section 95303(b) for a specified period, as determined by the Executive Officer, not to exceed three consecutive days.

(3) To obtain an Non-compliant Tractor Pass, the tractor owner must make a request to the Executive Officer prior to affected travel. In the request, the owner must provide the following information for each tractor.

(A) Owner contact information, as specified in section 95306 (b).

(B) Tractor identification number (VIN).

(C) Date tractor will begin travel, or enter California if traveling from out of state location, under the Non-compliant Tractor Pass.

(4) No owner will be granted more than one Non-compliant Tractor Pass per year

(5) Only one tractor per fleet operating under a common United States Department of Transportation (USDOT) number, motor carrier identification number, or International Registration Plan (IRP) fleet number will be granted a Non-compliant Tractor Pass per year.

(6) The Executive Officer will respond to a request for a Non-compliant Tractor Pass within 15 days of receiving the information identified in section 95305(i)(3) and notify the transferor in writing of the decision.

(A) If approved, The Executive Officer will provide the owner with a Non-compliant Tractor Pass in electronic or written format that will contain the following information:

1. Effective dates of the Non-compliant Tractor Pass.

2. Non-compliant Tractor Pass Approval Number.

(i) *Trailer Aerodynamic Equipment Compliance Delay*

(1) An owner of a dry-van or refrigerated-van trailer that is subject to the requirements of section 95303(b) may apply for a Trailer Aerodynamic Equipment Compliance Delay if the trailer is configured such that existing aerodynamic technologies necessary to meet the requirements defined in sections 95303(b)(1)(B)(2) for dry-van trailers or 95303(b)(2)(B)(2) for refrigerated-van trailers cannot be installed.

(2) A trailer identified in a Trailer Aerodynamic Equipment Compliance Delay is subject to the following compliance deadlines

(A) For a trailer not participating in an optional trailer fleet compliance schedule, the applicable compliance date is one year from the trailer's current compliance date, or one year from the Trailer Aerodynamic Equipment Compliance Delay approval date, whichever is later.

(B) For a trailer participating in an optional trailer fleet compliance schedule as defined in section 95307, *Optional Trailer Fleet Compliance Schedules*, the applicable compliance date is one year

from the applicable Conformance Threshold Deadline for that trailer, provided all other trailers in the fleet have been brought into compliance.

(3) To apply for a Trailer Aerodynamic Equipment Compliance Delay, an owner must provide the Executive Officer the following information

(A) Owner contact information

1. Trailer owner's name, and if a corporate entity or governmental agency owns the trailer, the responsible official and title (if applicable);

2. Street address of owner or owner's company including city, state or province, zip code, colonia (Mexico only), and country;

3. Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

4. Owner contact person's name;

5. Telephone number of contact person;

6. Email address of contact person (if available);

7. TRUCRS identification number (if applicable)

(B) Trailer Information (for each candidate compliance delay trailer)

1. Trailer vehicle identification number (VIN).

2. Trailer participating in Optional Compliance Schedule? (Y or N)

3. Current scheduled compliance date of trailers.

4. Narrative description of why exemption is necessary. Description should clearly explain why all available aerodynamic technologies that meets the requirements defined in sections 95303(b)(1)(B)(2)a. or 95303(b)(2)(B)(2)a. cannot be installed on the trailer, and why modification of such technologies is infeasible without compromising the aerodynamic effectiveness of the technology or technologies.

5. Additional supporting materials as requested by the Executive Officer.

(4) Applications for a Trailer Aerodynamic Equipment Compliance Delay may be submitted to the Executive Officer in written or electronic format no sooner than one year prior to the trailer's current compliance date.

(5) The Executive Officer will respond to the application for a Trailer Aerodynamic Equipment Compliance Delay within 30 days of receipt of the application, and notify the applicant in writing of the decision.

(A) If the Executive Officer determines that the candidate trailer(s) identified in the application can be equipped with an aerodynamic technology that meets the requirements defined in sections 95303(b)(1)(B)(2) or 95303(b)(2)(B)(2), the application will be denied.

(B) If approved, the Executive Officer will notify the applicant in writing of the new effective compliance dates for those trailers identified in the application.

(6) The applicant may request an extension to an approved Trailer Aerodynamic Equipment Compliance Delay compliance dates no sooner than 30 days prior to the new effective compliance dates.

(j) *Exemption for 2011 or Subsequent Model Year Tractors with Open-shoulder Drive Tires*

(1) Until January 1, 2013, a 2011 or subsequent model year HD tractor pulling a 53-foot or longer box-type trailer subject to the requirements of section 95303(a) may operate on a highway within California with two or more open-shoulder drive tires that are not SmartWay Verified Technologies.

(k) An owner may be prohibited by the Executive Officer from operating his or her vehicles under the provisions of section 95305 if the owner or any of owner's vehicles that are registered exempt short-haul tractors, local-haul tractors, local-haul trailers, or storage trailers are found in violation of any requirement of section 95305.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95306 Short-Haul Tractor, ~~and~~ Local-Haul Tractor, ~~and~~ Local-Haul Trailer, and Storage Trailer ~~Exemption~~ Registration Requirements.

(a) To qualify for ~~any~~ an exemptions set forth in ~~sub~~sections 95305 (a), 95305(b) ~~or~~ ,95305(c), or 95305(e), the owner of a HD tractor or the owner of a 53-foot or longer box-type trailer must submit to the Executive Officer all applicable

information and statements identified in ~~sub~~sections 95306(b) through (f) ~~and must comply with subsections (g) through (o)~~.

(b) Owner Contact Information:

(1) Short-haul or local-haul tractor owner's name, and if a ~~business~~corporate entity or governmental agency owns the tractor, the responsible official and title (if applicable);

(2) Local-haul or storage trailer owner's name, and if a ~~business~~corporate entity or governmental agency owns the trailer, the responsible official and title (if applicable);

(3) Name of owner's company, corporation, or governmental agency (if applicable);

(4) Corporate parent (if applicable);

(5) Motor carrier identification number and type;

(6) Street address of owner or owner's company including city, state or province, zip code, colonia (Mexico only), and country;

(7) Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

~~(8) Physical address of location where records pertaining to the applicable compliance schedule will be maintained including city, state or province, zip code, colonia (Mexico only), and country;~~

(~~9~~8) Owner contact person's name;

(~~10~~9) Telephone number of ~~owner or owner's company~~ contact person;

(~~11~~10) Email address of ~~owner or owner's company~~contact person (if available);

(~~12~~11) Company taxpayer identification number (if applicable); and

(~~13~~12) ~~DOORS~~TRUCRS identification number of corporate parent (if one has been obtained).

(c) Local-Haul Base Information for Owners of Local-haul Tractors or Trailers (an owner may have multiple local-haul bases):

(1) Local-haul base contact person's name;

(2) Contact person's title;

(3) Street address of local-haul base including city, state, zip code, colonia (Mexico only), and country; and

(4) Telephone number of local-haul base.

(d) Short-haul or Local-haul Tractor Fleet Information. For each tractor to be exempted, the following information:

(1) Type of exemption applied for:

(A) Limit annual miles traveled to 50,000 (short-haul); or

(B) Limit total area of operation to within a 100-mile radius from its local-haul base (local-haul);

(2) Tractor identification number (vehicle identification number (VIN));

(3) Tractor make;

(4) Tractor model;

(5) Tractor model year;

(6) State or province of registration;

(7) Country of registration;

(8) Registration type (state, IRP, temporary, seasonal, monthly, or other);

(9) License plate number;

(10) For short-haul tractors: Odometer reading; and

(11) For local-haul tractors: tractor's local-haul base street address, including city, state, and zip code.

(e) Local-haul and Storage Trailer Fleet Information. For each trailer to be exempted, the following information:

(1) Trailer type (dry van or refrigerated van);

(2) Trailer identification number (vehicle identification number (VIN));

(3) Trailer make;

(4) Trailer model;

(5) Trailer model year;

(6) State or province of registration;

(7) Country of registration;

(8) Registration type (State, IRP, Temporary, Seasonal, Monthly, or Other);

(9) License plate number; and

(10) For a local-haul trailer only, the local-haul t~~T~~railer's local-haul base street address, including city, state, and zip code.

(f) A dated written submittal by the owner with the information required by ~~sub~~sections 95306(b) through 95306(e) and one or all of the following statements, as applicable:

(1) For all local-haul trailers and tractors:

> *I agree to strictly limit the ~~all~~ use of this* [or these] *tractor[s]* [or trailer[s]] *to the area within a 100-mile radius of the local- haul base[s] identified in this submittal. I understand that if I transport any freight in the trailer[s] when pulling it* [or them] *on California highways outside the 100-mile radius, the tractor[s]* [or trailer[s]] *may lose exempt status ~~operation of the equipment outside this area will be a~~ and I may be subject to possible enforcement actions for violations of sections 95300-953~~11~~2, title 17, California Code of Regulations. I also understand that I am allowed to relocate the trailer[s] to a new location, but only if the trailer[s] is* [or are] *empty or I have obtained a Relocation Pass[es] for the trailer[s]. If stopped for inspection by authorized enforcement personnel, I will allow inspection of the inside[s] of the trailer[s]. I declare under penalty of perjury that the information provided is true, accurate, and complete."*

(2) For short-haul tractors:

> *"I agree to limit use of this* [or these] *tractor[s] to 50,000 or fewer miles per year. I understand that operation of the equipment for more than 50,000 miles per year ~~will be a~~ may result in loss of exempt status and possible enforcement actions for violations of sections 95300-953~~11~~2, title 17, California Code of Regulations. If stopped for inspection by authorized enforcement personnel, I will*

allow visual inspection of the tractor's [or tractors'] *odometer[s]. I declare under penalty of perjury that the information provided is true, accurate, and complete."*

(3) For storage trailers:

"I agree to limit use of this [or these] *trailer[s] exclusively for the storage of items at a fixed location. I understand that I am allowed to relocate the trailer[s] to a new location, but only if the trailer[s] is [are] empty or I have obtained a Relocation Pass[es] for the trailer[s]. Without a Relocation Pass, if I transport any items in the trailer[s] when pulling it[them] on California highways, the trailer[s] may lose exempt status, which may result in enforcement action for violations of sections 95300-95312, title 17, California Code of Regulations. If stopped for inspection by authorized enforcement personnel, I will allow inspection of the inside[s] of the trailer[s]. I declare under penalty of perjury that the information provided is true, accurate, and complete."*

~~(g) A local-haul exemption obtained under subsections 95305(b) or (c) will remain in effect as long as the owner and the exempt trailer or tractor are in compliance with the requirements of this section. The owner of an exempt local-haul tractor or trailer must notify the Executive Officer if the information submitted in accordance with subsections (b) through (f) has changed, and must submit the updated information to the Executive Officer.~~

~~(h) For a local-haul tractor or trailer that is removed from an owner's local-haul fleet or is otherwise no longer exempt under subsection 95305(b) or (c) the owner must notify the Executive Officer and update the local-haul tractor or trailer information submitted in accordance with subsections (d) and (e) to reflect this change in status prior to change in ownership of the tractor or trailer, or prior to the trailer travelling on a highway within California, whichever occurs first.~~

~~(i) For a short-haul tractor that is removed from an owner's short-haul tractor fleet or is otherwise no longer exempt under subsection 95305(a), the owner must notify the Executive Officer and update the short-haul tractor information submitted in accordance with subsections (d) to reflect this change in status prior to change in ownership of the tractor, or prior to the tractor travelling on a highway within California, whichever occurs first. A tractor that is removed from the owner's short-haul tractor fleet or that for any other reason loses its exempt status under subsection 95305(a) is ineligible for the short-haul exemption under subsection 95305(a) for 36 months from the date its exempt status was lost.~~

~~(j) A short-haul exemption obtained under subsection 95305(a) will remain in effect for a period of 1 year from the date that the information required in subsections~~

~~95306(b) through (f) is submitted to the Executive Officer if the owner and the exempt tractor are in continuing compliance with the requirements of this section. To extend the exemption for an additional 1 year, the owner must submit the tractor's current odometer readings prior to, but no more than 30 days before, the expiration date of the exemption.~~

~~(k) The driver of an exempt short-haul or local-haul tractor, or a HD tractor pulling an exempt local-haul trailer must, upon demand, provide the following information to authorized enforcement personnel identified in section 95308:~~

~~(1) Driver's license;~~

~~(2) Odometer reading of tractor;~~

~~(3) Tractor registration;~~

~~(4) Origin of freight being transported;~~

~~(5) Destination of freight being transported;~~

~~(6) If dispatched by a motor carrier, the motor carrier information listed in subsection 95303(g)(1)(B);~~

~~(7) If dispatched by a broker, the broker information listed in subsection 95303(f)(1)(B); and~~

~~(8) Vehicle identification number.~~

~~(l) The driver of an exempt short-haul HD tractor must, upon request, allow authorized enforcement personnel to directly view the odometer of the HD tractor.~~

~~(m) The use of a short-haul tractor that is exempt under subsection 95305(a) in excess of 50,000 miles in a year is a violation of this subarticle.~~

~~(n) The use of a local-haul tractor that is exempt under subsection 95305(b) at a location farther than 100 miles from the vehicle's local-haul base is a violation of this subarticle.~~

~~(o) The use of a local-haul trailer that is exempt under subsection 95305(c) at a location farther than 100 miles from the vehicle's local-haul base is a violation of this subarticle.~~

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95307 Optional Trailer Fleet Compliance Schedules.

(a) Trailer Fleet Compliance Schedule Applicability.

(1) As specified in section 95303(b)(3), an owner of one or more 2010 or previous model year 53-foot or longer box-type trailers may bring such trailers into compliance in accordance with an applicable compliance schedule set forth in this ~~sub~~section.

(2) Trailers participating in Option 1 of the large fleet compliance schedule specified in section 95307(b)(1), must be acquired by the fleet owner prior to July 1, 2010.

(3) Trailers participating in Option 2 of the large fleet compliance schedule specified in section 95307(b)(2) must be acquired by the fleet owner prior to July 1, 2011.

(4) Trailers participating in the small fleet compliance schedule specified in section 95307(c) must be acquired by the fleet owner prior to July, 1, 2012.

(~~2~~5) Trailer fleet size determination. For purposes of this section, fleet size is the total of all 53-foot or longer box-type trailers within the owner's fleet, including:

(A) trailers that do not operate in California; and

(B) trailers that operate in California, including but not limited to:

1. existing compliant trailers;

2. non-compliant trailers;

3. trailers exempted in accordance with section 95305, *Exemptions*; and

4. refrigerated-van trailers that are eligible for the compliance deadlines set forth in section 95303(b)(3)(~~B~~F)~~2~~.

(~~3~~6) *Applicable Compliance Schedules.*

(A) A fleet owner with a trailer fleet size of 21 or more trailers, as determined in accordance with ~~sub~~section 95307(a)(2) above, may ~~only~~ elect to participate in either of the following two compliance schedule options. A large fleet owner who does not register for one of these options must bring all trailers in the fleet into compliance as

specified in section 95303(b)(3)(B) or section 95303(b)(3)(F).~~the large fleet compliance schedule, specified in subsection (b).~~

1. Option 1 of the large fleet compliance schedule specified in section 95307(b)(1), beginning January 1, 2011, or

2. Option 2 of the large fleet compliance schedule specified in section 95307(b)(2), beginning January 1, 2012.

(B) A fleet owner with a trailer fleet size of 20 or fewer trailers may elect to participate~~has the option of participating~~ in either of the large fleet compliance schedule options in section ~~9~~5307(b), or in the small fleet compliance schedule~~, specified~~ in ~~sub~~sections ~~(b) and~~ 95307(c)~~, respectively~~.

(b) Large Fleet Compliance Schedule.

(1) ~~Minimum fleet conformance thresholds (Table 1): A trailer owner participating in the large fleet compliance schedule must ensure that the percentage of compliant trailers on the compliance plan base list, as defined in subsection (d)(3), is equal to or greater than:~~Option 1 of the large fleet compliance schedule beginning January 1, 2011

(A) ~~5 percent beginning January 1, 2011;~~Minimum fleet conformance thresholds (Table 1): A trailer owner participating in this large fleet compliance schedule option must ensure that the percentage of compliant trailers on the compliance plan base list, as described in section 95307(d)(3), is equal to or greater than:

~~(B) 15 percent beginning January 1, 2012;~~

~~(C) 30 percent beginning January 1, 2013;~~

~~(D) 50 percent beginning January 1, 2014;~~

~~(E) 75 percent beginning January 1, 2015; and~~

~~(F) 100 percent beginning January 1, 2016.~~

1. 5 percent beginning January 1, 2011;

2. 15 percent beginning January 1, 2012;

3. 30 percent beginning January 1, 2013;

4. 50 percent beginning January 1, 2014;

5. 75 percent beginning January 1, 2015; and

6. 100 percent beginning January 1, 2016.

Table 1: Minimum Fleet Conformance Thresholds for the Large Fleet Compliance Schedule (Option 1)

Compliance Year (Y)	Minimum Fleet Conformance Threshold (P_Y)	Conformance Threshold Deadline
2010	5%	January 1, 2011
2011	15%	January 1, 2012
2012	30%	January 1, 2013
2013	50%	January 1, 2014
2014	75%	January 1, 2015
2015	100%	January 1, 2016

(2) Option 2 of the large fleet compliance schedule beginning January 1, 2012

(A) Minimum fleet conformance thresholds (Table 2): A trailer owner participating in this large fleet compliance schedule option must ensure that the percentage of compliant trailers on the compliance plan base list, as described in section 95307(d)(3), is equal to or greater than:

1. 20 percent beginning January 1, 2012;

2. 40 percent beginning January 1, 2013;

3. 60 percent beginning January 1, 2014;

4. 80 percent beginning January 1, 2015; and

5. 100 percent beginning January 1, 2016.

Table 2: Minimum Fleet Conformance Thresholds for the Large Fleet Compliance Schedule (Option 2)

Compliance Year (Y)	Minimum Fleet Conformance Threshold (P_Y)	Conformance Threshold Deadline
2010	---	---
2011	20%	January 1, 2012
2012	40%	January 1, 2013
2013	60%	January 1, 2014
2014	80%	January 1, 2015
2015	100%	January 1, 2016

(~~2~~3) ~~Large fleet compliance plan:~~ To participate in either Option 1 or Option 2~~the large fleet compliance schedule~~, a trailer owner must provide the following information to the Executive Officer, electronically or in a document package entitled "Large Fleet Compliance Plan," by July 1, 2010 for Option 1, and by July 1, 2011 for Option 2. This submittal must include the following:

(A) Statement of intent, in accordance with ~~sub~~section 95307(d)(1);

(B) Trailer fleet list, in accordance with ~~sub~~section 95307(d)(2);

(C) Large fleet compliance plan base number, calculated in accordance with ~~sub~~section 95307(e)(1);

(D) Compliance plan base list, in accordance with ~~sub~~section 95307(d)(3);

(E) Annual conformance number for each compliance year, calculated in accordance with ~~sub~~section 95307(e)(5); and

~~(F) Annual conformance commitment list for each compliance year, in accordance with subsection (d)(4); and~~

(~~G~~F) Early compliance option reporting, if applicable: If a trailer owner elects to delay the compliance of trailers in accordance with ~~sub~~section 95307(b)(4), such owner must submit the following trailer information within the compliance plan:

1. Early compliance trailer number: The number of early compliance trailers determined in accordance with ~~sub~~section 95307(b)(4);

2. Early compliance trailer list: A trailer owner participating in the early compliance option must clearly identify on the trailer fleet list all early compliance trailers;

3. Delayed compliance trailer number, calculated in accordance with ~~sub~~section 95307(e)(3); and

4. Delayed compliance trailer list: A trailer owner participating in the early compliance option must clearly identify on the trailer fleet list all delayed compliance trailers.

~~(3) Large fleet compliance plan revision: A trailer owner may make certain revisions to the annual conformance commitment lists reported for compliance years 2013, 2014, and 2015, electronically or by submitting a document titled, "Large Fleet Compliance Plan Revision," by July 1, 2013. Although this allows a trailer owner to redistribute trailers among the final three annual conformance commitment lists, the trailer owner may not alter the number of trailers identified on each list. If participating in the early compliance option, a trailer owner may also redistribute trailers amongst the annual conformance commitment list for compliance years 2013, 2014, and 2015 and the list of delayed compliance trailers.~~

(4) Early compliance option: Subject to the requirements and limitations set forth in this ~~sub~~section, for every one early compliance trailer in an owner's fleet, a trailer owner may delay the retrofit or replacement of 1.5 non-compliant trailers until December 31, 2016.

(A) Maximum allowable number of early compliance trailers, as calculated in accordance with ~~sub~~section 95307(e)(4): The number of early compliance trailers within a fleet may not exceed the equivalent of 20 percent of the sum of: 1) all trailers that the owner elects to bring into compliance under the large fleet compliance schedule and 2) the total number of trailers within the fleet that are in compliance before January 1, 2010.

(B) A trailer owner must bring all delayed compliance trailers into compliance before January 1, 2017.

(C) Early compliance option report: To participate in the early compliance option, a trailer owner must submit all information required by ~~sub~~section 95307(b)(~~2~~3)(~~G~~F), as part of the large fleet compliance plan by July 1, 2010 for Option 1, and by July 1, 2011 for Option 2.

(c) Small Fleet Compliance Schedule.

(1) Minimum fleet conformance thresholds (Table 2): A trailer owner participating in the small fleet compliance schedule must ensure that the percentage of compliant trailers on the compliance plan base list, as defined in ~~sub~~section 95307(d)(3), is equal to or greater than:

(A) 25 percent beginning January 1, 2014;

(B) 50 percent beginning January 1, 2015;

(C) 75 percent beginning January 1, 2016; and

(D) 100 percent beginning January 1, 2017.

Table ~~23~~: Minimum Fleet Conformance Thresholds for the Small Fleet Compliance Schedule

Compliance Year (Y)	Minimum Fleet Conformance Threshold (P_Y)	Conformance Threshold Deadline
2013	25%	January 1, 2014
2014	50%	January 1, 2015
2015	75%	January 1, 2016
2016	100%	January 1, 2017

(2) Small fleet compliance plan: To participate in the small fleet compliance schedule, a trailer owner must provide the following information to the Executive Officer, electronically or in a document package entitled "Small Fleet Compliance Plan," by July 1, 2012. This submittal must include the following:

(A) Statement of intent, in accordance with ~~sub~~section 95307(d)(1);

(B) Trailer fleet list, in accordance with ~~sub~~section 95307(d)(2);

(C) Small fleet compliance plan base number, calculated in accordance with ~~sub~~section 95307(e)(2);

(D) Compliance plan base list, in accordance with ~~sub~~section 95307(d)(3); and

(E) Annual conformance number for each compliance year, calculated in accordance with ~~sub~~section 95307(e)(5)~~; and~~.

~~(F) Annual conformance commitment list for each compliance year, in accordance with (d)(4).~~

(d) General Compliance Plan Components.

(1) Statement of intent: The statement of intent must be provided to the Executive Officer as part of the owner's compliance plan by the applicable compliance plan due date. The statement of intent must include the following:

(A) A statement indicating that the trailer owner elects to participate in an optional trailer fleet compliance schedule;

(B) A statement identifying the compliance schedule in which the trailer owner elects to participate;

(C) For trailer owners electing to participate in the small fleet compliance schedule, a statement affirming that the owner's trailer fleet contains 20 or fewer 53-foot or longer box-type trailers;

(D) A statement affirming that the trailer owner will bring all non-compliant trailers subject to the requirements of this regulation into compliance in accordance with the applicable compliance schedule;

(E) A statement affirming that the trailer owner understands that participation in an applicable compliance schedule may be terminated by the Executive Officer should the fleet owner, or any of the owner's vehicles, be found in violation of this regulation;

(F) A statement affirming that the trailer owner understands that if participation in a compliance schedule is terminated by the Executive Officer, the owner must bring all affected trailers into compliance within 90 days or by December 31, 2012, whichever is later, but in no case later than December 31, 2015 if participating in the large fleet compliance schedule and December 31, 2016 if participating in the small fleet compliance schedule;

(G) A statement affirming that the trailer owner understands that if participation in an applicable trailer fleet compliance schedule is withdrawn, such owner will not be allowed to operate a non-compliant trailer on a highway within California beginning January 1, 2013, except for refrigerated-van trailers that are eligible for the compliance deadlines set forth in section 95303(b)(3)(B~~2~~F)~~2~~ and exempted trailers;

(H) A statement affirming that the trailer owner agrees to allow the Executive Officer, or any person authorized by the Executive Officer, to conduct periodic audits of vehicles and records to ensure compliance with the applicable compliance schedule, this regulation, and other air quality regulations; and

(I) A signature, or electronic attestation, of the trailer owner or, where applicable, a company or governmental official, affirming that all information contained within the compliance plan, including information contained within the statement of intent and the trailer fleet list, is true and correct.

(2) Trailer fleet list: The trailer fleet list, as defined in this ~~sub~~section, must be provided to the Executive Officer as part of the owner's compliance plan by the applicable compliance plan due date. Except upon specific Executive Officer approval, the trailer owner may not change the number or identity of trailers included on the trailer fleet list once the submission due date for the applicable compliance plan has passed. The trailer fleet list must include the following:

(A) Name of trailer fleet owner, or responsible official and title if the owner is a business entity or governmental agency;

(B) Name of company, corporation, or governmental agency;

(C) Company's motor carrier identification number and type, if applicable;

(D) Company address including city, state or province, zip code, colonia (Mexico only), and country;

(E) Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

(F) Physical address of location where records pertaining to the applicable compliance schedule will be maintained including city, state or province, zip code, colonia (Mexico only), and country;

(G) Contact person's name;

(H) Telephone number;

(I) Email address (if available);

(J) Company taxpayer identification number (if applicable);

(K) Name of corporate parent (if applicable);

(L) ~~DOORS~~TRUCRS identification number of corporate parent (if applicable);

(M) List of all 2010 and previous model-year 53-foot or longer box-type trailers that are subject to the requirements of this subarticle while the owner is participating in an optional trailer fleet compliance schedule:

1. For an owner who elects to participate in one of the large fleet compliance schedules, the trailer list must include all trailers that will operate in California including compliant trailers, non-compliant

trailers, exempted trailers, and refrigerated-van trailers that are eligible for the compliance deadlines set forth in section 95303(b)(3)(~~B~~F)~~2~~;

2. For an owner that elects to participate in the small fleet compliance schedule, the trailer list must include all trailers in the owner's fleet, including compliant trailers, non-compliant trailers, exempted trailers, and refrigerated-van trailers that are eligible for the compliance deadlines set forth in section 95303(b)(3)(~~B~~F)~~2~~. For the sole purpose of documenting the owner's eligibility for the small fleet compliance schedule, the trailer list for those submitting a small fleet compliance plan must also include trailers in the fleet that do not travel on a highway within California;

(N) For each trailer listed, provide the following:

1. Trailer type (dry van or refrigerated van);
2. Vehicle identification number (VIN);
3. Trailer make;
4. Trailer model;
5. Trailer model year;
6. License plate number;
7. State or province of registration;
8. Registration type (state, IRP, temporary, seasonal, monthly, or other);
9. Country of registration;
10. Compliance status (compliant or non-compliant) ;
11. Exemption Status (not exempt, exempt local-haul ~~exempt~~, exempt storage, dedicated to short-haul or local-haul tractors)-;
12. California operating status (indicate whether the trailer will operate in California during the applicable optional compliance schedule)-;
13. Transport refrigeration unit model year (as applicable); and

14. Transport refrigeration unit engine model year (as applicable).

(3) Compliance plan base list: The compliance plan base list is the list of all non-compliant trailers identified on the trailer fleet list as trailers that will be brought into compliance in accordance with the applicable compliance schedule. Trailers that are not early compliance trailers but are in compliance before January 1, 2010, may also be included on the compliance plan base list and used to meet minimum fleet conformance thresholds. The compliance plan base list shall not include the following trailers:

(A) Exempted trailers, including those local-haul trailers and storage trailers exempt under ~~sub~~section 95305(c) and 95305(e);

(B) Refrigerated-van trailers that are eligible for the compliance deadlines set forth in section 95303(b)(3)(F)~~(B)2~~;

(C) Early compliance trailers, if applicable;

(D) Delayed compliance trailers, if applicable; and

(E) Trailers that will not operate in California for the duration of the applicable trailer fleet compliance schedule.

~~(4) Annual conformance commitment list: The annual conformance commitment list for a particular compliance year is the list of trailers on the compliance plan base list that the owner commits to bring into compliance to meet the minimum fleet conformance threshold that will take effect on January 1 of the following year. For each compliance year's annual conformance commitment list, the trailer owner must list a sufficient number of trailers to meet or exceed the annual conformance number for that same year.~~

(e) Calculation Methodology.

(1) Large fleet compliance plan base number: The compliance plan base number for large fleets is the number of trailers that a trailer owner elects to bring into compliance in accordance with the large fleet compliance schedule.

$$N_{LB} = N_T - N_D - N_E - N_R - N_X \qquad \text{(Equation 1)}$$

"N_{LB}" = Large fleet compliance plan base number.

"N_T" = Total number of trailers listed on the trailer fleet list.

"N_D" = Number of delayed compliance trailers, as determined in accordance with ~~sub~~section 95307(e)(3), if applicable.

"N_E" = Number of early compliance trailers, not to exceed $N_{E, max}$ as determined in accordance with Equation 5, if applicable.

"N_R" = Number of refrigerated-van trailers that are eligible for the compliance deadlines set forth in sections (b)(3)(~~B~~F)~~2.a~~1. through 95303(b)(3)(~~B~~F)~~2.c~~3., if applicable.

"N_X" = Number of trailers with a trailer fleet list exemption status of ~~"~~"exempt local-haul ~~exempt~~," "exempt storage," "dedicated to short-haul tractors," or "dedicated to local-haul tractors," if applicable.

(2) Small fleet compliance plan base number: The compliance plan base number for small fleets is the number of trailers that a trailer owner elects to bring into compliance in accordance with the small fleet compliance schedule.

$$N_{CA} = N_T - N_{NC} \qquad \text{(Equation 2)}$$

"N_{CA}" = Total number of trailers in California fleet.

"N_T" = Total number of trailers listed on the trailer fleet list.

"N_{NC}" = Number of trailers that will not operate in California for the duration of an applicable trailer fleet compliance schedule

$$N_{SB} = N_{CA} - N_R - N_X \qquad \text{(Equation 3)}$$

"N_{SB}" = Small fleet compliance plan base number.

"N_{CA}" = Total number of trailers in California fleet, as determined in accordance with Equation 2.

"N_R" = Number of refrigerated-van trailers that are eligible for the compliance deadlines set forth in sections (b)(3)(~~B~~F)~~2.a~~1. through 95303(b)(3)(~~B~~F)~~2.c~~3., if applicable.

"N_X" = Number of trailers with a trailer fleet list exemption status of "exempt local-haul ~~exempt~~," "exempt storage," "dedicated to short-haul tractors," or "dedicated to local-haul tractors," if applicable.

(3) Large fleet delayed compliance trailer number: The delayed compliance

trailer number is the number of trailers for which compliance may be delayed-, pursuant to ~~sub~~section 95307(b)(4), *Early Compliance Option.*

$N_D = N_E \times 1.5$ (Equation 4)

"N_D" = Number of delayed compliance trailers, if applicable. If N_D is not a whole number, round down to the next whole number.

"N_E" = Number of early compliance trailers, not to exceed $N_{E, max}$ as determined in accordance with Equation 5, if applicable.

(4) Large fleet maximum allowable number of early compliance trailers: The resultant number must be rounded down to the nearest whole trailer.

$N_{E, max} = (N_T - N_R - N_X) \times 0.20$ (Equation 5).

"$N_{E, max}$" = Maximum allowable number of early compliance trailers. If $N_{E, max}$ is not a whole number, round down to the next whole number.

"N_T" = Total number of trailers listed on the trailer fleet list.

"N_R" = Number of refrigerated-van trailers that are eligible for the compliance deadlines set forth in sections 95303-(b)(3)(~~B~~F)~~2.a~~1. through 95303(b)(3)(~~B~~F)~~2.c~~3., if applicable.

"N_X" = Number of trailers with a trailer fleet list exemption status of "exempt local-haul ~~exempt~~," "exempt storage," "dedicated to short-haul tractors," or "~~"~~dedicated to local-haul tractors," if applicable.

(5) Annual conformance number: The annual conformance number is the number of trailers that a trailer owner must bring into compliance by December 31st of a particular compliance year to ensure that the percentage of compliant trailers within the compliance plan base list meets or exceeds the applicable minimum fleet conformance threshold that takes effect on January 1 of the following year.

$N_Y = (N_B \times P_Y) - N_{C, Y-1}$ (Equation 6)

"N_Y" = Annual conformance number for compliance year Y. If N_Y is not a whole number, round up to the next whole number if the fractional part is equal to or greater than 0.5, and round down if less than 0.5.

"N_B" = The compliance plan base number, either N_{LB} as calculated in ~~sub~~section 95307(e)(1) for a large fleet or N_{SB} as calculated in ~~sub~~section 95307(e)(2) for a small fleet.

"P_Y" = Minimum fleet conformance threshold for compliance year Y, as defined in ~~sub~~section 95307(b)(1) for large fleets and 95307(c)(1) for small fleets, expressed as a fraction (e.g. 5 percent is entered into equation as 0.05).

"$N_{C, Y-1}$" = Total number of trailers within the compliance base that would already be in compliance prior to January 1 of compliance year Y. This number must not include early compliance trailers.

(f) Reporting Requirements

(1) For each trailer listed in the compliance plan base list that is brought into compliance in order to meet the conformance threshold of a particular year, the owner must provide the trailer identification number (vehicle identification number (VIN)) and the applicable compliance method for the trailer as defined in (A), (B), or (C) below, to the Executive Officer by no later than December 31st of that year.

(A) Install on the trailer aerodynamic devices that meet the requirements defined in section 95303(b)(3), or

(B) Remove the trailer from the owner's fleet, or

(C) Restrict the trailer from traveling on California highways.

(2) For each trailer listed in the compliance plan base list that is or will be re-designated into local-haul or storage trailer service in a specific compliance year, the owner must provide the trailer identification number (vehicle identification number (VIN)) to the Executive Officer by no later than December 31st of that year; and meet all applicable requirements specified in sections 95305 and 95306. Trailers re-designated into local-haul or storage trailer service do not count toward meeting an annual conformance number.

(~~f~~g) General Requirements for All Compliance Schedules: To participate in a trailer fleet compliance schedule, a trailer owner must comply with the following requirements:

(1) The trailer owner must ensure that, by December 31st of each compliance year, the percentage of compliant trailers on the owner's compliance plan

base list is equal to or greater than the applicable minimum fleet conformance threshold for that compliance year;

(2) The trailer owner must ensure that the actual number of trailers ~~listed on each compliance year's annual conformance commitment list~~ brought into compliance each compliance year is equal to or greater than the annual conformance number for that same year;

~~(3) The trailer owner must bring into compliance all trailers listed in each compliance year's annual conformance commitment list before January 1 of the following year;~~

(43) The trailer owner must allow the Executive Officer, or any other authorized enforcement personnel, to conduct periodic audits of records and equipment to verify compliance with an applicable compliance schedule, the owner's compliance plan, and other applicable air quality regulations;

(~~5~~4) Should the Executive Officer terminate the trailer owner's participation in a trailer feet compliance schedule, such trailer owner must bring all trailers into compliance within 90 days of such termination or by December 31, 2012, whichever is later, but no later than December 31, 2015 if participating in the large fleet compliance schedule and December 31, 2016 if participating in the small fleet compliance schedule;

(~~6~~5) Starting January 1, 2013, except for eligible refrigerated-van trailers that the trailer owner elects to bring into compliance in accordance with section 95303(b)(3)(F)~~(B)2.~~ and exempted trailers, a trailer owner may not allow the operation of a non-compliant trailer on a highway within California if such owner withdraws participation from an applicable trailer fleet compliance schedule;

(~~7~~6) The trailer owner must provide to the Executive Officer any documentation and information required by an applicable trailer fleet compliance schedule by the compliance plan due date specified in such compliance schedule;

(~~8~~7) The trailer owner must ensure that all information and documentation provided to the Executive Officer is accurate and true;

(~~9~~8) The trailer owner must ensure that all required information and documentation is received by the Executive Officer by the applicable due dates; the Executive Officer will not be responsible for materials lost in transit;

~~(10) If participating in one of the large fleet compliance schedules, the trailer owner must continue bringing trailers into compliance in accordance with the original compliance plan if a large fleet compliance plan revision is not~~

~~submitted;~~

(~~11~~9) The trailer owner must maintain all documentation pertaining to an applicable compliance schedule at the location indicated on the trailer fleet list;

(~~12~~10) Upon the request of the Executive Officer or other authorized enforcement personnel, the trailer owner must provide all information and documentation necessary to verify compliance with this subarticle, including applicable compliance schedules and the owner's compliance plan, and information and documentation necessary to verify compliance with any other air quality regulation;

(~~13~~11) A trailer owner who is participating in the small fleet compliance schedule may not allow a trailer subject to the requirements of this subarticle to operate on a highway within California after July 1, 2012, unless:

(A) the trailer is listed on the owner's trailer fleet list; or

(B) the trailer was acquired after July 1, 2012 and both of the following criteria are met:

1. the owner provides documented proof to the Executive Officer of the trailer's acquisition (purchase or transfer of ownership) date; and

2. the trailer is a compliant trailer, a refrigerated-van trailer that is eligible to be brought into compliance in accordance with the compliance deadlines set forth in section 95303(b)(3)(~~B~~F)~~2~~, or exempt under section 95305;

(~~14~~12) A trailer owner may not allow the operation of a non-compliant trailer on a highway within California after December 31st of the compliance year in which the trailer ~~is scheduled to be~~ has been reported to have been brought into compliance;

~~(15) With the Executive Officer's specific approval, a trailer owner may remove a trailer from a particular compliance year's annual conformance commitment list for the purpose of re-designating such trailer into local-haul or short-haul service, thereby relieving such owner from the obligation of bringing that trailer into compliance. However, such owner must fill the vacancy left on the affected annual conformance commitment list with another trailer from the owner's final annual conformance commitment list on which at least one trailer is still listed. If such owner is participating in the early compliance option, the replacement trailer must be a delayed conformance trailer, if one still exists;~~

(~~16~~13) ~~Except as provided in subsection (b)(3), a~~ A compliance plan revision may only be made with the approval of the Executive Officer if the Executive Officer determines that a company merger, acquisition, split, or other changed circumstances affecting operations of the owner, necessitate revisions to the compliance plan;

(~~17~~14) Executive Officer approval will not be granted to allow a newly-formed business, or an existing business commencing operations in California, to participate in a compliance schedule after the submission due date for the applicable compliance plan has passed;

(~~18~~15) The Executive Officer may make non-confidential information provided pursuant to an optional trailer fleet compliance schedule available to the public for the purpose of helping determine the compliance status of a trailer or fleet;

(~~19~~16) Although participation in an optional trailer fleet compliance schedule does not require the Executive Officer's specific approval, the Executive Officer may terminate a fleet's participation in a compliance schedule if the fleet or any tractor or trailer within the fleet is found in violation of this subarticle. Should the Executive Officer terminate a fleet's participation in a compliance schedule, the owner must bring all trailers into compliance within 90 days or by December 31, 2012, whichever is later, but in no case later than December 31, 2015, if participating in the large fleet compliance schedule, and December 31, 2016, if participating in the small fleet compliance schedule;

(~~20~~17) A trailer owner who is participating in one of the large fleet compliance schedule options may not allow a trailer subject to the requirements of this subarticle to operate on a highway within California after July 1, 2010 if participating in Option 1, or July 1, 2011 if participating in Option 2, unless:

(A) the trailer is a compliant trailer; or

(B) the trailer is listed on the owner's trailer fleet list and is in compliance with all requirements of the large fleet compliance schedule; or

(C) the trailer is a refrigerated-van trailer that is eligible to be brought into compliance in accordance with a compliance deadline set forth in section 95303-(b)(3)(~~B~~F)~~2~~ and such deadline has not yet passed; or

(D) the trailer is exempt under section 95305;

(~~21~~18) Any violation of the requirements of this section constitutes a violation of this subarticle.

(19) A trailer owner who has elected to participate in Option 1 and submitted information in accordance with section 95307(b)(3), may withdraw such participation and elect to participate in Option 2 instead. The notice to withdraw must be received by the Executive Officer no later than June 30, 2011;

(20) A trailer owner that has identified an exempt storage trailer or an exempt local-haul trailer in his or her trailer fleet list in accordance with section 95307(d)(2)(N), must register that trailer in accordance with the requirements of section 95306, *Short-Haul Tractor, Local-Haul Tractor, Local-Haul Trailer, and Storage Trailer Registration* Requirements by July 1, 2010 if participating in Option 1, by July 1, 2011 if participating in Option 2, and by July 1, 2012 if participating in the Small Fleet Compliance Schedule;

(21) A trailer owner that elects to withdraw participation in a trailer feet compliance schedule must notify the executive officer and bring all trailers into compliance by December 31, 2012.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95308 Enforcement.

Enforcement of this subarticle may be carried out by authorized enforcement personnel, which includes representatives of the Air Resources Board (ARB)~~,~~; peace officers as defined in California Penal Code, title 3, chapter 4.5, sections 830 et seq. and their respective law enforcement agencies; ~~and~~ authorized representatives of air pollution control or air quality management districts; and any other designee of the Executive Officer.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95309 Right of Entry.

For purposes of inspecting HD tractors and box-type trailers covered in the subarticle, and inspecting or auditing the records of drivers, owners of trailers and tractors, motor carriers, California-based brokers, ~~and~~ California-based shippers, and California-licensed vehicle dealers to determine compliance with this subarticle, an agent or employee of ARB, upon presentation of proper credentials, has the right to enter any

facility (with any necessary safety clearances) where HD tractors and box-type trailers are located or HD tractor and box-type trailer records, including dispatch records, are kept.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95310 Penalties.

As provided in Health and Safety Code section 38580, any person who violates any requirement of this subarticle is subject to the penalties set forth in Article 3 (commencing with section 42400) of Chapter 4 of Part 4, Division 26 of the Health and Safety Code. Failure to comply with any requirement of this subarticle shall constitute a single, separate violation for each day during any portion of which the person is not in compliance.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95311 Record Keeping.

(a) A California-licensed vehicle dealer of a HD tractor or 53-foot box-type trailer that is subject to the disclosure of regulation applicability requirements of section 95303(i) must maintain a record of the disclosure of regulation applicability for three years after the sale.

(b) A lessor of a HD tractor or a 53-foot or longer box-type trailer that has provided a lessee with a statement or written notice that informs the lessee about the lessee's obligation under terms of the lease to ensure compliance with the sections 95300-95312, title 17, California Code of Regulations, must maintain a record of this statement or written notice for three years after it is provided to the lessee.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code. Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

95312 Severability.

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of the subarticle is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of this subarticle.

NOTE: Authority cited: Sections 39600, 39601, 38510, 38560, and 38560.5, Health and Safety Code.
Reference: Sections 39600, 38560, 38560.5, and 38580, Health and Safety Code.

TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER PROPOSED AMENDMENTS TO THE REGULATIONS FOR IN-USE OFF-ROAD DIESEL-FUELED FLEETS AND OFF-ROAD LARGE SPARK IGNITION ENGINE FLEET REQUIREMENTS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adoption of amendments to its regulations for In-Use Off-Road Diesel-Fueled Fleets (off-road regulation), California Code of Regulations (CCR), title 13, sections 2449 through 2449.3, and for Large Spark Ignition Engine Fleet Requirements (LSI fleet regulation), CCR, title 13, sections 2775 through 2775.2. This notice summarizes the specific amendments being proposed. The Staff Report: Initial Statement of Reasons (ISOR) presents the proposed amendments for both regulations and information supporting the adoption of the amendments in greater detail.

DATE: December 16, 2010

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

This item may be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., December 16, 2010, and may continue at 8:30 a.m., on December 17, 2010. This item may not be considered until December 17, 2010. Please consult the agenda for the hearing, which will be available at least 10 days before December 16, 2010, to determine the day on which this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Off-Road Regulation

Sections Affected: Proposed amendments to California Code of Regulations, title 13, sections 2449, 2449.1, 2449.2, and 2449.3, the regulation for In-Use Off-Road Diesel Vehicles.

Regulation Background

The off-road regulation was originally approved by the Board on July 26, 2007, and became effective on June 15, 2008. Additional amendments were approved by the Board on December 11, 2008, and January 26, 2009, and became effective on January 8, 2010, and January 1, 2010, respectively. On February 20, 2009, the Governor signed Assembly Bill 8 2X (AB 8 2X) in which the Legislature added section

43018.2 to the Health and Safety Code, directing ARB to amend the off-road regulation. The Board approved the AB 8 2X amendments and additional minor amendments to the off-road regulation on July 23, 2009. The AB 8 2X became effective on December 3, 2009 (the AB 8 2X amendments were exempt from the Administrative Procedure Act and OAL review); the additional amendments approved by the Board in July 2009, became effective on August 15, 2010.

The off-road regulation is intended to significantly reduce emissions of diesel particulate matter (PM) and oxides of nitrogen (NOx) from over 150,000 in-use off-road diesel vehicles that operate in California and consequently significantly reduce the public's exposure to these pollutants and their byproducts. The off-road regulation is structured to achieve these environmental benefits by requiring fleet owners of in-use off-road diesel vehicles to modernize their fleets by accelerating the use of cleaner engines and exhaust retrofits in their vehicles. The off-road regulation was designed to support the Diesel Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, which was adopted by the Board on September 30, 2000, as well as the 2007 State Implementation Plans (SIP) for the South Coast and San Joaquin Valley air basins.

The scope of the off-road regulation is far reaching, affecting dozens of vehicle types used in thousands of fleets, in industries as diverse as construction, air travel, manufacturing, landscaping, and ski resorts, as well as public agencies. The off-road regulation affects, among others, the warehouse with one diesel forklift, the landscaper with a fleet of a dozen diesel mowers, the county that maintains rural roads, the landfill with a fleet of dozers, as well as the large construction firm or government fleet with hundreds of diesel loaders, graders, scrapers, and rollers. To punctuate the scope of the off-road regulation, as of September 20, 2010, 8,815 fleets have reported over 150,000 vehicles to the Diesel One-stop Online Reporting System (DOORS), the reporting system for the off-road regulation.

The off-road regulation's requirements vary depending on the size of the fleet and on the age of its vehicles. Fleets are defined in the off-road regulation as small, medium, or large based on their total statewide horsepower (hp). The off-road regulation requires that the largest fleets, which have the most significant emissions, meet the most stringent requirements. The smallest fleets and local municipal fleets located in low-population counties are required to meet less stringent provisions.

In general, the off-road regulation requires owners to modernize their fleets by replacing engines with newer, cleaner ones (repowering), replacing vehicles with newer vehicles equipped with cleaner engines, retiring older vehicles, operating higher emitting vehicles less often (designating them as low-use vehicles), or by applying exhaust retrofits that capture and destroy pollutants before they are emitted into the atmosphere.

To meet the PM and NOx emission reduction requirements, fleets have the option of meeting fleet average emissions targets, or meeting the Best Available Control Technology (BACT) requirements. The PM BACT requirements consist of installing

retrofits that have been approved by ARB as verified diesel emission control strategies (VDECS) on 20 percent of their maximum horsepower in each year of compliance. To meet the NOx BACT requirements, large and medium fleets must turnover eight percent of their maximum horsepower in each year of compliance until 2015, after which there is a 10 percent turnover requirement. Small fleets are not required to meet the NOx emission reduction requirements.

In April 2010, the Board directed staff to consider the impact of the recession and emission inventory changes from both on-road and off-road diesel vehicles operating in the state. The Board also directed staff to provide regulatory relief to fleets affected by the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use On-Road Diesel-Fueled Vehicles (on-road regulation) at title 13, CCR, section 2025 and/or the off-road regulation such that any appropriate economic relief could be targeted most cost effectively between the two regulations, and staff could ensure the combined emissions benefits achieved by the two regulations would continue to meet state implementation plan (SIP) requirements for the combined SIP categories.

On April 22, 2010, staff presented a preliminary update to the Board on the emissions inventory used to develop the off-road regulation, as well as a summary of the impact of the recession on emissions from off-road vehicles. Based on this new information, the Board asked staff to draft changes to the regulation that will mitigate the potential effects of an unfavorable economy on affected businesses, while recognizing the need to protect public health, meet federal clean air deadlines, and continue moving forward even through uncertain times.

In summer and fall of 2010, staff also worked with representatives from the Associated General Contractors of America (AGC), and came to an agreement with AGC in October 2010 to include a number of provisions in staff's proposal, including delaying initial compliance dates to no earlier than 2014 and raising the low-use threshold.

Finally, in December 2008, by Resolution 08-43, the Board approved amendments to bring two-engine cranes under the off-road regulation. In January 2010, by Resolution 10-2, the Board approved amendments to include two-engine water well drilling rigs within the scope of the off-road regulation.

Description of Proposed Regulatory Action

The first section below describes the more major modifications to the off-road regulation. The next section describes additional minor modifications and clarifications proposed by staff to clarify or simplify regulatory provisions.

Major Amendments

Staff's proposed major amendments to the off-road regulation are described in more detail in the sections below.

1. Delay Initial Compliance Dates

Staff is proposing to modify section 2449.1(a) to delay the initial compliance date of the off-road regulation for all fleets as described below:

- Large fleets: from March 1, 2010, to January 1, 2014,
- Medium fleets: from March 1, 2013, to January 1, 2017, and
- Small fleets: from March 1, 2015, to January 1, 2019.

Throughout the regulation, staff is proposing to modify dates to reflect the fact that compliance dates would be on January 1 rather than March 1 of each year.

2. New Combined PM and NOx Fleet Average Requirements

Staff is proposing to combine the PM and NOx fleet average targets in sections 2449.1 and 2449.2. The fleet average targets would be based on the fleet's NOx fleet average. However, the combined fleet average targets would be adjusted and shifted so as to require the appropriate amount of actions to reduce emissions (i.e., such that fleets that meet the NOx targets in the current regulation, but exceed the PM targets, would still be required to take some actions to reduce emissions). Considering the proposed new singular fleet average, section 2449.2 would be deleted completely. By combining the PM and NOx requirements, the regulation would become significantly less complicated as fleets will only have to meet a single annual fleet average. The targets in section 2449.3 for the Surplus Off-road Opt-in for NOx (SOON) program would also be revised to be more consistent with the amended fleet targets.
In addition, staff is proposing to change the final compliance date for large and medium fleets to January 1, 2024 (from March 1, 2020), and for small fleets to January 1, 2029 (from March 1, 2025). Since staff is proposing to remove the PM requirements of the regulation, there will be no final PM compliance requirements.

Staff is also proposing to modify section 2449.1(a)(1)(A)1. to increase the stringency of the final fleet average targets. This will result in fleets having to turn over additional older, dirtier vehicles such that a greater proportion of their vehicles are equipped with Tier 4i and Tier 4 engines. By lowering the final fleet average targets, additional emission reductions will be realized.

3. Modify the Best Available Control Technology (BACT) Requirements

Staff is proposing to combine the PM and NOx BACT requirements in sections 2449.1 and 2449.2. The combined BACT requirements would require annual actions on no more than 4.8 to 10 percent of a fleet's horsepower (depending on year) in each year the fleet did not meet the fleet average target.

All fleets would have the following compliance options for meeting the proposed combined BACT requirements:

- Replace older vehicles with new or cleaner, used vehicles;
- Replace diesel vehicles with electric or alternative fuel vehicles;
- Repower older engines with Tier 2 or higher engines;

- Retire vehicles from fleet;
- Designate vehicles as permanent low-use; or
- Install verified diesel emission control strategies (VDECS).

Staff's proposal would reduce the overall annual requirements as well as allow fleets the option to choose installing exhaust retrofits, turning over their oldest vehicles to newer, cleaner vehicles, or some combination thereof.

4. Credit Provisions

Staff's proposal is intended to allow fleets to maintain credits for actual efforts already made to reduce emissions and to further incentivize early actions by fleets, as described below.

In addition, the Board may consider additional amendments to provide fleets flexibility to take credit for actions to reduce emissions between the off-road regulation and the on-road regulation.

Extend Double Retrofit Credit Period

Staff is proposing to amend section 2449.2(a)(2)(A)2. (now moved to 2449.1(a)(2)(A)2.a.ii.) to extend the period during which a fleet may receive double credit for the installation of a VDECS until 12 months prior to the initial compliance deadline for that fleet. The impact of this proposal would be to incentivize continued progress toward cleaner air and support clean technology. It would encourage critical near term reductions of diesel PM and also helps ensure the investment that businesses and the State have made in retrofit technology is not lost due to the delay in the start of the fleet requirements.

In addition, the Board may consider additional amendments to further incentivize retrofitting prior to fleets' initial compliance deadlines.

Changes to Other Credit Provisions

Staff's proposal is intended to allow fleets to maintain credits for actual efforts already made to reduce emissions; however, credits would be adjusted to reflect the delay of compliance start dates. Staff is proposing to amend section 2449.1(a)(2)(A)2.a.v. to reduce each fleet's early retirement credits by 50 percent and provide that fleets may not use early retirement credits granted per section 2449.1(a)(2)(A)2.a.v. to satisfy all or part of their BACT requirements for the March 1, 2014, compliance date. Also, because reduced activity credits were scheduled to expire on March 1, 2011, if not used, per AB 8 2X, and because the proposed amendments would delay the initial requirements for fleets until January 1, 2014, staff is proposing to remove the regulatory language implementing reduced activity credits.

5. *Increase Low-Use Threshold*

Staff is proposing to explicitly identify and define the two types of low-use vehicles within the regulation as either year-by-year low use or permanent low use, and to increase the low-use threshold in section 2449.1(a)(2)(A)6 for both permanent low-use vehicles and year-to-year vehicles from 100 hours annually to 200 hours annually. Increasing the low-use threshold would provide additional relief, by exempting additional vehicles and increasing the cost effectiveness of the regulation by focusing turnover and retrofit requirements on vehicles that operate greater hours.

6. *New Provisions for Fleets Under 500 Horsepower*

Staff is proposing a new provision (section 2449(e)(17)) to allow fleets with under 500 horsepower to choose to comply with the BACT requirements of the regulation solely by phasing out their Tier 0 and Tier 1 vehicles over a prescribed schedule between 2019 and 2029. Compliance for these fleets using this phase-out schedule would be optional, as these fleets could instead opt to meet the fleet average requirements or the BACT requirements. This provision would provide a very streamlined and relaxed compliance path for the owners of the smallest fleets.

7. *Additional Minor Amendments*

Staff is proposing a number of minor amendments to clarify the off-road regulation, simplify compliance, and provide consistency with the major amendments discussed above. These proposed changes include, but are not limited to:

Captive Attainment Area Fleet Definition - modify the definition to designate these fleets as small fleets, regardless of their total horsepower.

Modify post-2007 flexibility engine definition - simplify the reporting requirements for Post-2007 flexibility engines.

Alternative Fuel and Hybrid Provisions - remove electric vehicle horsepower from the fleet's total horsepower calculation, which will also remove this horsepower from all BACT calculations, and incentivize the use of hybrid off-road vehicles by allowing fleets to use a lower emission factor(s) for hybrid equipment used in a fleet.

Remove Hours in Fleet Average Provision –delete this provision since no fleets have taken advantage of it or plan to.

New Fleet Requirements - clarify that upon purchasing vehicles or bringing vehicles into the state for the first time, a fleet must meet the following requirements:

- *Large or Medium fleets:* Require a large or medium fleet to meet the fleet average target for the closest future *large fleet* compliance date upon initial formation or upon entrance into the state after the effective date of the proposed amendments.

- *Small fleet:* Require a small fleet to meet the fleet average target for the closest future small fleet compliance date upon initial formation or upon entrance into the state after the effective date of the proposed amendments.

For any size fleet, the fleet would be required to meet either the fleet average target or comply with the BACT requirements by the next applicable compliance date.

Adding Vehicle Requirements - amend the adding vehicle requirements:

- Beginning January 1, 2012, large and medium fleets would be allowed to add only vehicles with only Tier 2 or higher engines; beginning January 1, 2016, the restrictions would apply to small fleets; and
- Beginning January 1, 2018, large and medium fleets would be allowed to add only vehicles with Tier 3 or higher engines; beginning January 1, 2021, the restrictions would apply to small fleets.

These revised requirements would apply to all fleets (regardless of compliance path) and to all horsepower categories, providing additional clarity and simplification to the regulation.

Compliance after the Final Target Date - clarify that the turnover and retrofit exemptions do not expire after the final compliance date.

Reporting Dates - change the reporting dates to make them more consistent with the changes and delays to the compliance dates.

Labeling - require equipment identification numbers (EIN) on both sides of a vehicle, instead of just on the right (starboard) side. Additionally, staff is proposing to require captive attainment area fleets to label their vehicles with EINs that are green with white letters (instead of red with white letters) if they choose to take advantage of the captive attainment area fleet provision.

Order of Turnover - simplify the order of turnover provisions by only requiring fleets to turn over all Tier 0 and Tier 1 vehicles before they can count other higher tiered vehicles in meeting the fleet's BACT requirements.

15 Percent Turnover Exemption - clarify that if a fleet has more than 15 percent of its vehicles retrofitted before March 1, 2011, the fleet may choose any of those vehicles to be counted under this exemption and be exempt from turnover, as long as the 15 percent cap is not exceeded and the exempted vehicle(s) continue to be equipped with the installed VDECS.

In addition to the above, the Board may consider amending the off-road regulation to cover other two engine vehicles, as appropriate, for reasons similar to its past decisions to include two-engine cranes and well drilling rigs within the regulation's scope.

LSI Fleet Regulation

Sections Affected: Proposed amendments to CCR, title 13, sections 2775(c), 2775.1(d)(1)(D), 2775.2(b), and 2775.2(e)(1)(A), the Large Spark-Ignition (LSI) Engine Fleet Requirements regulation.

Regulation Background

At its October 22, 1998, public meeting, ARB approved the Off-Road LSI Engine Regulation (LSI Regulation) with the adoption of California Code of Regulations, title 13, sections 2775 through 2775.2. The LSI Regulation established new engine emission standards and test procedures for manufacturers of off-road spark-ignited engines of 25 horsepower or greater (greater than 19 kilowatts).

On May 12, 2006, the ARB approved a second LSI rulemaking. The rulemaking included modifications to the existing emission standards and test procedures to make them more stringent. The rulemaking also included fleet requirements for operators of in-use LSI fleets (the LSI fleet regulation) and verification procedures for manufacturers of LSI retrofit emission control systems (retrofit kits).

The intent of the LSI new engine emission standards and fleet requirements was to reduce hydrocarbon and oxides of nitrogen (HC+NOx) emissions from the nearly 90,000 pieces of LSI equipment sold into and operating in the state by accelerating the introduction of new zero- and near zero-emissions equipment and the retrofit or retirement of uncontrolled in-use equipment, respectively.

Applicability

The new engine emission standards and test procedures apply to LSI engines used in airport ground support equipment (GSE), forklifts, generator sets, mining equipment not otherwise primarily used in the construction industry, off-highway recreational vehicles, refrigeration units less than 50 horsepower, industrial (non-road) sweeper/scrubbers, industrial tow tractors (tugs), turf care equipment, and other industrial equipment.

The LSI fleet regulation affects any operator of four or more forklifts, sweepers/scrubbers, tugs, and GSE, the four largest categories of LSI engine equipment. These vehicles are found in thousands of fleets in California, in industries as diverse as manufacturing, wholesale, transportation and utilities, retail, services, and construction, as well as public agencies.

Regulatory Requirements

The 1998 rulemaking required LSI engine manufacturers to certify 25 percent of their new engines to a 3.0 gram per brake horsepower-hour (g/bhp-hr) combined HC+NOx standard beginning with the 2001 engine model year. The percentage increased by 25 percent each subsequent model year so that 100 percent of the engines were

emission-controlled by the 2004 model year. To achieve this standard, manufacturers relied upon the same emission control technologies used in automotive engines – three way catalytic converters, electronic fuel/air controllers, and oxygen sensors. The 3.0g /bhp-hr standard represented a 75 percent reduction in emissions versus LSI engines with no emission controls.

The 2006 rulemaking required manufacturers to certify their new LSI engines to a 2.0 g/bhp-hr HC+NOx standard effective January 1, 2007 and a 0.6 g/bhp-hr standard effective January 1, 2010. The latter standard represents a 95 percent emission reduction versus uncontrolled LSI engines.

The 2006 rulemaking also required operators of in-use fleets to achieve specific HC+NOx fleet average emission level standards that are more stringent with fleet size and time. The standards are also more stringent for forklifts than they are for non-forklift LSI equipment. The stringency of the standards reflects the availability of retrofit devices for LSI equipment as well as the greater ability of large fleets to incorporate zero- and near zero-emission new and used equipment into their operations.

Description of Proposed Regulatory Action

Staff is proposing several minor changes and clarifications to the LSI fleet regulation. The minor changes include: (1) extending the limited hours of use provisions, (2) broadening compliance extension flexibility, (3) adding definitions, and (4) clarifying definitions and modifying record keeping requirements.

Proposed Amendments

1. *Limited Hours of Use Provision*

Staff proposes to amend section 2775.1(d)(1)(D) to extend the limited hours of use (LHU) exclusion for LSI equipment operated fewer than 251 hours per year. Currently, LHU equipment may be excluded from fleet average emission level standard calculations, but only until January 1, 2011. After that date, LHU equipment that has been retrofitted to a 3.0 g/bhp-hr standard may continue to be excluded from fleet average emission level standard calculations. If not retrofitted, the LHU piece of equipment may have to be retired or replaced, resulting in a significant economic impact on some operators. Staff proposes to extend the LHU provisions for equipment operated no more than 200 hours per year and intends to clarify that operators desiring to exclude equipment under the LHU provisions must use non-resettable hour meters.

2. *Compliance Extension Provision*

Staff proposes to amend section 2775.2(e)(1)(A) to extend the length of compliance extensions. Currently, an LSI equipment operator may request a one-year compliance extension in cases where retrofit emission control devices (retrofit kits) are not available for a given engine/equipment combination. After that time, if no retrofit kit has become

available, the operator is expected to retire or replace their piece of equipment to come into compliance with their fleet average emission level standards. However, replacement is not an economically feasible option for specialized LSI equipment with either very large engine displacements or an Underwriters Laboratories (UL) issued LPS/GS (propane/gas) safety designation. Staff proposes to allow a two-year compliance extension with a provision for an additional two years in the event of non-availability of retrofit kits. After the extension(s) expire(s), the operator may no longer exclude the LSI equipment from the fleet average emission level standard and may have to retire or replace it to achieve the standard. Staff also proposes to clarify an incomplete reference in section 2775.2(e)(1)(A) to "subsections 2775.1(a), (c), and (d).

3. Modified Definitions

Agricultural Operations - The "Agricultural Operations" definition would also clarify that forestry and nursery operations are considered agricultural operations. The "Fleet Average Emission Level" definition would also clarify two items for fleet average emission level standards calculations: (1) the default emission rate for uncontrolled LSI equipment is 12.0 grams HC+NOx per brake horsepower-hour, and (2) electric equipment of less than 19 kilowatts power may be included in calculations as long as it performs, with similar efficiency, the same function as an LSI engine-powered piece of equipment subject to the standards.

Airport Ground Support Equipment or GSE - "GSE" currently means any LSI engine or electric-powered equipment contained in the 24 categories of equipment included in section B.3 of Appendix 2 of the South Coast Ground Support Equipment Memorandum of Understanding, dated November 27, 2002. Two of these categories are "carts" and "other," which, for the purposes of electric-powered equipment, can be interpreted very broadly. Under the proposal, staff would eliminate the "other" category and limit the "cart" category so that it only allows electric carts into fleet average emission level standards calculations if they perform the work equivalent of an LSI engine-powered cart. These proposed modifications bring the definition in line with the original intent of the LSI fleet regulation.

Baseline Inventory - The "Baseline Inventory" definition currently states that this inventory should reflect all equipment owned at the time of the inventory. The intent of the regulation was that the baseline inventory should reflect all operated equipment subject to the fleet average emission level requirements. Staff proposes to clarify that the baseline inventory requirement applies to all operated LSI equipment by replacing the word "owned" with the word "operated."

Operator - The "Operator" definition currently states that "operator" includes a person whose usual and customary business is the rental or leasing of LSI engine equipment for any equipment not solely possessed or used for rental or leasing. The intent of the regulation was to allow rental equipment companies and equipment dealers some de minimis level of use of their rental and used equipment fleet vehicles without triggering

the fleet average emission level standards requirements. Staff proposes to modify the "operator" definition to stipulate a de minimis usage level that reflects this intent.

4. Record-keeping Requirements

Staff proposes to modify the record-keeping requirements in section 2775.2(b) of the existing regulation. This section requires operators to record identifying and emissions information for each piece of LSI equipment in their fleet. It also requires them to obtain product delivery tickets or a like surrogate, if obtainable, stipulating that the fuel they are using meets motor vehicle grade propane specifications. The ARB added this second requirement in an attempt to force operators to put pressure on their fuel suppliers to provide uncontaminated and low-olefin (propene) content motor vehicle grade fuel. However, operators have been unable to obtain this documentation from their fuel suppliers. Staff proposes to remove the fuel quality record-keeping requirement. Staff also proposes to clarify the ARB's intent that the record-keeping requirement apply to each piece of LSI equipment and that serial numbers be recorded for both engines and equipment.

COMPARABLE FEDERAL REGULATIONS

Off-Road Regulation

The United States Environmental Protection Agency (U.S. EPA) has promulgated federal emission standards for new non-road engines. However, no federal standards have been promulgated addressing emission reductions from in-use diesel vehicle engines.

Under section 209(e)(2), California may adopt and enforce emission standards and other requirements for off-road engines and equipment not expressly subject to federal preemption, so long as California applies for and receives authorization from the Administrator of U.S. EPA. California submitted its initial request for authorization on August 12, 2008, and filed a supplemental request on February 11, 2010. EPA conducted hearings on the requests on October 27, 2008, and April 14, 2010. The requests for authorization are presently pending.

LSI Fleet Regulation

In 2002, the U.S. EPA followed California's lead and adopted emission standards for new LSI engines (Volume 67, Federal Register, page 68242, November 8, 2002; title 40, Code of Federal Regulations, part 1048). As the preamble to the federal regulations notes, the federal regulations extend California's 1998 standards for new LSI engines to the rest of the United States in 2004 through 2006 and adopt more stringent standards for new LSI engines beginning in 2007.

In 2006, the ARB harmonized with the federal standards for new 2007 through 2009 model year LSI engines, but went a step further adopting more stringent California new

engine standards that became effective January 1, 2010. The ARB also adopted fleet average emission level standards for operators of LSI engine-powered equipment. The federal regulations do not impose the more stringent 2010 new engine standards. They additionally do not impose requirements on fleet operators or on in-use engines.

Under section 209(e)(2), California may adopt and enforce emission standards and other requirements for off-road engines and equipment not expressly subject to federal preemption, so long as California applies for and receives authorization from the Administrator of U.S. EPA. California's request for authorization was submitted on December 10, 2008; the request for authorization is presently pending.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory actions, which includes a summary of the economic and environmental impacts of the proposal. The report is entitled: "Proposed Amendments to the Regulations for In-Use Off-Road Diesel Fueled Fleets and Off-Road Large Spark-Ignition Fleet Requirements."

Copies of the ISOR and the full text of the proposed regulatory language for both the off-road regulation and the LSI fleet regulation, in underline and strikeout format to allow for comparison with the existing regulations, may be accessed on ARB's website listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing on December 16, 2010.

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on ARB's website listed below.

Inquiries concerning the substance of the proposed off-road regulation amendments may be directed to the designated agency contact persons, Ms. Kim Heroy-Rogalski, Manager of the Off-Road Implementation Section, at (916) 327-2200, or Ms. Elizabeth Yura, Off-Road Implementation Staff, at (916) 323-2397.

Inquiries concerning the substance of the proposed LSI fleet regulation amendments may be directed to the designated agency contact persons, Ms. Elise Keddie, Manager of the ZEV Implementation Section, at (916) 323-8974, or Mr. Mark Williams, ZEV Implementation Staff, at (916) 327-5610.

Further, the agency representative and designated back-up contact persons, to whom nonsubstantive inquiries concerning the proposed administrative action may be directed, are Ms. Lori Andreoni, Manager, Board Administration and Regulatory Coordination Unit, (916) 322-4011, or Ms. Trini Balcazar, Regulations Coordinator,

(916) 445-9564. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the ISOR and all subsequent regulatory documents, including the FSOR, when completed, are available on ARB's website for this rulemaking at http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadlsi10.htm

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulations are presented below.

Pursuant to Government Code sections 11346.5(a)(5), the Executive Officer has determined that the proposed regulatory actions would not create any costs to or mandates on any local agency or school district that is reimbursable by the State pursuant to Government Code, title 2, division 4, part 7 (commencing with section 17500).

Pursuant to Government Code sections 11346.5(a)(6), the Executive Officer has determined, based on estimates prepared in accordance with instruction adopted by the Department of Finance, that the amendments to the off-road regulation or the LSI fleet regulation would not create additional costs to any State agency or to any local agency or school district, whether or not reimbursable by the State pursuant to Government Code, title 2, division 4, part 7 (commencing with section 17500), create other nondiscretionary costs on local agencies, and affect costs or savings in federal funding to the State.

The proposed amendments to both regulations will provide significant relief from compliance requirements, and are expected to decrease the compliance costs for both public and private fleets alike; it is not expected that any of the proposed amendments will increase compliance costs for fleets.

In developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons or businesses. ARB is not aware of any cost impacts, other than the aforementioned savings, that a representative private person or business would necessarily incur in reasonable compliance with the proposed action. Additionally, as stated above, the proposed amendments to both regulations are expected to decrease compliance costs for fleets, which will result in a cost savings for fleets.

Pursuant to Government Code section 11346.5(a)(8), the Executive Officer has made an initial determination that the proposed regulatory actions would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative

private persons. In accordance with Government Code sections 11346.5(a)(10) and 11346.3(b), the Executive Officer has further determined that the proposed regulatory actions will overall decrease the elimination of jobs within the State of California, and decrease the elimination of existing businesses within the State of California. The amendments to both regulations are expected to provide significant relief to affected fleets and, therefore, will not have an adverse affect on California businesses.

Although these proposed amendments are not expected to adversely impact the economy overall, these modifications could have a negative economic impact on retrofit manufacturers and installers, and firms that provide repowers or new or used vehicles because they would receive fewer orders in the next few years. However, the off-road regulation will still provide incentives that are intended to encourage early retrofitting, repowering, and replacement, and the LSI fleet regulation does not preclude a fleet from voluntarily cleaning up there fleet, which could help mitigate potential impacts on retrofit and repower jobs and businesses.

A detailed assessment of the economic impacts of the proposed regulatory actions and their effect on California businesses can be found in the ISOR.

In accordance with Government Code section 11346.3, except as stated above with respect to retrofit manufacturers and installers, and firms that provide repowers or new or used vehicles, by providing significant relief to affected fleets, the Executive Officer has determined that the proposed regulatory actions would overall positively affect the number of jobs created or, at least, decrease the number of jobs eliminated within the State of California; positively affect the number of new businesses created or, at least, decrease the number of existing businesses eliminated within the State of California, and positively affect the expansion of businesses currently doing business within the State of California. A detailed assessment of the economic impacts of the proposed regulatory actions can be found in the ISOR.

The Executive Officer has also determined, pursuant to California Code of Regulations, title 1, section 4, that the proposed off-road regulatory action would affect small businesses. It is expected that the proposed amendments to the off-road regulation will result in an overall cost savings to small businesses. However, as stated above, the amendments could have a negative economic impact on small businesses associated with retrofit manufacturing and installation because they would receive fewer orders in the next few years. The proposed LSI fleet regulatory action would not affect small businesses as they are already exempt from the requirements of the LSI fleet regulation.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the regulations which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory actions, the Board must determine that no reasonable alternatives considered by the Board, or that has otherwise been identified and brought to the attention of the Board, would be more effective in carrying out the purpose for which the actions are proposed, or would be as effective and less burdensome to affected private persons than the proposed actions.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and comments may be submitted by postal mail or by electronic submittal before the meeting. The public comment period for this regulatory action will begin on November 1, 2010. To be considered by the Board, written comments, not physically submitted at the meeting, must be submitted on or after November 1, 2010 and received **no later than 12:00 noon on December 15, 2010,** and must be addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Please note that the webpage provided above for electronic submittal is for comments on the following on-road and off-road regulations:

- Truck and Bus
- Drayage Truck
- Tractor-Trailer GHG
- Off-Road
- Large Spark Ignition

To ensure that all comments are properly considered and responded to, please identify in the subject heading of each comment letter the regulation(s) for which comments are being submitted.

Please note that under the California Public Records Act (Gov. Code, § 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and any other search engines.

The Board requests, but does not require, that 20 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board members have time to fully consider each comment. The Board encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

STATUTORY AUTHORITY AND REFERENCES

Off-Road Regulation

This regulatory action is proposed under that authority granted in Health and Safety Code sections 39002, 39003, 39500, 39600, 39601, 39602, 39602.5, 39650, 39656, 39658, 39659, 39665, 39667, 41511, 43000, 43000.5, 43013, 43018, and 43018.2. This action is proposed to implement, interpret and make specific 39002, 39003, 39500, 39600, 39601, 39602, 39602.5, 39650, 39656, 39658, 39659, 39665, 39667, 41511, 43000, 43000.5, 43013, 43018, and 43018.2.

LSI Fleet Regulation

This regulatory action is proposed under that authority granted in Health and Safety Code, sections 39002, 39003, 39500, 39600, 39601, 43000, 43011, 43013, 43017, 43018, 43600, and 43700. This action is proposed to implement, interpret, and make specific sections 43000, 43013, 43017, 43018, 43101, 43102, 43104, 43105, 43106, 43150, 43151, 43152, 43153, 43154, 43204, 43205, 43205.5, 43210, 43210.5, 43211, and 43212.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Government Code, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340).

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non-substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice and that the regulatory language as modified could result from the proposed regulatory action; in such event, the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15-days before it is adopted.

The public may request a copy of the modified regulatory text from ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, First Floor, Sacramento, California, 95814, (916) 322-2990.

SPECIAL ACCOMMODATION REQUEST

Special accommodation or language needs can be provided for any of the following:

- An interpreter to be available at the hearing;
- Documents made available in an alternate format (i.e., Braille, large print, etc.) or another language;
- A disability-related reasonable accommodation.

To request these special accommodations or language needs, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at 916) 322-3928 as soon as possible, but no later than 10 business days before the scheduled Board hearing. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Comodidad especial o necesidad de otro idioma puede ser proveído para alguna de las siguientes:

- Un intérprete que esté disponible en la audiencia
- Documentos disponibles en un formato alterno (por decir, sistema Braille, o en impresión grande) u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 322-5594 o envíe un fax a (916) 322-3928 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

CALIFORNIA AIR RESOURCES BOARD

for

James N. Goldstene
Executive Officer

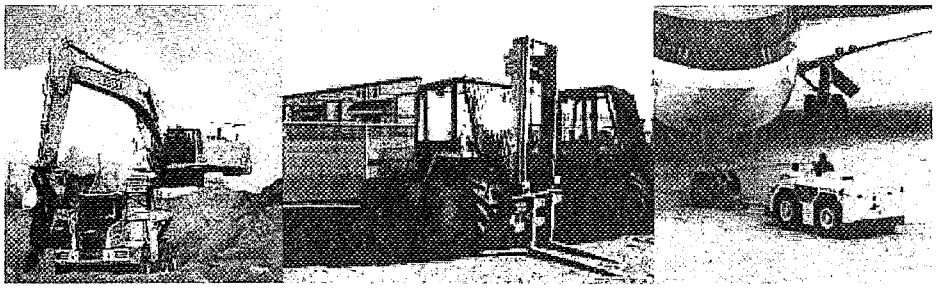
Date: October 19, 2010

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.arb.ca.gov.

California Environmental Protection Agency
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

PROPOSED AMENDMENTS TO THE REGULATION FOR IN-USE OFF-ROAD DIESEL-FUELED FLEETS AND THE OFF-ROAD LARGE SPARK-IGNITION FLEET REQUIREMENTS



Mobile Source Control Division
Emissions Reductions Incentives Branch

October 2010

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS

Public Hearing to Consider

PROPOSED AMENDMENTS TO THE REGULATION FOR IN-USE OFF-ROAD DIESEL-FUELED FLEETS AND THE OFF-ROAD LARGE SPARK-IGNITION FLEET REQUIREMENTS

To be considered by the Air Resources Board at a meeting of the Board that will commence on December 16, 2010, may continue to December 17, 2010, at

California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE REGULATION FOR IN-USE OFF-ROAD DIESEL-FUELED FLEETS AND THE OFF-ROAD LARGE SPARK-IGNITION FLEET REQUIREMENTS

This report has been prepared by the Mobile Source Control Division staff of the Air Resources Board with the assistance and support from the following divisions: Planning and Technical Support and Research. In addition, we would like to acknowledge the assistance and cooperation that we have received from many individuals and organizations.

Publication does not signify that the contents reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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I. EXECUTIVE SUMMARY

Emissions associated with off-road vehicles (such as those used in construction, manufacturing, the rental industry, road maintenance, airport ground support and landscaping) are a significant contributor to many of the air quality challenges facing California, whether they be meeting federal air quality standards, reducing premature mortality, addressing localized risk, or reducing greenhouse gas emissions. To meet its air quality goals, the Air Resources Board (ARB or Board) has put into place a series of comprehensive regulations and programs to meet these challenges.

Important among these is the in-use off-road diesel vehicle regulation (off-road regulation), approved in 2007, which is intended to significantly reduce emissions of diesel particulate matter (PM) and oxides of nitrogen (NOx) from the over 150,000 in-use off-road diesel vehicles that operate in California by requiring their owners to modernize their fleets and install exhaust retrofits. The regulations are especially rigorous in the near-term, in part to meet federally-mandated clean air standards by 2014.

Complementing this regulation is the large spark ignition (LSI) fleet regulation, approved in 2006. The LSI fleet regulation is intended to reduce hydrocarbon and oxides of nitrogen (HC+NOx) emissions from the nearly 90,000 LSI vehicles operating in California by accelerating the introduction of new clean vehicles and the retrofit or retirement of uncontrolled in-use vehicles.

Since the adoption of the off-road and LSI fleet regulations, a number of events have occurred which have presented an opportunity for ARB to reevaluate these regulations. First, a global recession has substantially reduced the activity (and emissions) of many off-road fleets. At the same time, the recession has substantially reduced the near-term ability of fleets to invest in the clean vehicles and equipment needed to comply with the regulations. These first two factors are especially true for California's construction industry. Lastly, ARB staff has undertaken a thorough review and update to our estimates of the emissions from off-road diesel vehicles, and staff has determined that emissions are substantially lower than previously estimated.

Despite a significant reduction in emissions, the off-road and LSI fleet regulations are still critically important to ensuring that California meets both its short-term and long-term air quality obligations and health based goals. This includes achieving sufficient PM emissions reductions to meet federal air quality standards for fine particulate (PM2.5) by 2014, and to make continued progress to maximize reductions of ozone forming emissions by 2023. The overall reduction in emissions from off-road vehicles resulting from the current economic climate presents an opportunity, especially in the near-term, to reduce the economic impact on impacted fleets while still achieving needed emission reductions.

Considering this, in April 2010, the Board directed staff to update the emissions inventories from heavy-duty on-road trucks and buses and off-road vehicles to reflect

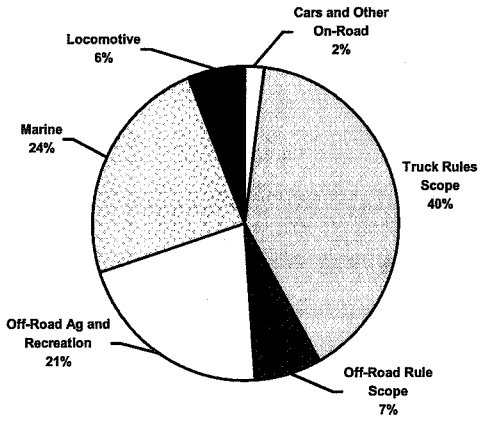
the impact of the recession. The Board further directed staff to develop amendments to the In-use On-Road Diesel Vehicle (Truck and Bus) and off-road regulations together that would reduce the cost to fleets while continuing to meet the Board's air quality goals and obligations. The Board's direction included the following principles for staff to consider in proposing amendments:

- Continue progress toward cleaner air
- Maintain public health benefits
- Meet California's State Implementation Plan (SIP) commitments
- Provide incentives to achieve greenhouse gas reductions
- Improve cost effectiveness
- Lower peak year costs
- Consider cumulative impact of both regulations
- Provide most economic relief to fleets hardest hit by recession
- Ensure emission reductions as economy recovers
- Support clean technologies

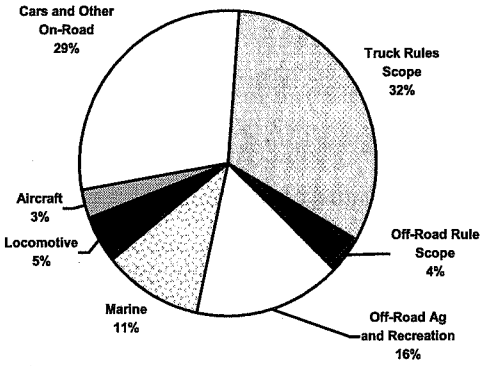
To support development of the proposed amendments, staff conducted a comprehensive review of the off-road emissions inventory that focused on two areas. First, staff undertook a thorough review of its inventory methodology, and updated many key factors used in estimating emissions from off-road vehicles. This included new population and activity data reported to ARB, as well as new published studies and other data that evaluated emissions from off-road vehicles. Staff also evaluated new data that showed that the previous inventory overestimated how much and how hard off-road vehicles work. Staff also took into account the severe impact the recession has had on the construction industry in California, where construction activity has decreased by more than 50 percent since 2005, and new vehicle sales have declined more than 90 percent (CA DOF, 2010; EDA, 2010). The net result of the recession and methodology changes was an almost 80 percent reduction in emissions from what had previously been estimated, with about half of this reduction the result of the recession, and about half to changes in inventory methods.

Despite the changes and reduced emissions from off-road vehicles without the off-road regulation, the categories of vehicles that it covers remain an important contributor to emissions in California, both in 2010 and 2020, as shown in Figure 1 and Figure 2. In addition, reducing emissions is necessary to reduce premature deaths associated with exposure to fine PM (PM2.5) and near-source exposure to diesel PM.

Figure 1: Off-Road Contribution to 2010 Statewide Mobile Source Emissions (Particulate Matter and NOx without Regulations)

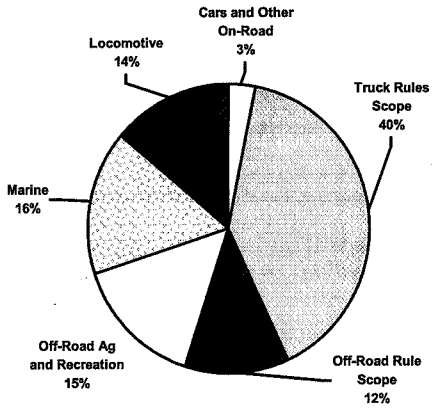


PM Emissions

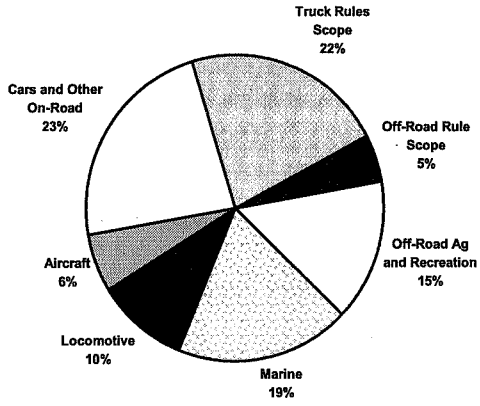


NOx Emissions

Figure 2: Off-Road Contribution to 2020 Statewide Mobile Source Emissions (Particulate Matter and NOx without Regulations)



PM Emissions



NOx Emissions

In directing staff to propose changes to the Truck and Bus and off-road regulations together, the Board further instructed staff to also consider the impact of the recession and inventory changes on affected fleets. This was intended to ensure emissions reductions could be targeted most cost effectively, and the combined emissions benefits achieved by the two rules would continue to meet State Implementation Plan (SIP) requirements. The SIP is California's roadmap towards achieving federal clean air standards by the applicable deadlines. To assess progress towards meeting the emission reduction obligations in the SIP, staff evaluated whether the lower emissions from the revised inventory and the recession provided greater emission reductions than were expected. Any excess emission reductions achieved are referred to as an emission margin. The margin defines how much relief can be provided under the regulations while still meeting the legal emission reduction requirements of the SIP. To allow for a comparison of different pollutants (PM and NOx), the margin is calculated, by

air basin, in NOx equivalent emissions. Table 1 shows the emission margin for the South Coast and San Joaquin Valley air basin for 2014, which is the attainment date for these two air basins to meet federal PM2.5 standards. Based on this analysis, staff believes it is feasible to significantly reduce the economic impact on affected fleets while meeting all SIP obligations.

Table 1: Emission Margin for Truck and Bus and Off-Road Regulations: 2014

Air Basin	Equivalent NOx Tons per Day Below Combined SIP Target
South Coast	62
San Joaquin Valley	40

The U.S. EPA has recently concluded, based on the published and peer reviewed scientific literature, that long-term exposure to PM2.5 is causally associated with premature mortality. A causal relationship means it has the highest scientific level of certainty. The U.S. EPA also found that premature deaths caused by PM2.5 occur at levels well below the Federal air quality standard for PM2.5. The U.S. EPA estimates that about 63,000 to 80,000 premature deaths each year in the U.S. are related to PM2.5. ARB staff used the EPA methodology to estimate that long-term exposure to PM2.5 from all sources in California results in 9,200 premature deaths annually and that reducing emissions to meet the Federal standard would reduce premature deaths by 2,700 annually. Reducing PM emissions below the Federal standard would reduce the number of premature deaths even further.

After holding 19 workshops in 2010 throughout the state and considering the principles laid out by the Board, staff has developed a comprehensive set of amendments to the Truck and Bus[1] and off-road regulations that will:

- Substantially reduce compliance costs;
- Achieve the emissions reductions needed to meet California's SIP commitments to attain federal air quality standards;
- Continue to reduce localized risk; and
- Continue to reduce the premature mortality impacts of diesel emissions.

Included in these proposed amendments to the off-road regulation are recommendations developed in conjunction with representatives from the Associated General Contractors of America (AGC) (ARB, 2010a), including:

- Delay start of requirements until January 1, 2014
- Increase the number of "low-use" equipment exempted
- Provide simpler compliance options for the smallest fleets
- Extend benefits for businesses that comply before their deadline
- Lower annual requirements to clean up engines

[1] A summary of amendments to the Truck and Bus regulation is set forth in the Truck and Bus Staff Report: Initial Statement of Reasons.

The current performance requirements of the off-road regulation require large fleets (those with over 5,000 horsepower (hp)) to begin turning over 8 percent and retrofitting 20 percent of their hp per year, beginning in 2010. Medium fleets (those between 2,501, and 5,000 horsepower) are required to begin meeting the same requirements in 2013. Small fleets, those with 2,500 hp or less, are required to install retrofits on 20 percent of their horsepower beginning in 2015, but are not required to turn over any vehicles. Large and medium fleets may complete their turnover requirements by replacing, retiring, or repowering them with a newer engine, operating the vehicle less than 100 hours per year, or moving to electric or alternative fuel engines. For fleets of all sizes, the fleet may avoid the need to take any compliance action under the off-road regulation if the fleet is relatively new and clean and meets a 'fleet average target,' meaning the average emissions per vehicle are low (which is the case with newer vehicles). The regulation also requires fleets to report their off-road diesel vehicles to ARB and label the vehicles with an ARB assigned identifier in 2009, and currently requires fleets to limit idling to no more than five minutes and provide a disclosure notice whenever they sell an off-road vehicle in California.

The proposed amendments to the off-road regulation delay the initial compliance date for all fleets by four years, provide a path to compliance without any required retrofits, simplify the regulation, and lower the costs of the regulation significantly while still maintaining progress toward clean air. More specifically, these amendments would:

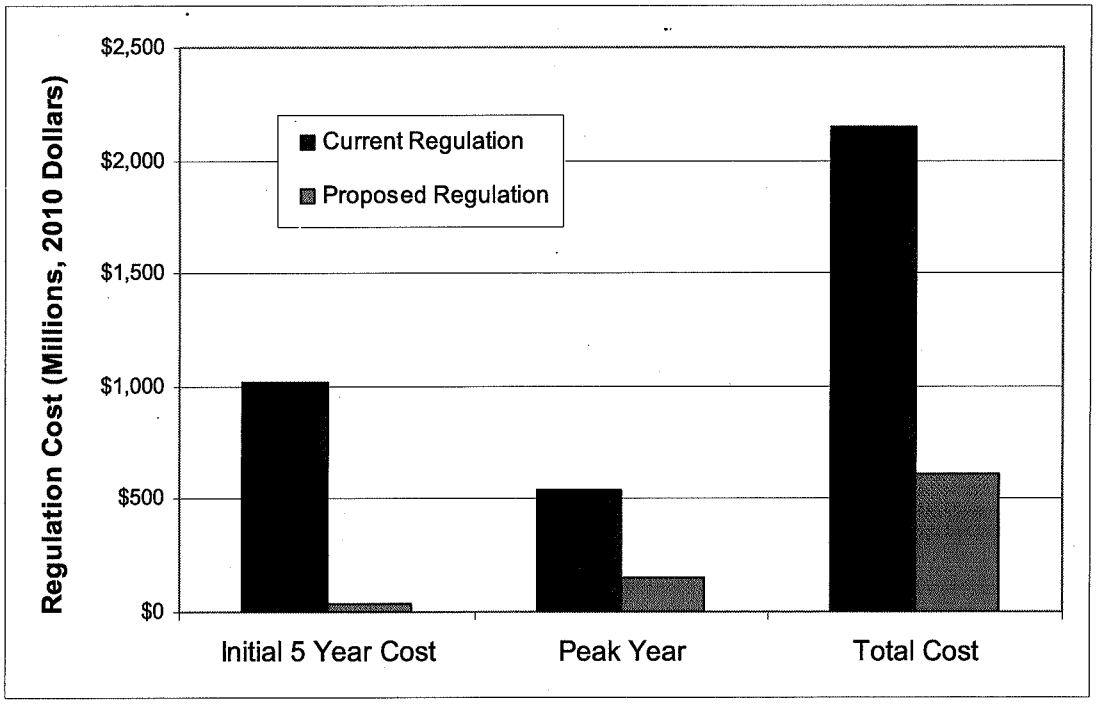
- Delay first compliance date until no earlier than January 1, 2014, for all fleets. The initial compliance dates for medium and small fleets would be delayed until January 1, 2017, and January 1, 2019, respectively;
- Combine PM and NOx requirements to dramatically simplify the regulation and reduce the number of annual requirements;
- Allow turnover in lieu of retrofitting;
- Lower annual requirements to clean up engines to no more than 5 to 10 percent of a fleet's horsepower (down from 28 to 30 percent);
- Provide significant credit for early retrofits to incentivize early actions;
- Increase low use threshold from 100 to 200 hours annually, allowing more vehicles to be defined as low-use (and therefore exempt from control requirements);
- Provide simpler compliance option for the smallest fleets, those with less than 500 horsepower; and
- Achieve more NOx reductions in later years by requiring more turnover to the newest, cleanest engines starting in 2017.

The reporting, labeling, and idling restrictions would remain in place. In addition to these amendments above, staff is also proposing additional minor modifications to clarify or simplify regulatory provisions.

For the LSI fleet regulation, staff is proposing to broaden the definition of low-use vehicles to match that in the off-road regulation, broaden compliance extension flexibility, and make other minor clarifications.

The proposed amendments to the off-road regulation will provide substantial economic relief to all affected fleets, especially in the short term. Estimated costs of the off-road regulation over the next 5 years would be reduced by 97 percent, from $1 billion to $33 million. Total costs over the life of the off-road regulation would be reduced by over 72 percent, and peak year costs would be reduced by 73 percent. This would represent a cost savings of $1.5 billion and $396 million, respectively. These cost savings are shown in Figure 3. The proposed LSI fleet regulation changes are expected to provide $8.4 to $59.5 million in savings to affected fleets by increasing flexibility options.

Figure 3 : Cost of Proposed Off-Road Regulation Down Substantially



Overall, the regulations will continue to provide significant emissions reductions that are necessary to meet California's air quality obligations and goals. The proposed amendments will reduce the emissions margin to zero in the San Joaquin Valley and to 5 tons/day in the South Coast. Because the combined margin for trucks/buses and off-road equipment is minimized, maximum relief is provided while still meeting SIP legal obligations.

In addition, the off-road regulation will continue to provide significant health benefits by reducing premature mortality from PM2.5 exposure and localized risk from diesel PM. Staff estimates that 470 premature deaths (360 to 570, 95% confidence interval) would be avoided by implementation of the amended off-road regulation from 2010 to 2029. This estimate is based on United States Environmental Protection Agency's (U.S. EPA) new risk assessment methodology (U.S. EPA, 2010), and includes the most recent air quality data available (2006 to 2008) and the latest emissions inventory estimates. Staff also expects localized risk to be reduced commensurate with the expected diesel PM emission reductions.

II. INTRODUCTION

The purpose of this report is to describe proposed amendments to the following regulations:

- Regulation for In-Use Off-Road Diesel-Fueled Vehicle Fleets (the off-road regulation), California Code of Regulations (CCR), Title 13, sections 2449 through 2449.3, and
- The Large Spark Ignition Engine Fleet Requirements (LSI fleet regulation), CCR, title 13, sections 2775 through 2775.2.

Staff of the Air Resources Board (ARB or Board) is proposing amendments to provide economic relief to fleets affected by the recent recession and to address the finding that off-road diesel emissions are lower than previously expected. At the same time, staff is proposing minor amendments, simplifications, and clarifications to both regulations.

A. Background

1. History of off-road regulation and previous amendments

The off-road regulation was originally approved by the Board on July 26, 2007, and became effective on June 15, 2008. The Board approved additional amendments on December 11, 2008, which aligned requirements with the newly adopted Truck and Bus regulation, and January 26, 2009, which extended credits for exhaust retrofits. These became effective on January 8, 2010, and January 1, 2010, respectively. On February 20, 2009, the Governor signed Assembly Bill 8 2X (AB 8 2X) in which the Legislature added Section 43018.2 to the Health and Safety Code, directing ARB to amend the off-road regulation. The Board approved the AB 8 2X amendments, and additional minor amendments to the off-road regulation on July 23, 2009. The AB 8 2X Amendments became effective on December 3, 2009, and the additional amendments approved by the Board in July 2009, became effective on August 15, 2010.

The off-road regulation is intended to significantly reduce emissions of diesel particulate matter (PM) and oxides of nitrogen (NOx) from over 150,000 in-use off-road diesel vehicles that operate in California. The off-road regulation is structured to achieve these reductions by requiring fleet owners of off-road in-use diesel vehicles to modernize their fleets by accelerating the use of cleaner engines and applying exhaust retrofits to their vehicles (ARB, 2007a). The off-road regulation was designed to support the Diesel Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, which was adopted by the Board on September 30, 2000, as well as the 2007 State Implementation Plans (SIPs) for the South Coast and San Joaquin Valley air basins (ARB, 2000; ARB, 2007c).

2. History of LSI fleet regulation and previous amendments

The Off-Road LSI Engine Regulation (LSI regulation), which established new engine standards and test procedures for manufacturers of LSI engines, was approved by the Board on October 22, 1998, and became effective on November 8, 1999. On May 12, 2006, the ARB amended the existing LSI Regulation and additionally adopted

fleet requirements for operators of in-use LSI fleets (the LSI fleet regulation) and verification procedures for manufacturers of LSI retrofit emission control systems (retrofit kits). The amendments became effective on May 12, 2007.

The 2006 rulemaking requires operators of in-use fleets to achieve specific hydrocarbon and oxides of nitrogen (HC+NOx) fleet average emission level (FAEL) standards that become more stringent with fleet size and time. The standards are also more stringent for forklifts than they are for non-forklift LSI equipment. The stringency of the standards reflects the differences in availability of retrofit devices for the four categories of in-use LSI equipment as well as the greater ability of large fleets to incorporate zero- and near zero-emission equipment into their operations.

The intent of the LSI new engine standards and fleet requirements was to reduce HC+NOx emissions from the approximately 90,000 pieces of LSI equipment operating in the State of California by accelerating the introduction of new zero- and near zero-emissions equipment and the retrofit or retirement of in-use uncontrolled equipment. The LSI fleet regulation was designed to support the 2003 SIP (ARB, 2003a).

The LSI fleet regulation applies to operators of forklifts, sweepers/scrubbers, tugs, and ground support equipment (GSE), the four largest categories of LSI engine equipment. These vehicles are found in thousands of fleets in California, in industries as diverse as manufacturing, wholesale, transportation and utilities, retail, services, and construction, as well as public agencies. The LSI fleet regulation affects approximately 2,000 LSI fleets in California.

B. Regulatory Authority

ARB has authority under California law to adopt the proposed amendments to the off-road and LSI fleet regulations. California Health and Safety Code (Health & Saf. Code) sections 43000, 43000.5, 43013(b) and 43018 provide broad authority for ARB to adopt emission standards and other regulations to reduce emissions from new and in-use vehicular and other mobile sources. Under Health & Saf. Code sections 43013(b) and 43018, ARB is directly authorized to adopt emission standards for off-road vehicular sources, as expeditiously as possible, to meet state ambient air quality standards.

ARB is further mandated by California law under Health & Saf. Code section 39667 to adopt Airborne Toxic Control Measures (ATCMs) for new and in-use vehicular sources, including off-road diesel vehicles, for identified toxic air contaminants (TACs), such as diesel PM.

Under federal and California law, ARB is the primary agency in California responsible for ensuring that all regions of the State attain and maintain the National Ambient Air Quality Standards (NAAQS). To achieve this, California must adopt all feasible measures to obtain the necessary emission reductions, including measures from mobile sources. The Federal Clean Air Act (CAA) preempts states, including California, from adopting requirements for new off-road engines less than 175 hp used in farm or

construction equipment. California may adopt emission standards for in-use off-road engines pursuant to CAA section 209(e)(2), but must receive authorization from U.S. EPA before it may enforce the adopted standards.

C. Rationale for the Proposed Amendments

Both the off-road and LSI fleet regulations are needed to protect public health and to achieve the emission reductions necessary to attain federal clean air standards. However, staff is proposing major amendments to both regulations, especially to the near-term requirements, for several reasons.

First, the global recession has caused a loss in employment and revenue in the construction sector and other industries that are affected by the regulations (U.S. BLS, 2010; U.S. BEA, 2009). This has resulted in a reduction in business activity and has strained the financial ability of industry to comply with the regulations. At the same time, the recession has also resulted in reduced vehicle activity and emissions there from.

In February 2009, ARB was directed to grant short term economic relief from the off-road regulation for fleets adversely affected by the economy through AB 8 2X (ARB, 2009b; AB 8 2X, 2009), including providing credits towards the PM and NOx requirements of the regulation if a fleet could show:

1) A reduction in total fleet horsepower from March 1, 2006, to March 1, 2010, or
2) A reduction in fleet activity between July 1, 2007, and March 1, 2010.

As of April 2010 (the annual reporting deadline for large fleets), approximately 55 percent of large fleets have received reduced activity and/or reduced horsepower credit under the off-road regulation. On average, these fleets have accrued enough credits to delay initial compliance with the existing regulation for two to four years (ARB, 2010b). Although these credits will help many fleets comply with the first several years of regulatory requirements, there are still many fleets in California that have not been able to obtain credits, and therefore would be subject to full regulatory compliance.

In addition, since the beginning of 2010, ARB staff has undertaken a comprehensive review and update of the methodology and data inputs used in staff's initial estimates of off-road diesel vehicle emissions. As part of that work, staff considered the current economic recession and corresponding decrease in off-road vehicle activity. Based on the new data available, staff now believes that past and future emissions from off-road vehicles are significantly lower than previously estimated. Staff has determined that it is feasible to utilize the lower than expected emissions to provide economic relief to fleets, while still achieving the emission reductions necessary to attain federal clean air standards (Further detail on the emission inventory changes is provided in Chapter III.A.1.)

In April 2010, the Board directed staff to update the emissions inventories from trucks and buses and off-road equipment to reflect the impact of the recession on emissions. The Board further directed staff to develop amendments to the In-Use On-Road Diesel Vehicle Regulation (Truck and Bus) and off-road regulations together that would provide

economic relief to fleets while continuing to meet the Board's air quality goals and obligations. The Board's direction included the following ten guiding principles for staff to consider in proposing amendments (shown below).

Table 2: Ten Guiding Principles

1.	Continue progress toward cleaner air
2.	Maintain public health benefits
3.	Meet SIP commitments
4.	Incentivize greenhouse gas reductions
5.	Improve cost effectiveness
6.	Lower peak year costs
7.	Consider cumulative impact of both regulations
8.	Provide most relief to fleets hardest hit by recession
9.	Ensure emission reductions as economy recovers
10.	Support clean technologies

While the substantially lower off-road diesel vehicle emissions and the severe recession have created an opportunity for the ARB to go back and modify the off-road regulation to reduce its economic impacts, off-road diesel vehicles remain a significant source of pollution. Therefore, the proposed amendments to the regulation are structured to reduce the economic impact from this regulation while maintaining the emissions and public health benefits expected from the original regulation.

Along with providing economic relief to fleets, staff believes that the off-road regulation should be amended to provide fleets greater flexibility in how they choose to lower their emissions. When the Board approved the off-road regulation in July 2007, staff believed off-road exhaust retrofits would be a widely available and cost effective solution for compliance for nearly all fleets. Hence, the current off-road regulation includes mandatory requirements for installing retrofits for all fleets that do not meet the PM fleet average targets; such fleets are required to install retrofits on a fifth of their horsepower annually. However, as implementation of the off-road regulation began, it became clear that for many fleets and applications, retrofits presented a significant challenge, and accelerated turnover to newer vehicles was a more attractive compliance option. For example, actively regenerated retrofits may not a viable option for large equipment rental fleets that would have to train their customers on how to operate, regenerate, and maintain them. Although exhaust retrofits remain a viable option for many fleets, staff believes it is necessary to restructure the off-road regulation to remove mandatory retrofitting and instead allow fleets to choose between turnover and retrofitting as a compliance strategy.

Staff is also proposing several minor amendments to the off-road and LSI fleet regulations, which are not expected to significantly alter the emissions reductions or total costs expected from the regulations. These minor amendments are modifications or clarifications that are designed to make each regulation more clear, easier to

implement, or fix inconsistencies discovered during the beginning stages or regulatory implementation.

D. Stakeholder Participation

Since January 2010, staff held 19 public workshops statewide to discuss proposed amendments to the regulations and changes to the emission inventories. For the workshops held in Central Valley, live video feed was also provided to locations in Modesto and Bakersfield. The August 31 to September 8 workshop series also provided stakeholders an opportunity to discuss the revised report, "Estimate of premature deaths associated with fine particle pollution (PM2.5) in California using a U.S. Environmental Protection Agency Methodology," which was released by ARB on August 31, 2010 (ARB, 2010c). Table 3 shows the dates, locations, and the primary discussion topics of the workshops.

Table 3: Public Workshops

Workshop Dates	Locations	Truck and Bus	Drayage Truck	Off-Road	Emissions Inventory	Tractor Trailer GHG
January 20, 2010	El Monte	X				
January 25, 2010	Sacramento (webcast)	X				
January 26, 2010	Central Valley	X				
May 6, 2010	Sacramento (webcast)	X		X	X	
May 12, 2010	El Monte	X		X	X	
May 18, 2010	Central Valley	X		X	X	
June 23, 2010	Central Valley	X		X		X
June 28, 2010	Sacramento (webcast)	X		X		X
July 1, 2010	El Monte	X		X		X
July 6, 2010	San Diego	X		X		X
August 31, 2010*	El Monte				X*	
September 1, 2010*	San Diego				X*	
September 3, 2010*	Central Valley				X*	
September 7, 2010*	Sacramento (webcast)				X*	
September 8, 2010*	Oakland				X*	
September 30, 2010	Sacramento (webcast)	X	X	X**		X
October 4, 2010	El Monte	X	X	X**		X
October 5, 2010	San Diego	X	X	X**		X
October 12, 2010	Central Valley	X	X	X**		X

* PM2.5 Mortality Report was discussed

** LSI Fleet Regulation was also discussed

During the May workshops, staff distributed a survey regarding potential changes to the off-road regulation, with responses requested back to staff by June 1, 2010. The survey

sought feedback on different approaches, such as options in delaying the regulation, various levels of increasing the number of hours for the definition of low use, rolling back turnover/retrofit requirements and any other comments fleets may have on amending the regulation. The questions asked as well as a summary of responses to each question can be found in Appendix C.

In addition to the workshops, staff held numerous meetings with individual fleets, industry associations, and environmental groups. Also, on March 29, 2010, staff solicited input on the proposed off-road amendments from the Off-road Implementation Advisory Group (ORIAG). ORIAG is an informal committee whose goal is to help ARB staff fine tune outreach, training, and implementation materials and help make ARB staff more aware of the needs and opinions of affected stakeholders.

Staff considered all comments and recommendations received from various stakeholders and crafted the final proposed amendments to address the concerns that were expressed.

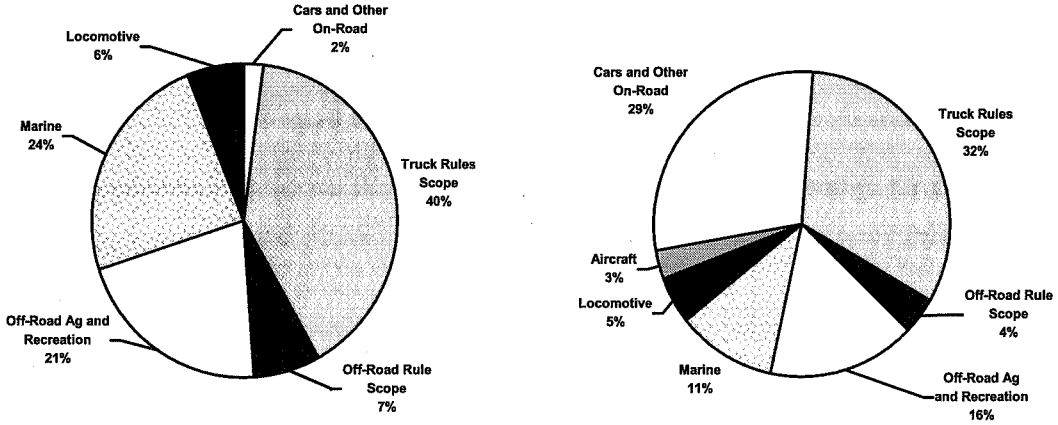
III. NEED FOR EMISSION REDUCTIONS

The emission reductions anticipated from the regulations are needed from a public health standpoint and to allow the state to meet its near and mid-term SIP commitments required by the CAA. They reduce public exposure to directly-emitted toxic PM and reduce atmospheric PM2.5 and ozone.

A. Emissions from Off-Road Vehicles

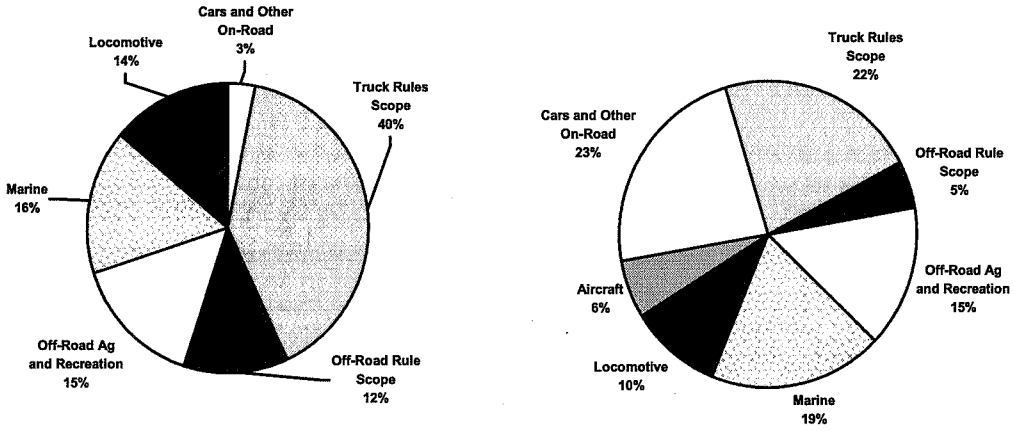
As shown in the Figures 4 and 5 below, the vehicles covered by the off-road regulation are a significant source of diesel PM and NOx emissions that lead to ozone and ambient PM; off-road vehicles covered by the LSI fleet regulation are also a significant source of NOx emissions. Despite the major economic recession and revisions to the off-road regulation inventory, the in-use off-road diesel vehicle category remains an important source of emissions. In 2010, staff estimates the off-road vehicles subject to the off-road regulation are the 4th largest source of diesel PM in California (7 percent of total) and the 6th largest source of NOx from all sources (4 percent of total).

Figure 4: Off-Road Contribution to 2010 Statewide Mobile Source Emissions (Particulate Matter and NOx without Regulations)



As shown in Figure 5 below without the off-road and LSI fleet regulations, in 2020 the emission impact of off-road vehicles within the scope of the off-road and LSI fleet regulations would remain significant.

Figure 5: Off-Road Contribution to 2020 Statewide Mobile Source Emissions (Particulate Matter and NOx without Regulations)



PM Emissions **NOx Emissions**

Diesel PM also contributes to ambient concentrations of fine particulate matter (PM2.5), which is associated with premature mortality, aggravation of respiratory and cardiovascular disease, asthma exacerbation, chronic and acute bronchitis and reductions in lung function.

NOx leads to formation in the atmosphere of ozone and PM2.5. Ozone is a powerful oxidant, and exposure to ozone can result in reduced lung function, increased respiratory symptoms, increased airway hyper-reactivity, and increased airway inflammation. Exposure to ozone is also associated with premature death, hospitalization for cardiopulmonary causes, and emergency room visits for asthma.

To put the air quality impacts discussed later in context, the uncontrolled annual statewide emissions from vehicles subject to the off-road regulation are shown below in Table 4. Note that these emission estimates are significantly lower than those presented in the Technical Support Document (TSD) for the original off-road rulemaking in 2007 or previous staff reports, due to the recession and updated emissions inventory data, as summarized in Chapter II and discussed in Appendix D (ARB, 2007b).

Table 4: Annual NOx and PM Emissions from Off-Road Diesel Vehicles in California without the Regulation (tpd)

Baseline Emissions[2]	2011	2014	2017	2023
NOx Emissions	73	76	77	52
PM Emissions	3.7	3.9	3.9	2.4

[2] Baseline emissions are the emissions that would occur without a regulation in place.

1. Updates to off-road emissions inventory

During the development of the off-road regulation in 2005-2007, staff used a wide range of industry reports and studies as well as ARB surveys to update the emissions inventory. The original emissions inventory used to support the off-road regulation relied on the standard technique used by both the U.S. EPA and ARB, which calculates emissions as the product of the number of equipment (population), the size of the equipment (horsepower), the age of the equipment (model year distribution), how often the equipment works (annual hours of use), how hard the equipment works (load factor), and emission rates per unit power (emission factors). Staff used ARB's off-road emissions inventory model, called OFFROAD, to estimate emissions.

Estimating emissions from off-road equipment is challenging. Historically there has been no registration program for off-road equipment and so population must be estimated. Data on annual hours of use and load factor by equipment type are sparse and based upon industry funded studies that were not designed for emissions inventory purposes. In updating the inventory for the off-road regulation, staff focused on developing refined data representing population, hours of use, and other factors for input to the model. Data sources included:

- MacKay and Company Construction Equipment Universe Study (2003)
- ARB Off-Road Equipment Surveys (2005 and 2006)
- TIAX Public Fleet Survey (2003)
- Power Systems Research (2000 and 1996)
- Other data sources provided by industry stakeholders

Through the regulatory development process inventory updates were presented in workshops to solicit industry input. Stakeholders provided their input and in some cases provided additional information. When the workshop process was completed, staff finalized the original emissions inventory. In July 2007, the Board approved the off-road regulation for adoption.

Since the original emissions inventory was completed in 2007, conditions in the construction industry have changed dramatically. The subsequent economic recession was the most severe since the Great Depression, and had a devastating impact on the construction industry in California. Staff estimates that between 2005 and 2010 construction emissions dropped by more than 50 percent because of reduced demand for construction services caused by the recession. The recession has also caused significant declines in emission from other emissions categories, such as industrial off-road equipment and aircraft ground support equipment over the same time period.

In 2009 industry stakeholders pointed out a study by Millstein and Harley (2009) that used a fuel-based method to assess construction equipment emissions and found that ARB's inventory was significantly overestimated. Industry also pointed out that a similar study, which focused on all off-road equipment nationally, was published in 2000 by Kean, Sawyer and Harley and found similar results. Both of these studies used a fuel-based approach to estimate emissions. The fuel-based approach estimates emissions based on fuel usage in a broad array of equipment, using fuel-based emission factors.

The approach is simpler and often favored by academic researchers but is not used to support regulatory development because the method cannot relate emissions or reductions to specific equipment types or to a population of equipment directly. Such information is necessary for the rulemaking process.

In the past staff has been concerned about the accuracy of the fuel-based approach. While total off-road (red-dye) diesel fuel sales information in California is known, the breakdown of fuels among the different sources such as locomotives, construction equipment, industrial equipment, stationary and portable equipment, marine vessels, commercial harbor craft, cargo handling equipment, and other categories is not measured. The federal Energy Information Administration publishes estimates of fuel usage in broad categories of off-road equipment through their Annual Energy Outlook; these estimates are based on confidential surveys. Staff believes fuel use estimates should inform, but not be the basis for category-specific emissions estimates.

The Board's request coupled with the Millstein and Harley study caused ARB staff to go back and conduct a comprehensive review of the inventory. Staff evaluated new sources of information that were not available when the off-road regulation was developed, and updated the emissions inventory to reflect these new data as well as the impact of the recession. Staff made several updates:

- Population: The regulation, as initially adopted, required reporting to ARB of all off-road equipment subject to the regulation. This allowed staff to use the actual population of equipment, rather than estimates in the inventory. The total population estimate in 2009 was 26 percent lower than anticipated in 2007, largely due to fleet downsizing during the recession.
- Hours of Use: AB 8 2X regulatory amendments allowed fleets to report 2007 and 2009 activity to obtain credits towards meeting regulatory obligations. About 10 percent of regulated vehicles reported this information. Staff originally thought 2007 was a relatively average year for construction, so staff expected data to be consistent with estimates from MacKay (2003) that were used in the 2007 inventory. Instead, new data by equipment type were in most cases at least 30 percent lower than staff expected, and in some cases more than 50 percent lower. For example, staff assumed backhoes worked on average 942 hours per year; new data suggested the average was 512 hours per year. Staff evaluated the new information against a recent, albeit limited study conducted by a consultant and the results were generally consistent, so staff used the AB 8 2X data. The 2009 activity was lower than 2007 due to the recession.
- Load Factor: Load factor is a measure of how hard an engine works, and is expressed as a percent of total horsepower of an engine. Previous estimates from Power Systems Research (1996; 2000) were in the 60 percent range for many equipment types. In 2008 and 2009 several academic studies focused on testing construction equipment in real-world applications were completed. Additionally in 2010 staff received some data from engine manufacturers. While data varied across equipment types, overall staff's analysis suggested load factors should be reduced by 33 percent; however, staff is continuing to pursue additional information in this area.

- Growth Forecasts: Staff's previous growth forecasts used historical employment as a surrogate, and forecasted growth from historical trends. In 2007 staff did not anticipate the recession. After looking at many different indicators, from construction Gross Domestic Product (GDP) and employment to estimated construction fuel use, staff determined that in 2009 construction activity had decreased by 50 percent relative to 2005. Staff then reviewed economic forecasts by the University of California at Los Angeles (UCLA), University of the Pacific (UOP), the Department of Finance (DOF), the United States Congressional Budget Office, and others. Because future emissions will be a function of the shape of the economic recovery and that shape is not known, staff developed a bounding-scenario of a fast recovery (return to trend in 2017) and a slow recovery (historically average growth from the recession trough) and averaged the two. Because of the recession, staff's future growth forecasts were substantially revised.

As a result of this work, the revised emissions are substantially lower than previously estimated. About half of this reduction can be attributed to the recession, and about half to updated assumptions independent of the recession. Table 5 compares the 2007 and current inventories. Table 6 compares estimated fuel use in the 2007 inventory to the current inventory and industry estimates.

Table 5: Comparison of 2007 Off-Road Regulation and Current Emissions Estimates

Calendar Year	2007 Inventory (tons/day)		Current Inventory (tons/day)	
	PM2.5	NOx	PM2.5	NOx
2009	18.5	358	3.7	79
2014	13.1	272	3.6	76
2023	5.1	136	2.2	52

Table 6: 2009 Estimated Fuel Use (Million Gallons of Diesel Fuel): ARB vs. Industry

2007 Inventory	Current Inventory	Industry Estimates
990	219	160 to 186

Staff has more confidence in the inventory estimates today than in 2007 because staff has access to new input data provided directly by California fleets that wasn't available at the time of the original rulemaking. Fuel consumption now agrees more closely to other fuel based estimates.

B. National Ambient Air Quality Standards

1. SIP commitments

The U.S. EPA has established health protective NAAQS for a number of criteria pollutants, including PM2.5 and ozone. States with areas that do not meet these

standards must develop SIPs and adopt regulations to meet the standards by certain deadlines. Figure 6 and Figure 7 below show the nonattainment areas in California for PM and Ozone, respectively. Two air basins in California in particular – the South Coast Air Basin and the San Joaquin Valley Air Basin – are in nonattainment for both PM2.5 and the 8-hour ozone standard.

Figure 6: California Nonattainment Areas for PM2.5

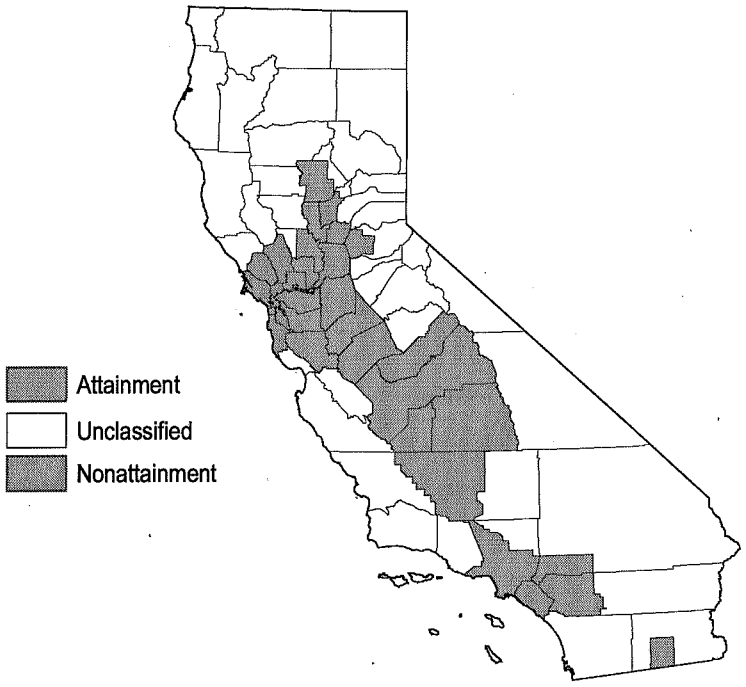
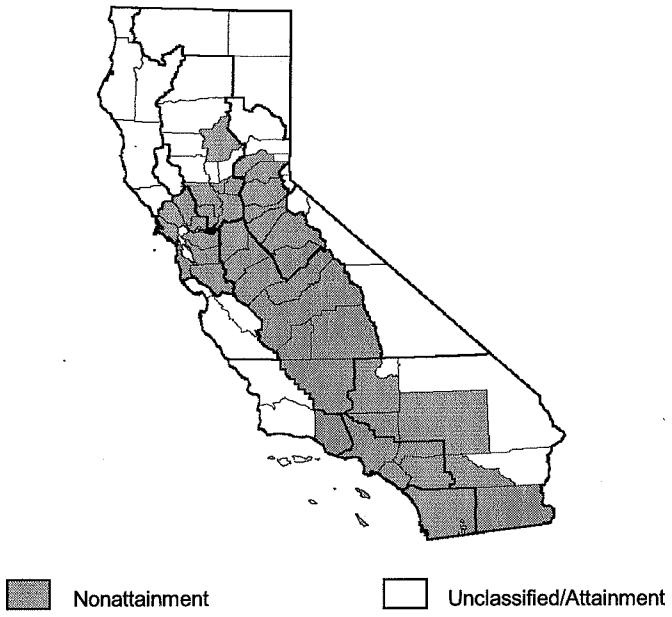


Figure 7: California Nonattainment Areas for Ozone



Overall, to meet the PM2.5 standard in the South Coast and the San Joaquin Valley Air Basins, NOx emissions must be reduced by approximately 50 percent. Even greater reductions of NOx, on the order of 75 to 88 percent, will be needed to achieve the 8-hour ozone standard in the by 2023. Despite the fact that emissions in future years are expected to be lower than originally anticipated when the regulations were adopted, substantial emissions reductions from trucks and buses are still needed by 2014 to meet the PM2.5 attainment deadline and by 2023 to meet the 8-hour ozone attainment deadline.

California's 2003 South Coast SIP contained two measures for off-road LSI equipment that represented a commitment of 2.8-6.0 tons per day in 2010 and 1.5-5.1 tons per day in 2020. The 2006 LSI rulemaking commits to reduce HC+NOx emissions from LSI equipment by 2.6 and 2.9 tons per day in the South Coast in 2010 and 2020, respectively (ARB, 2006a).

California's 2007 SIP included the off-road regulation as a control measure. ARB's legal commitment to achieve the emission reductions laid out in the SIP relies upon the emission reductions from the regulation by 2014 in the South Coast and the San Joaquin Valley (ARB, 2007c). If the off-road regulation falls short of achieving these reductions, the shortfall would need to be achieved by other control measures.

2. Meeting SIP Target

In directing staff to propose changes to the Truck and Bus and off-road regulations together, the Board directed staff to also consider the impact of the recession and

inventory changes on fleets affected by these regulations in deciding how to provide appropriate regulatory relief. This was intended to ensure emissions reductions could be targeted most cost effectively, and the combined emissions benefits achieved by the two rules would continue to meet SIP requirements.

To assess progress towards meeting the emission reduction obligations in the SIP, staff evaluated whether the lower emissions from the revised inventories for both trucks and off-road vehicles, combined with the effects of the recession, provided greater emission reductions than were expected. Any excess emission reductions achieved are referred to as an emission margin. The margin defines how much relief can be provided under the regulations while still meeting the legal emission reduction requirements of the SIP.

To allow for a comparison of different pollutants (PM and NOx), the margin is calculated, by air basin, in NOx equivalent emissions, since both pollutants contribute to ambient levels of PM2.5 levels in the atmosphere. Table 7 below shows the emission margin for the South Coast and San Joaquin Valley Air Basins for 2014, which is the attainment date for these two air basins to meet federal PM2.5 standards. As can be seen, based on this analysis, it is feasible to provide regulatory relief to affected fleets while still meeting all SIP obligations, so long as these emission margins are not exceeded.

Table 7: Emissions are Less Than the 2014 SIP Target – Existing Truck and Bus and Off-Road Regulations, Including Recession

Air Basin	Equivalent Tons of NOx Below Combined SIP Target
South Coast	62
San Joaquin Valley	40

C. PM Emissions and Mortality

The U.S. EPA recently published a review of the PM-related health science literature in the Integrated Science Assessment, which is the first part of the ongoing review of the national ambient air quality standards for PM (U.S. EPA, 2009). Based on the overall evidence from the more than one thousand peer-reviewed publications of PM2.5 exposure in humans, animals, and cells, the U.S. EPA concluded that long-term exposure to PM2.5 exposure is causally associated with premature mortality, and that premature deaths caused by PM2.5 occur at levels as low as 5.8 micrograms per cubic meter, which is considerably lower than the current national standard of 15 micrograms per cubic meter. A causal relationship means it has the highest scientific level of certainty in its ability to contribute to premature death. This report was peer reviewed through a public process by the Clean Air Scientific Advisory Committee Particulate Matter Review Panel, an independent body of 24 national scientists.

The U.S. EPA risk assessment methodology, the basis for ARB's calculation, was developed to estimate premature deaths associated with PM2.5 exposure across the nation. This report was also peer reviewed through a public process by the Clean Air

Scientific Advisory Committee Particulate Matter Review Panel. The relationship between premature death and PM2.5 relies on a new comprehensive study of about 500,000 participants in 116 U.S. cities (Krewski et al., 2009). Besides the large representative study population, the U.S. EPA concluded this study has significant advantages over other epidemiological studies of the relationship between PM2.5 and premature death. These include the use of more recent measured PM2.5 air quality data, more individual lifestyle information to allow for consideration of potential confounding (compared to other cohort studies), and rigorous statistical methods. Using this relationship, the U.S. EPA conducted a national-scale analysis and a more limited risk assessment, which was focused on 15 urban study areas, including Fresno and Los Angeles (U.S. EPA, 2010).

Based on this work, the U.S. EPA estimates that about 63,000 to 80,000 premature deaths each year in the United States are related to PM2.5. Using the same methodology, ARB staff estimated that 9,200 (7,300-11,000, 95 percent confidence interval) of these deaths occur annually in California, and that reducing emissions to meet the Federal standard would result in 2,700 fewer premature deaths annually. Reducing PM emissions further would provide an additional reduction in the number of premature deaths.

D. Localized Risk

Diesel PM as a component of ambient PM2.5 is a significant public health concern throughout the state. Additionally, in August 1998, the ARB identified PM emissions from diesel-fueled engines as toxic air contaminants. It is, by far, the largest contributor of known ambient air toxics cancer risk in California (ARB, 2009b).

Following the identification process, the ARB developed the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan) in September 2000, paving the way for the development of control measures designed to reduce toxic diesel PM emissions. Through this plan staff identified strategies, including air toxics control measures and other regulations, to reduce diesel emissions by 75 percent by 2010, and by 85 percent by 2020. The goal of each regulation is to make diesel engines as clean as possible to reduce emissions and their associated cancer risk. The off-road regulation is a critical piece of the Diesel Risk Reduction Plan, as is evidenced by the significant emissions of diesel PM from the vehicles subject to this regulation. Failure to obtain substantial reductions in diesel PM from off-road diesel vehicles will likely mean the overall goals of the Diesel Risk Reduction Plan will not be met.

IV. PROPOSED AMENDMENTS TO THE OFF-ROAD REGULATION

This chapter describes the proposed changes to the off-road regulation. As described further in the sections below, amendments to the regulation are necessary and appropriate for the following reasons: (1) under current economic conditions, fleets subject to the regulation need economic relief from the cost of compliance, (2) emissions from off-road diesel vehicles are significantly lower than previously estimated due to the recession and new data and inventory methodology changes, and (3) based on feedback from affected fleets and ARB implementation staff, a number of other regulation provisions require clarification or streamlining.

A. Existing Regulation

1. Overview

The scope of the off-road regulation is far reaching; affecting vehicles of dozens of types used in thousands of fleets, in industries as diverse as construction, air travel, manufacturing, landscaping, and ski resorts, as well as public agencies. The off-road regulation affects, among others, the warehouse with one diesel forklift, the landscaper with a fleet of a dozen diesel mowers, the county that maintains rural roads, the landfill with a fleet of dozers, as well as the large construction firm or government fleet with hundreds of diesel loaders, graders, scrapers, and rollers. To punctuate the scope of the regulation, as of September 20, 2010, over 8,800 fleets had reported over 150,000 off-road vehicles to the Diesel Off-Road Online Reporting System (DOORS), the electronic reporting system for the regulation (DOORS, 2010).

The off-road regulation's requirements vary depending on the size of the fleet and on the vintage of its vehicles. Fleets are defined in the off-road regulation as small, medium, or large based on their total statewide horsepower (hp). The off-road regulation requires that the largest fleets, which have the most significant emissions, meet the most stringent requirements. The smallest fleets, and local municipal fleets located in low-population counties, are required to meet less stringent provisions.

2. Enforcement delay of off-road regulation

California may adopt and enforce emission standards and other requirements for off-road engines and equipment not expressly subject to federal preemption so long as California applies for and receives authorization from the Administrator of U.S. EPA. California's request for authorization was submitted on August 12, 2008. On October 27, 2008, and April 14, 2010, the U.S. EPA conducted hearings regarding California's request for authorization for the off-road regulation. However, the request for authorization is still pending.

In response to the continuing effects of the economy and because the U.S. EPA had not granted California's request for authorization, the ARB Executive Officer issued a regulatory advisory on February 11, 2010. The advisory notified stakeholders that ARB will not be enforcing the NOx and PM requirements of the regulation, pending further

notice (ARB 2009c). The reporting, labeling, idling and disclosure requirements remain in effect, however, because they do not require federal authorization.

B. Proposed Amendments to the Off-Road Regulation

As described in Chapter II, the recession and an updated inventory assessment provided both cause and means to lower the requirements and costs of the regulation. In selecting the provisions of the off-road regulation to modify, staff considered direction from the Board (see Chapter I), input from stakeholders and the ORIAG, and the results of emissions and cost modeling. Staff also worked with representatives from the Associated General Contractors of America (AGC), to develop several proposed amendments (ARB, 2010a), including:

- Delay start of requirements until January 1, 2014;
- Increase the number of "low-use" equipment exempted;
- Provide simpler compliance options for the smallest fleets;
- Extend benefits for businesses that comply before their deadline; and
- Lower annual requirements to clean up engines.

Staff developed the following package of proposed amendments to balance a number of considerations, including the wide range of industry, public health, and the legal requirements of the state to meet air quality standards. In developing the proposed amendments, staff considered numerous alternatives to this proposal, as discussed further in Chapter VIII.

A summary of the proposed amendments includes:

- The regulation would place annual requirements on fleets over the following timeline:
  - Large fleets: 2014 to 2024
  - Medium fleets: 2017 to 2027
  - Small fleets: 2019 to 2029
- In each compliance year, fleets (of all sizes) would be required to meet an adjusted fleet average target, or complete a single set of Best Available Control Technology (BACT) requirements;
- Annual BACT requirements would consist of turning over **or** retrofitting 8 to 10 percent of the fleet's horsepower (4.8 percent for large fleets in 2014);
- Extend double credit period for fleets choosing to retrofit;
- Vehicles under 200 hours of use annually would be defined as low-use and therefore largely be exempt from the regulation's requirements;
- Provide credit for reduced fleet horsepower from 2010 to 2011;
- Simplify compliance path for fleets under 500 horsepower; and
- Increase turn-over requirements in the later years of the regulation.

Background on each amendment is provided below, and each is described in further detail.

1. Major Amendments

Below is a summary of the proposed major amendments.

a) *Delay Implementation for Four Years*

Proposed Change: 2449.1(a)(1)(A)(1) and 2449.1(a)(2)(A)(1): Staff proposes to move the start date of the regulation back four years for all fleets.

- The first requirements for large fleets would be moved from 2010 to 2014, medium fleets from 2013 to 2017, and small fleets from 2015 to 2019.
- All requirements would be required by January 1 of the calendar (i.e. large fleets 2014 requirements would be required by January 1, 2014), instead of March 1.
- Credits that expire (i.e. reduced activity credits) would not be extended
- Reduced horsepower credits would be reduced by half, and fleets could not use such credits to meet the 2014 requirements.
- Fleets would maintain credit for repowers and retrofits until that credit is used to meet the BACT requirements.

b) *Combined PM and NOx Fleet Averages and BACT Requirements*

Proposed Change: 2449.1 and 2449.2: Staff proposes to combine the PM and NOx fleet averages and BACT requirements as described below:

- The combined BACT requirements would require actions on 8 to 10 percent of a fleet's horsepower in each year that a fleet does not meet the fleet average target (or 4.8 percent in 2014).
- A fleet would receive credit toward the BACT requirements for both retrofits and turnover.
- To determine whether it is required to comply with the BACT requirements, a fleet would compare its fleet average index to its fleet average target rate. The index would be based on a fleet's NOx fleet average, adjusted to reflect verified diesel emission control strategies (VDECS), including those that only reduce PM.

All fleets would have the following compliance options for meeting the proposed combined BACT requirements:

- Replace older vehicles with new or used vehicles;
- Replace diesel vehicles with electric or alternative fuel vehicles;
- Repower older engines with Tier 2 or higher engines;
- Retire vehicles from the fleet;
- Designate vehicles as permanent low-use; or
- Install VDECS.

c) *Extend Double Retrofit Credit Period*

Proposed Change: 2449.1(a)(2)(A)2.iii: Staff proposes to extend the period during which a fleet may receive double credit for the installation of a VDECS until 12 months

prior to the initial compliance deadline for all fleet sizes. Table 8 below lists the proposed deadlines for double credit for all fleet sizes, and for comparison the current deadlines for all fleet sizes.

Table 8: Existing and Proposed VDECS Double Credit Deadlines

Fleet Size	Current Double Credit Deadline	Proposed Double Credit Deadline
Large	January 1, 2010	January 1, 2013
Medium	March 1, 2012	January 1, 2016
Small	March 1, 2012	January 1, 2018

d) *Increase Low-Use Threshold*

Proposed Change: 2449.1(a)(2)(A)7: Staff proposes to increase the low-use threshold for both permanent low-use vehicles and year-to-year vehicles from 100 hours annually to 200 hours annually. This proposed change would impact both year-by-year low use vehicles and those designated as permanently low use (further discussion of low-use vehicles can be found in Appendix E)

e) *Provide Credit for Reduced Fleet Horsepower from 2010 to 2011*

Proposed Change: 2449.1(a)(2)(A)2.iv: Staff proposes to award credit toward the BACT requirements for fleets that reduce horsepower from March 1, 2010, to March 1, 2011, for retirements that comply with the order of turnover requirements. Fleets would receive credit toward the new combined BACT requirements in an amount equal to the total reduction of fleet horsepower from March 1, 2010, to March 1, 2011, or for the reduction in horsepower from Tier 0 and Tier 1 vehicles during that period, whichever is lower.

f) *Delay Requirements for Fleets That Complied in 2010*

Proposed Change: Staff proposes to remove the 2014 requirements for large fleets that came into compliance with the regulation's performance requirements by March 1, 2010. This provision would recognize the effort of fleets that met the 2010 fleet averages or accumulated enough credits to meet the March 1, 2010, BACT requirements. Such fleets would not be required to meet the 2014 fleet average or use their credits to comply with the BACT requirements in 2014 (therefore preserving their credits to be used in later years).

g) *Delay of Turnover for Tier 2 Vehicles*

Proposed Change: Staff proposes to exempt all Tier 2 vehicle or newer vehicles from the January 1, 2014 and January 1, 2015 compliance requirements for large fleets. That is, no fleet would be required to replace or retire a Tier 2 vehicle until the compliance year beginning January 1, 2015, and ending December 31, 2015, if it was necessary to meet the January 1, 2016 requirements. This provision would extend the similar principle the regulation current provides in delaying Tier 1 turnover until March 1,

2013, but would apply to Tier 2 or higher vehicles. By January 1, 2016, Tier 2 vehicles will be up to 15 years old (depending on horsepower category).

h) *Simpler Compliance Path for Fleets Under 500 Horsepower*

Proposed Change: 2449(e)(17): Staff proposes to allow fleets with under 500 horsepower to choose to comply with the regulation by phasing out their Tier 0 and Tier 1 vehicles. This phase-out would not be required, and these fleets could instead opt to meet the fleet average requirements or the BACT requirements. The phase-out schedule proposed is shown in Table 9.

Table 9: Compliance Option for Fleets Under 500 Horsepower

Compliance Date January 1 of Year	Percent of Fleet (by horsepower) Which Must Have a Tier 2 or Higher Engine
2019	25
2022	50
2026	75
2029	100

i) *More Stringent Fleet Average Targets Through 2023*

Proposed Change: 2449.1(a)(1)(A)(1): Staff proposes to increase the stringency of the fleet average targets, such that fleets are required to turn over to additional Tier 4i and/or Tier 4 vehicles from in 2022 and 2023. For vehicles over 175 horsepower and below 750 horsepower, the NOx fleet average currently end (in 2020) at levels slightly less stringent that the Tier 4i standard for off-road vehicles. These targets would be lowered to match the Tier 4i emissions standard by 2023. For vehicles between 75 and 175 horsepower, where vehicle life is generally lower and turnover is less costly, the final fleet average targets will be placed between Tier 4i and Tier 4 final emission standards.

Overall, this change would increase the amount of Tier 4i and Tier 4 vehicles required to comply with the regulation by 2023. The current and proposed final fleet averages are shown below in Table 10.

Table 10: Current and Proposed: Final Fleet Average Targets by Horsepower (Hp) Bin

Fleet Average Targets	25-49 Hp	50-74 Hp	75-99 Hp	100-174 Hp	175-299 Hp	300-599 Hp	600-750 Hp	Over 750 Hp
Current 2020 NOx Targets	3.5	3.2	2.4	2.2	1.9	1.9	1.9	3.4
Proposed 2023 Final Targets	3.3	3.0	1.4	1.3	1.5	1.5	1.5	3.4

Staff will continue to evaluate the fleet average targets for the middle years of the off-road regulation, and may make adjustments to further smooth out the compliance requirements.

2. *Minor amendments*

Staff is also proposing several minor modifications or clarifications to the regulations, which are not expected to significantly alter the emissions reductions or total costs expected from the regulation when initially adopted. These minor amendments are designed to make the off-road requirements clearer or to fix inconsistencies discovered during the beginning stages of regulatory implementation. The changes include the following:

Remove the Word "Should" - Remove all instances of the word "should" throughout the regulation, and replace the word with "shall".

Captive Attainment Area Fleet Definition - Modify the definition to designate these fleets as small fleets, regardless of their total horsepower.

Clarify Low Use Definition - Explicitly identify the two types of low-use within the regulation (year-by-year low use, and permanent low-use).

Modify Post-2007 Flexibility Engine Provisions - Modify the reporting requirements for Post-2007 flexibility engines. Although these engines will now be treated as if they were not "flexed", reporting is still required.

Alternative Fuel and Hybrid Provisions - Remove electric vehicle horsepower from the fleet's total horsepower calculation and from all BACT calculations; this change would incentivize the use of hybrid off-road vehicles by allowing fleets to use a lower emission factor(s) for hybrid equipment used in a fleet.

Remove Hours in Fleet Average Provision – Delete this provision since no fleets have taken advantage of it.

New Fleet Requirements - Clarify that upon a new fleet purchasing vehicles or bringing vehicles into the state for the first time, a fleet must meet the following requirements:

- *Large or Medium fleets:* Require a large or medium fleet to meet the fleet average target for the closest future *large fleet* compliance date upon initial formation or upon entrance into the state after the effective date of the proposed amendments.
- *Small fleet:* Require a new small fleet to meet the fleet average target for the closest future small fleet compliance date upon initial formation or upon entrance into the state after the effective date of the proposed amendments.

For any size fleet, the new fleet would have the choice of meeting either the fleet average target or the BACT requirements for subsequent compliance dates.

Adding Vehicle Requirements - Amend this provision to require that:

- A ban on adding vehicles with Tier 0 engines to any fleet would begin only after:

  - The proposed amendments to the off-road regulation are certified by the Secretary of State; and
  - The Administrator of the U.S. EPA grants authorization to enforce the off-road regulation.
- Beginning March 1, 2011, large and medium fleets would be allowed to add only vehicles with Tier 2 or higher engines, except as follows. A vehicle with a Tier 1 engine could still be added during this time, as long as all the following conditions are met:
  - The added vehicle with the Tier 1 engine must have been registered in DOORS before March 1, 2011;
  - The fleet adding the vehicle with the Tier 1 engine must be registered in DOORS; and
  - The fleet removing the vehicle with the Tier 1 engine must be registered in DOORS.
- Without exception, beginning January 1, 2013, large and medium fleets would be allowed to add only vehicles with Tier 2 or higher engines; beginning January 1, 2016, the restrictions would apply to small fleets; and
- Beginning January 1, 2018, large and medium fleets would be allowed to add only vehicles with Tier 3 or higher engines; beginning January 1, 2023, the restrictions would apply to small fleets.

These revised requirements would apply to all fleets (regardless of compliance path) and to all horsepower categories, providing additional clarity and simplification to the regulation.

Compliance after the Final Target Date - Clarify that the turnover and retrofit exemptions do not expire after the final compliance date.

Reporting Dates - Change the reporting dates to make them more consistent with the changes and delays to the compliance dates.

Labeling - Require equipment identification numbers (EINs) on both sides of a vehicle, instead of just on the right (starboard) side. Additionally, staff is proposing to require captive attainment area fleets to label their vehicles with EINs that are green with white letters (instead of red with white letters) if they choose to take advantage of the captive attainment area fleet provision. Staff is proposing to provide fleets with two years (until January 1, 2013) to make these labeling changes.

Compliance Certification Process – Clarify this provision by re-naming process "Responsible Official Affirmation of Reporting".

Order of Turnover - Simplify the order of turnover provisions by requiring fleets to turn over all Tier 0 and Tier 1 vehicles before counting other higher tiered vehicles in meeting the fleet's BACT requirements.

15 Percent Turnover Exemption – Extend this provision from March 1, 2011 to January 1, 2013, and clarify that if a fleet has more than 15 percent of its vehicles retrofitted before then, the fleet may choose any of those vehicles to be counted under this exemption, as long as the 15 percent cap is not exceeded; and clarify that a fleet must keep the VDECS on the vehicles with this exemption in order to maintain the exemption.

SOON targets - Adjust the SOON targets to reflect the delay in implementation and fleet average tightening in later years.

3. Impacts of Amendments on an Actual Fleet

Staff evaluated the impact of the proposed amendments on a variety of fleets of different sizes and ages. An example is shown below. This actual fleet has 490 vehicles with a combined 29,000 horsepower and an average vehicle age of 12 years.

The annual retrofit and turnover requirements under the existing regulation and the proposed amendments are shown below in Figure 8 and Figure 9, respectively.

Figure 8: Annual Retrofit Requirements under the Current Regulation and Proposed Amendments

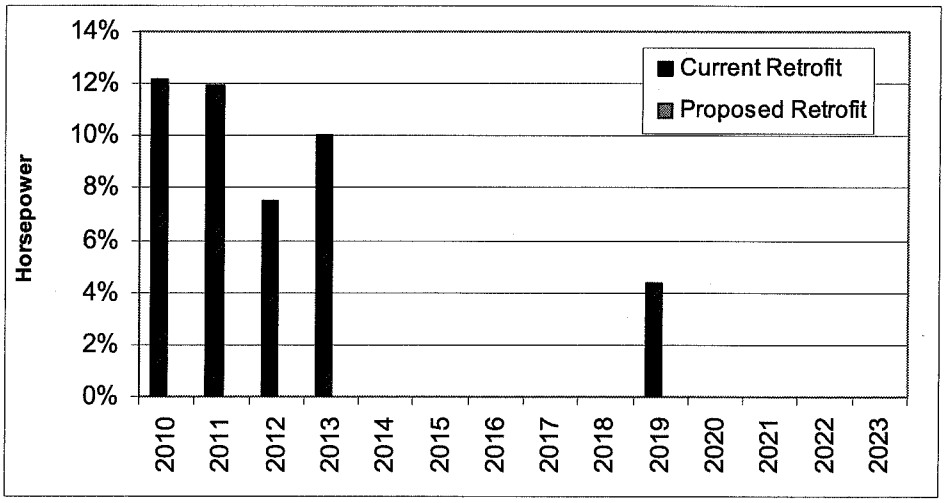
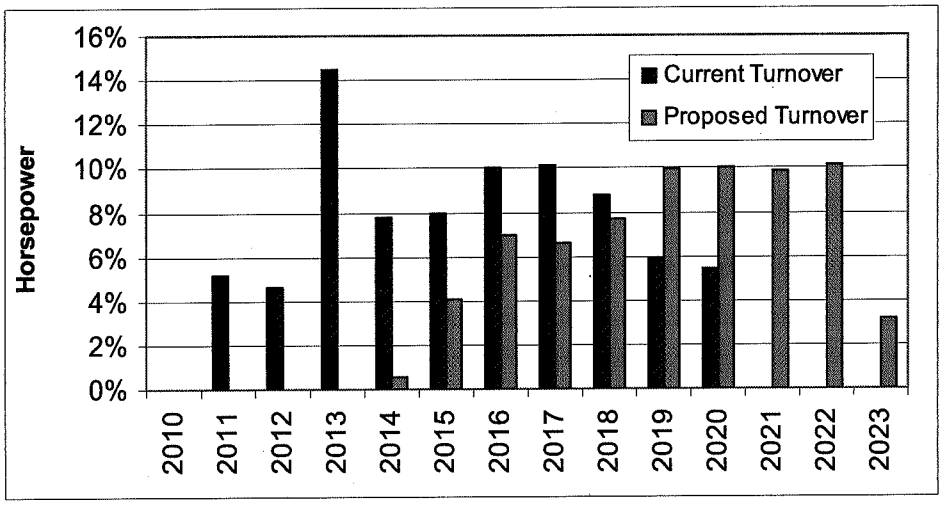


Figure 9: Annual Turnover Requirements under the Current Regulation and Proposed Amendments



The current regulation would require this actual fleet to turn over approximately 80 percent of its overall fleet horsepower from 2010 to 2020, and retrofit 30 percent of its horsepower, primarily between 2010 and 2013. After the proposed amendments, this fleet could comply by turning over 70 percent of its horsepower between 2014 to 2024, and not retrofitting any vehicles. As shown above, the proposed amendments allow for both a delay and reduction in compliance requirements, which will provide significant economic relief for those fleets subject to the regulation.

C. Impact of Proposed Changes on Funding Opportunities

Incentive funding programs play a complementary role to the state's regulatory emission reduction programs to help meet the state's SIP requirements and achieve California's air quality goals by funding projects that achieve early and extra (surplus) emission reductions. ARB oversees two incentive funding programs that allow off-road fleets to obtain funding to help meet future compliance requirements: the Carl Moyer Program and the off-road loan assistance program funded through the federal American Recovery and Reinvestment Act of 2009.

1. Program overview

Funding through the Carl Moyer Program is currently available for the replacement, retrofit, or repower of off-road vehicles to provide early and extra reductions to the regulatory requirements. These reductions are referred to as surplus. Eligibility depends on several factors, including fleet size, hours of usage, and the type of reduced emission technology. The regulation compliance deadlines affect eligibility by defining the end of the surplus emission reduction period. In general, the proposed regulatory changes will enable greater funding opportunities by allowing more time for applicants to apply for funding before compliance dates.

Staff is continuing to evaluate how the proposed amendments will affect available incentive funding opportunities, and will present a summary of potential incentive impacts when the Board considers the proposed regulatory changes in December, 2010. Staff will incorporate public comments and Board direction into planned revisions to the Carl Moyer Program that are currently scheduled to be considered by the Board in the spring of 2011. One change to the current Moyer program that staff has already identified would reduce the minimum project life for small fleets. The Carl Moyer Program currently requires a minimum three year project life which means that incentive funds cannot be used to pay for equipment that is less than three years from its compliance deadline. Staff intends to propose decreasing this requirement to two years for small off-road fleets, as has already been done for small on-road fleets.

The off-road loan assistance program, implemented in partnership with the California Air Pollution Control Financing Authority (CPCFA), is a component of the ARB's comprehensive Providing Loan Assistance to California Equipment (PLACE) program. The PLACE program is designed to assist small businesses in obtaining competitive-rate financing to purchase eligible vehicles and equipment to achieve early regulatory compliance. Through a one-time $5 million award from the U.S. EPA, the off-road loan assistance program utilizes the structure of CPCFA's highly successful loan guarantee California Capital Access Program to enable participating commercial lenders to provide affordable loans to borrowers that otherwise may not qualify for conventional financing. Borrowers then use the loan proceeds to upgrade their off-road equipment any time in advance of compliance deadlines. Unlike the Carl Moyer Program, eligible purchases need not occur two to three years prior to a compliance deadline.

2. Access to funding for equipment owners

Interested equipment owners can obtain more information on funding and compliance by using any of ARB's outreach tools including, the phone hotline at 866-6DIESEL (866-634-3735), or the email address at 8666diesel@arb.ca.gov

Other federal and state financial and incentive programs are administered by local agencies, so equipment owners should check with their local air quality management district for funding opportunities. Some equipment may have their own specially funded programs based on type and use.

D. New and Existing Incentives for Early Actions

Although the proposed amendments would delay the first large fleet compliance deadline until January 1, 2014, the proposal would introduce new incentives and maintain existing incentives for early actions including early retrofits, engine repowers, rebuilds, and vehicle replacement. Staff believes these incentives will help ensure continued progress toward cleaner off-road vehicles even in the years before the first compliance deadline. The new and existing incentives for early action are outlined in Table 11 and summarized below.

Table 11: Early Credit and Incentive Period Deadlines for Receiving Credit by Fleet Size

Early Credit or Incentive	Large Fleets	Medium Fleets	Small Fleets
Retrofit Double Credit (Period Ends On)	January 1, 2013	January 1, 2016	January 1, 2018
Exempt from Turnover if Retrofit	Up to January 1, 2013		
Early Credit for Repowers and Rebuilds to Higher Standard (Period Ends On)	January 1, 2013	January 1, 2016	January 1, 2018
Replacement or Retirement Over 8 Percent in a Year	January 1, 2013	January 1, 2016	January 1, 2018
Reduced Horsepower Full Credit	Between March 1, 2010 and March 1, 2011		
Reduced Horsepower Half Credit	Between March 1, 2006 and March 1, 2010		

1. Double Credit for Retrofits (Proposed Extension)

Staff's proposal would extend double credit for all retrofits installed up to 12 months prior to a fleet's first compliance deadline. Fleets would receive double BACT credit for all retrofits completed prior to the following dates:

- Large fleets: January 1, 2013;
- Medium fleets: January 1, 2016; and
- Small fleets: January 1, 2018.

Fleets can utilize credits in lieu of taking future compliance actions.

2. Turnover Exemption for Retrofit Vehicles (Proposed Extension)

Under this provision, fleets that retrofit their vehicles prior to March 1, 2011, receive a permanent exemption from turnover requirements for that vehicle, for the life of the regulation, for up to 15 percent of their horsepower. Staff is proposing to extend this date until January 1, 2013.

3. Repowers and Rebuilds (Proposed Extension)

Staff also proposes to credit fleets that repower or rebuild their engines to a Tier 2 or higher emissions standard before their initial requirements. All fleets will maintain credit

for previous repowers (including those to Tier 1 or higher completed before March 1, 2009) and rebuilds to a higher emission standard. The proposal would provide several years to accumulate additional credits for early repowers and rebuilds completed prior to the following dates:

- Large fleets will receive an additional 2 years (January 1, 2013);
- Medium fleets will receive 5 years (January 1, 2016); and
- Small fleets will receive 7 years (January 1, 2018).

4. Early Turnover (Proposed)

Fleets that choose to retire or replace their vehicles may also begin accumulating credit. To ensure that credit is only granted for turnover that exceeds normal replacement of vehicles, staff propose to credit any fleet retiring or replacing vehicles at a rate over 8 percent of a fleet's total horsepower, in any year up to the fleets initial compliance year. For 2011, this period will extend from March 1, 2011, to December 31, 2011, to avoid overlapping with the credit for fleet reductions discussed below. For all other years, the annual period will extend from January 1 to December 31. This credit is available in the following years.

- Large fleets: 2011 and 2012 (i.e., for turnover prior to January 1, 2013);
- Medium fleets: 2011 through 2016 (i.e., for turnover prior to January 1, 2016);
- Small fleets: 2011 through 2018 (i.e., for turnover prior to January 1, 2018).

For example, if a medium fleet (first requirements would due between January 1, 2016 and December 31, 2016 for the compliance deadline of January 1, 2017) replaced 16 percent of their horsepower in 2012 and then replaced 18 percent of their horsepower in 2015, the fleet would accumulate 8 percent credit from 2012 and 10 percent credit from 2015. This would allow the fleet to start with 18 percent credit, or enough to comply with their first two year of requirements.

5. Reduced Horsepower from 2010 to 2011 (Proposed)

The impact of the economic recession caused many fleets to reduce their total horsepower by selling off or scrapping equipment. To recognize this impact, and provide relief from the regulation for those fleets most impacted by the recession, staff is proposing to credit all fleets if they reduced horsepower between March 1, 2010 and March 1, 2011.

6. Reduced Horsepower from 2006 to 2010 (Proposed Modification)

The regulation currently credits fleets for the total reduction in horsepower from March 1, 2006 to March 1, 2010. This credit was adopted to provide a delayed implementation for those fleets hardest hit by the recession. However, under staff's current proposal, all fleets would have delayed requirements for 4 years. Staff still believes there is value in retaining the credit, but that it is appropriate to discount the amount of credit accumulated by fleets under this credit by 50 percent.

V. PROPOSED AMENDMENTS TO THE LSI FLEET REGULATION

This chapter summarized the proposed changes to the LSI fleet regulation.

A. Existing Regulation

The original (1998) LSI rulemaking required LSI engine manufacturers to certify their new engines to a 3.0 gram per brake horsepower-hour (g/bhp-hr) combined HC+NOx standard. The emission control requirements were phased in, in increments of 25 percent per year, beginning with the 2001 model year. Thus, by the 2004 model year, 100 percent of the new engines were emission-controlled. To achieve this standard, manufacturers relied upon the same emission control technologies used in automotive engines – three way catalytic converters, electronic fuel/air controllers, and oxygen sensors. The 3.0 g/bhp-hr standard represented a 75 percent reduction in emissions versus LSI engines with no emission controls.

The subsequent (2006) rulemaking required manufacturers to certify their new LSI engines to a 2.0 g/bhp-hr HC+NOx standard effective January 1, 2007, and a 0.6 g/bhp-hr standard effective January 1, 2010. The latter standard represents a 95 percent emission reduction versus uncontrolled LSI engines.

The 2006 rulemaking also required operators of in-use fleets to achieve specific HC+NOx fleet average emission level (FAEL) standards that become more stringent with fleet size and time. The standards are also more stringent for forklifts than they are for non-forklift LSI equipment. The stringency of the standards reflects the differences in availability of retrofit devices for the four categories of in-use LSI equipment as well as the greater ability of large fleets to incorporate zero- and near zero-emission equipment into their operations.

The new engine emission standards and test procedures apply to LSI engines used in airport ground support equipment (GSE), forklifts, generator sets, mining equipment not otherwise primarily used in the construction industry, off-highway recreational vehicles, refrigeration units less than 50 horsepower, industrial (non-road) sweeper/scrubbers, industrial tow tractors (tugs), turf care equipment, and other industrial equipment. The standards affect approximately 30 engine and equipment manufacturers.

The LSI fleet regulation applies to operators of forklifts, sweepers/scrubbers, tugs, and GSE. These vehicles are found in approximately 2,000 LSI fleets in California in industries as diverse as manufacturing, wholesale, transportation and utilities, retail, services, and construction, as well as public agencies.

B. Proposed Amendments to the LSI Fleet Regulation

As with the off-road regulation, the recession and its impact on the emissions inventory provide an opportunity to reduce the compliance requirements and costs of the regulation while retaining its overall emission benefits. In considering the provisions of the regulation to modify, staff primarily considered the extent to which large operators

have already taken measures to comply with the 2011 and 2013 FAEL standards, and identified those emission reduction measures that were the least cost effective.

Staff compiled the following amendments to address the wide range of obligations towards industry, public health, and the legal requirements of the state of California to meet air quality standards. Staff also considered alternatives to this proposal, as discussed further in Chapter VIII.

Based on its assessment, staff is proposing the following major modifications to the LSI fleet regulation:

- Modify the limited hours of use provisions; and
- Broaden compliance extension flexibility.

A summary of the regulatory requirements if the proposed amendments are approved is as follows:

- The LSI fleet regulation would continue to require medium and large fleet operators to comply with the existing 2011 and 2013 FAEL standards requirements;
- Agricultural crop preparation services fleets would continue to comply with the retrofit or lesser FAEL standard requirements;
- Operators would achieve the FAEL standards requirements through either replacement with new or used zero- or near zero-emission equipment or retrofit of late model uncontrolled equipment; and
- Small fleets would continue to be exempt.

1. Major Amendments

Below is a summary of the proposed major amendments.

a) *Modify the Limited Hours of Use Provisions*

Proposed Change: 2775.1(d)(1)(D): Staff proposes to modify the current limited hours of use (LHU) provisions to allow equipment operated no more than 200 hours per year subsequent to January 1, 2011, to be excluded from FAEL standard calculations. To ensure that the LHU provision is enforceable, the ARB intends to clarify that operators desiring to exclude equipment need to use non-resettable hour meters.

b) *Broaden Compliance Extension Flexibility*

Proposed Change: 2775.2(e)(1)(A): Staff proposes to modify the current extension provision language to allow a two-year compliance extension with provisions for an additional two years in the event of continued non-availability of retrofit kits. Administratively, section 2775.2(e)(1)(A) provides an incomplete reference to "subsections (a), (c), and (d) without stating the section. Staff proposes to clarify that the subsections are part of section 2775.1.

2. Minor amendments

Staff is also proposing other minor modifications to the LSI fleet regulation, which are intended to clarify or simplify the provisions of the LSI fleet regulation. Below is a description of these minor amendments.

Agricultural Operations Definition – Add an Agricultural Operations definition.

Airport Ground Support Equipment Definition – clarify this definition to remove the "other" category of equipment and allow operators to include electric equipment in their FAEL standards calculations only as long as the equipment performs the work equivalent of an LSI engine-powered piece of equipment.

Baseline Inventory Definition – Clarify this definition to reflect that the baseline inventory should reflect all operated equipment subject to the FAEL standards.

Boneyard Definition - Add a "boneyard" definition and modify the FAEL definition to exclude boneyard fleets.

Fleet Average Emission Level Definition –Modify the definition to:

- exclude in-field, boneyard, experimental, and retired equipment from the FAEL standards calculations,
- allow electric equipment of less than 19 kW to be included in FAEL standards calculations as long as the equipment performs, with similar efficiency, the same function as an LSI engine-powered piece of equipment subject to the standards, and
- clarify that the default emission rate for uncontrolled LSI equipment is 12.0 g/bhp-hr HC+NOx.

In-Field Equipment Definition – Add a definition for in-field equipment.

Operator Definition – Modify this definition to allow dealers some de minimis level of use of their rental and used equipment fleet vehicles without triggering the FAEL standard requirements.

Retired Equipment Definition – Add a definition for retired equipment.

Record Keeping Requirements – Modify to remove the fuel quality record-keeping requirement, and clarify the ARB's intent that the record-keeping requirement apply to each piece of LSI equipment.

VI. ENVIRONMENTAL IMPACTS

This chapter describes how the proposed amendments continue to achieve the needed emission reductions, reduce localized risk from exposure to diesel PM, reduce impacts of diesel engine emissions on mortality and other health effects and meet SIP commitments to meet federal air quality standards.

A. Legal Requirements

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. The legal requirements applicable to the environmental impact analysis are the same as those presented in the original off-road TSD (ARB, 2007b). Please see Chapter IX of the off-road TSD for a description of these requirements.

The results of the environmental impact analysis for the proposed regulation amendments are discussed in the sections below. Alternatives to the proposed amendments, including a comparison of emissions benefits, are discussed in Chapter VIII.

B. Air Quality Impacts of Proposed Off-Road Regulation Amendments

Because of the recession and revisions to the emissions inventory, revised emissions estimates are significantly lower than estimated in 2007. However, despite these reduced emissions, further emission reductions are necessary to meet the federal clean air standards as well as provide important reductions in premature mortality and localized risk from diesel PM. The proposed amendments to the off-road regulation would continue to provide significant air quality benefits to meet these objectives. Staff anticipates, even with proposed amendments, that the regulation will achieve a 17 percent reduction in NOx emissions and a 21 percent reduction in PM2.5 emissions in 2023.

All emissions estimates were completed using the Off-Road Simulation Model (OSM), and the Off-Road Emissions Inventory Model, discussed further discussed further in Appendix D.

1. Methodology to Model Emissions Impacts

Staff modeled the proposed amendments using OSM to determine the actions all fleets in the state would be required to take to meet the regulatory requirements. Staff used OSM to analyze the benefits of various proposed amendments. This information was then used to estimate the emissions benefits of the amendments proposed by staff herein. Staff then compared these results with the expected benefits of the current regulation to determine the change in benefits due to staff's proposal. The difference in emissions benefits can be considered to be the change in emissions benefits due to the proposed amendments. Staff then considered the impact of the recession on emissions and compared the expected benefits of the proposed amendments against the expected benefits of the current regulation that considered emissions expected before the

recession began. Through this analysis, staff was able to determine if the amended regulation would provide the emission reductions necessary (when combined with the estimated benefits from the Truck and Bus regulation) to meet applicable SIP targets.

Provisions Modeled - The portions of the proposed amendments staff modeled using OSM were:

- the delay of implementation,
- the combined NOx and PM BACT fleet average and schedule,
- the adjustment to credits for all fleets,
- and delayed requirements for fleets that complied early, and
- the increase in turnover requirements from 2022 to 2023.

Staff did not model other provisions of the proposed amendments, as they are not expected to have a significant impact on the overall benefits of the regulation. However, staff will monitor the implementation of the minor amendments to determine if any change in the expected benefits of the regulation is occurring.

2. Emissions Benefits of the Proposed Amendments

The revised baseline off-road emissions inventory (assuming no off-road regulation) and the impact of the proposed amended regulation on emissions in years relevant to attainment of NAAQS are shown below in Table 12.

Table 12: Baseline Emissions and Regulation Impact on Statewide NOx and PM Emissions[3]

Year	NOx Emissions Baseline	With Proposed Regulation	NOx Emissions Benefits	PM Emissions Baseline	With Proposed Regulation	PM Emissions Benefits
2014	76.2	74.9	1.3	3.9	3.8	0.1
2017	76.8	71.2	5.6	3.9	3.6	0.3
2020	65.0	56.8	8.2	3.1	2.6	0.5
2023	52.3	43.6	8.8	2.4	1.9	0.5

Figure 10 and Figure 11 below show the baseline NOx and PM emissions, respectively, from off-road diesel vehicles and the impact of the regulation on emissions if the proposed amendments are adopted.

[3] Using the revised off-road emissions inventory.

Figure 10: Statewide NOx Emissions from Off-road Diesel Vehicles

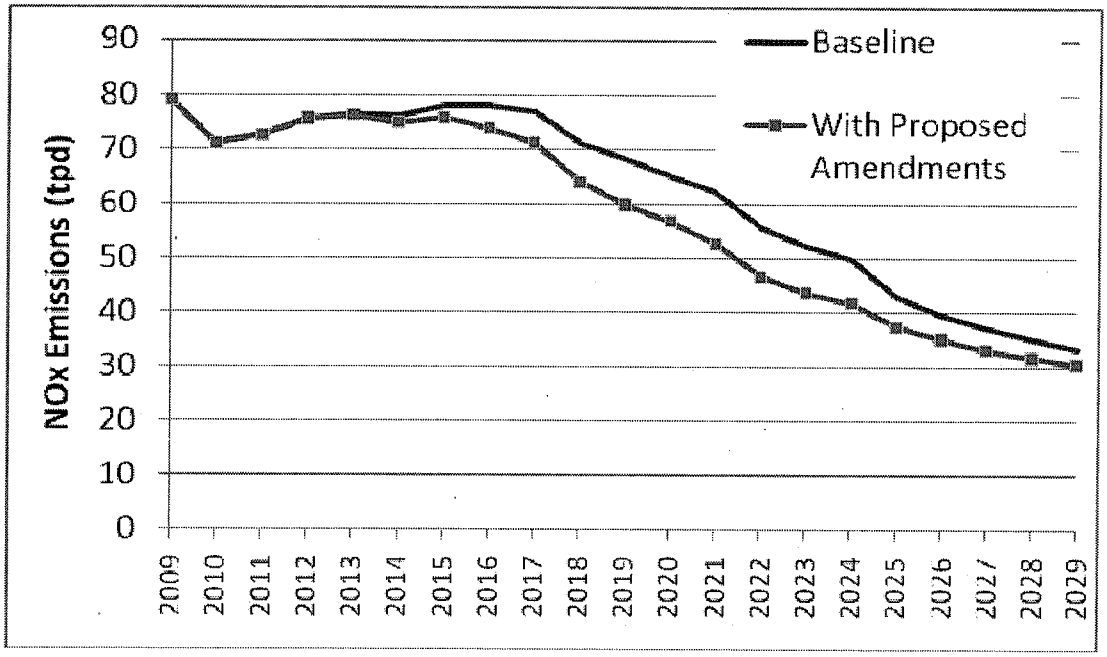
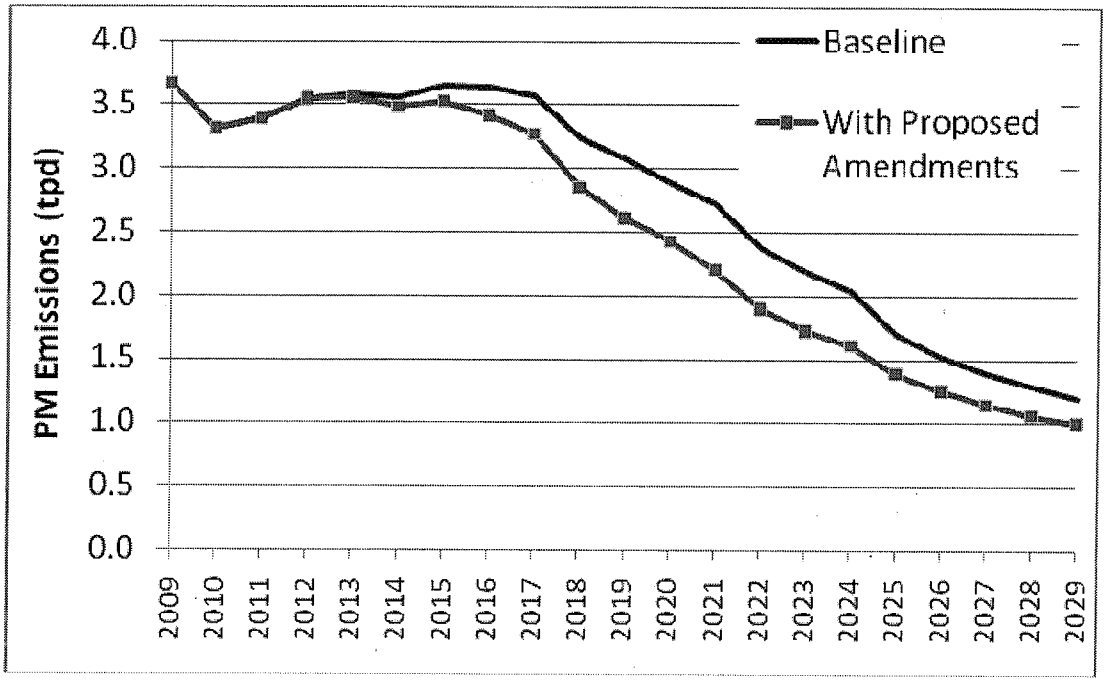


Figure 11: Statewide PM Emissions from Off-road Diesel Vehicles



3. Comparison of Emissions Benefits

The proposed amendments would delay the date for fleets to take initial action and generally require fleets to take fewer compliance actions in each year. Table 13 compares the benefits of the current regulation and the regulation as proposed to be amended.

Table 13: Benefits of the Current Regulation Compared to the Proposed Amendments (tpd)[4]

Year	NOx Benefits		PM Benefits	
	Current Regulation	With Proposed Amendments	Current Regulation	With Proposed Amendments
2014	8.7	1.3	1.3	0.1
2017	17.4	5.6	2.1	0.3
2020	18.5	8.2	2.0	0.5
2023	10.7	8.8	1.4	0.5

As can be seen, the NOx benefits of the proposed amendments would be less than if the current regulation were implemented, through 2020. By 2023, the requirement for fleets to increase turnover to Tier 4i and Tier 4 would increase the NOx benefits to approximately 80 percent of the benefits of the current regulation.

Due to the removal of the aggressive retrofit schedule, PM emission reductions from off-road diesel vehicles would be substantially less compared to implementation of the current regulation.

4. PM and NOx Emission Benefits are Preserved

The proposed regulatory amendments across both the Truck and Bus and off-road regulations are designed to provide the maximum amount of economic relief possible while still preserving as much of the originally envisioned benefits as possible. Staff's estimates suggest that statewide the combined impact of the recession with the proposed amendments to the Truck and Bus and off-road regulations will provide essentially the same cumulative remaining emissions levels between 2011 and 2023 as was expected with the existing regulations before the recession. These estimates are shown in Figure 12 and Figure 13 for PM2.5 and NOx respectively.

As can be seen in Figure 12, while the emissions that would occur in each year are not equivalent between the current regulation and the proposed amendments, cumulatively the amended regulation will result in essentially the same NOx and PM2.5 emissions levels compared to what was expected when the regulation was approved by the Board before the recession.

[4] Using the revised off-road emission inventory.

Figure 12: Year-by-Year Comparison of Truck and Bus and Off-Road PM Emissions after Regulation is Applied: Current Rule without Recession vs. Amended Rule with Recession

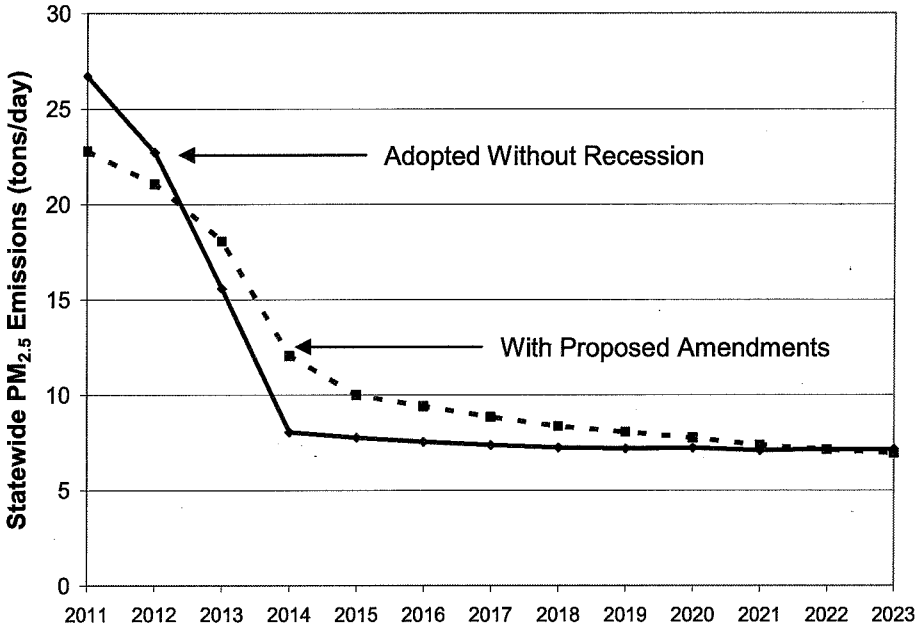
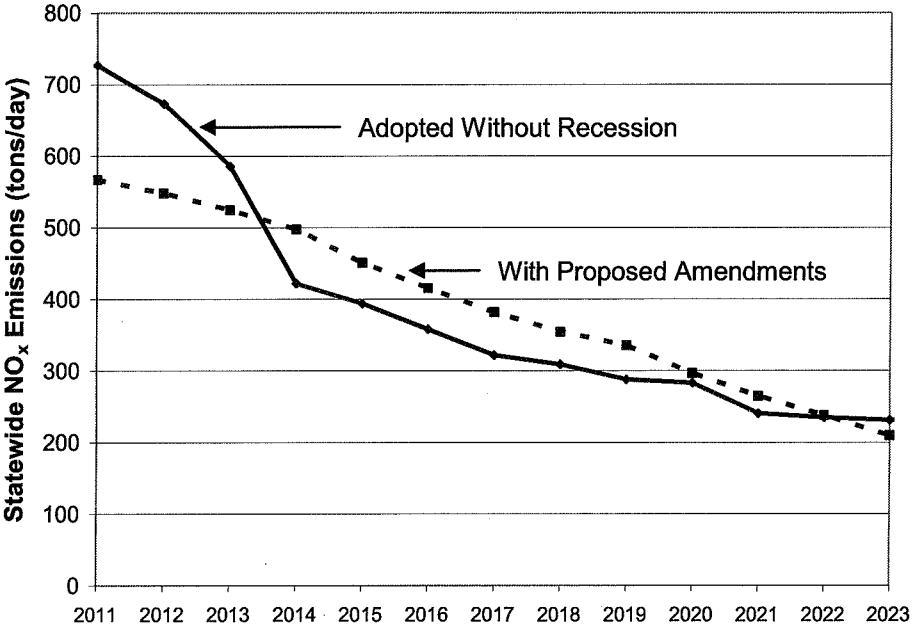


Figure 13: Year-by-Year Comparison of Truck and Bus and Off-Road NOx Emissions after Regulation is Applied: Current Rule without Recession vs. Amended Rule with Recession



5. *Cost Effectiveness of the Emissions Reductions from the Off-road Amendments*

The proposed amendments would improve the overall cost effectiveness of the regulation's PM reduction, but would not improve the cost effectiveness of NOx reductions, as shown below in Table 14. This is due to staff's efforts to provide the maximum economic relief (while maintaining SIP targets) and is discussed in Chapter VIII (alternatives chapter).

Table 14: Cost Effectiveness Comparison of the Regulation[5]

Emission Reductions	Proposed Amendments	Current Regulation
NOx ($/lb)	$4.31	$3.31
PM ($/lb)	$76.20	$93.80

The methodology used to calculate cost effectiveness is the same as described in the TSD for the original off-road rulemaking (ARB, 2007b).

C. Air Quality Impacts of Proposed LSI Fleet Regulation Amendments

1. *Baseline HC+NOx Emissions from LSI Equipment and Current Regulatory Emissions Benefits*

The ARB's OFFROAD emission inventory model was used in the development of the 1998 and 2006 LSI rulemakings. The projected annual average statewide emissions from off-road LSI engines are shown in Table 15 below. Based on the implementation of new engine standards that commenced in 2001, and the fleet requirements that commenced in 2009, HC+NOx emissions from off-road LSI equipment were expected to be about 30 tons per day in 2010 and 17 tons per day in 2020.

Table 15: Annual HC+NOx Emissions from Off-Road LSI Equipment in California (tpd)

Emissions	2004	2010	2020
HC+NOx Emissions	70.2	30.2	17.2

2. *Air Quality Impact from Major Amendments*

The proposed amendments are intended to provide economic relief for fleets, and would generally require fewer actions, particularly in the next year, and delay the requirement for fleets to take action on specialty equipment. As a result, the emissions benefits of the LSI fleet regulation will decrease, and statewide emissions may increase because of the proposed amendments. However, staff believes that reduced activity from LSI engines will offset this impact.

[5] Using the revised off-road emissions inventory, and the updated cost methodology (as described in Appendix F.

Most LSI equipment operators are expected to take advantage of the extended LHU provisions, but some are expected to retrofit, replace or retire the equipment anyway because of their commitment to cleaning up their fleet. However, it is uncertain how many fleets would take advantage of the broadened extension provisions for specialty equipment. Staff estimates that 20 percent and 5 percent of uncontrolled forklifts are LHU or specialty equipment, respectively. This represents about 2,400 pieces of equipment and a decreased HC+NOx emission benefit of about 1.1 ton per day.

Staff does not anticipate an appreciable impact on emissions from any of the minor amendments being proposed because they implement the original intent of the regulation. To the extent that some operators retrofit or replace pieces of equipment that could be excluded from the FAEL standards calculations because of the amendments, there may be air quality benefits.

D. Impact on SIP Target

Per the direction of the Board, staff considered the maximum economic relief that could be provided while ensuring that all applicable SIP targets were met. To do this, staff considered the impact of the recession and inventory changes on both truck and buses and off-road vehicles together in deciding how to provide appropriate economic relief. This approach allowed staff to better target emissions reductions across the two categories of vehicles while continuing to ensure that the combined emissions targets in the SIP were met.

As previously discussed, to determine how much economic relief could be provided and still meet applicable SIP remaining emissions targets, staff compared what emissions were expected to be remaining with the existing regulations and the pre-recession inventories to what emissions are expected to be under the proposed amendments and the updated inventories. The difference between these two is the emission margin. Since there are SIP targets for both NOx and PM2.5, staff expressed the margin as a weighted total of the two in NOx equivalent terms. The margin is 62 TPD of NOx equivalent emissions in the South Coast in 2014, and 40 TPD in the San Joaquin Valley.

Next, to evaluate whether the proposed amendments still met all applicable SIP targets, staff compared the remaining emissions from these vehicles, after applying the benefits of the proposed amendments and the revised emission inventories, to the 2014 SIP margins in the South Coast and San Joaquin Valley. In the San Joaquin Valley the proposed amendments reduce the margin to zero, meaning that the emission levels (after considering the amendments and the recession) will be at the same level that was expected with the existing regulation before the recession. In the South Coast, the margin will be reduced to about five tons per day NOx equivalent. Overall, this demonstrates that the proposed amendments continue to provide maximum economic relief while meeting all applicable SIP targets for trucks and buses and off-road vehicles.

E. Impact on PM Mortality

Even with the major amendments and economic relief proposed, the off-road regulation when implemented will provide significant health benefits by reducing premature mortality from PM2.5 exposure and localized risk from diesel PM. Staff estimates that 470 premature deaths (360 to 570, 95% confidence interval) would be avoided by implementation of the amended off-road regulation from 2010 to 2029. This estimate is based on U.S. EPA's new risk assessment methodology (U.S. EPA, 2010), and includes the most recent air quality data available (2006 to 2008) and the latest emissions inventory estimates.

F. Impact on Localized Risk

As discussed above, even with the proposed amendments, the off-road regulation is expected to reduce emissions signficantly. The regulation, coupled with normal turnover to newer, cleaner vehicles, will bring off-road vehicle emissions of toxic diesel PM down dramatically over time. As shown above in Figure 11, by 2020, staff expects that diesel PM emissions from off-road diesel vehicles will have dropped over 40 percent from 2010 levels, and by 2030, they will have dropped over 75 percent from 2010 levels. As off-road diesel vehicles on average become lower-emitting, staff expects a corresponding reduction in localized risk from sites where large numbers of off-road diesel vehicles are utilized, such as large construction projects.

G. Impact on Climate Change

Recent studies by scientists cited in the Intergovernmental Panel on Climate Change's (IPCC) report estimate that emissions of black carbon (BC) are the second largest contributor to global warming, after carbon dioxide emissions (Ramanathan, V. and Carmichael, G., 2008). Studies in the peer-reviewed literature also indicate that BC emissions cause warming primarily in the region where they are emitted. Therefore, it is important to understand that BC's warming impact requires close attention to the geography of emissions. A study published this year shows that the darkening of snow and ice by black carbon deposition is a major factor for the rapid disappearance of snow packs. The observed trend toward earlier melting of the snow packs in the Sierras is an important factor in water supply problems in California (Hadley, O. L. et al. 2010).

Reviewing all source categories of PM2.5 emissions, the BC content is greatest for diesel exhaust. Fifty percent of PM2.5 emissions from on-road diesel exhaust consists of BC, while 40 percent of PM2.5 emissions from off-road diesel exhaust consists of BC (Chow JC, Watson JG, Lowenthal DH, Chen LW, Motallebi N., 2010). By estimating the BC fraction of diesel PM and the global warming potential (GWP) of BC (using 500 $GWP_{100\text{-}yr}$ and 2000 $GWP_{20\text{-}yr}$)(Hansen, J.; Sato, M.; Kharecha, P.; Russell, G.; Lea, D. W.; Siddall, M., 2007), the approximate climate warming effect of the proposed off-road regulation for 2029 is about 1 and 4 million metric tons (MMT) carbon dioxide equivalents (CO_2-eq) for 100-year and 20-year time horizons, respectively. These estimates represent considerable reductions in global warming impacts from current BC emissions based on the baseline regulation. Finally, although use of a GWP may be a helpful tool to assess the importance of BC climate warming impact, the GWPs of

atmospheric short-lived compounds (e.g. non Kyoto compounds such as BC) are more uncertain and their climate forcing will strongly depend on the location and timing of the emission.

Additionally, staff is proposing to add a provision to incentivize hybrid electric off-road vehicles, which may lead to some additional green house gas (GHG) reductions. However, it is expected that overall impacts on GHG emissions from this provision will be negligible.

H. Environmental Justice and Neighborhood Impacts

The objectives of ARB's statewide regulatory programs are better air quality and reduced health risk for all residents throughout California. The Board has a policy that community health and environmental justice (EJ) concerns be addressed in all of ARB's regulatory programs

The proposed amendments to the off-road and LSI fleet regulations are consistent with the goals of the current regulations to reduce PM, NOx, and greenhouse gas emissions, as well as reduce the associated cancer risks and other health impacts over time statewide. This is consistent with the ARB's EJ policy of reducing exposure to air pollutants and reducing the adverse impacts from toxic air contaminants in all communities, including low-income and minority communities.

I. Other Environmental Impacts

Staff does not believe there will be any additional environmental impacts from the proposed amendments to both regulations.

The proposed amendments to the off-road regulation will reduce the number of exhaust retrofits installed. The diminished use of exhaust retrofits will lower the impacts on fuel economy and reduce hazardous waste generation. Hence, any negative environmental impacts due to hazardous waste generation are expected to be less than described in the TSD for the original off-road rulemaking (ARB, 2007b).

J. Conclusion

The proposed amendments would result in foregone emission reductions compared to the current regulation. However, ARB staff believes there are overriding economic and social considerations driving these proposed changes. The recession has significantly impacted the economic health of the regulated industry and, consequently, has greatly affected its ability to comply with the current regulation. Additionally, the recession has had significant social implications, causing a number of businesses to reduce their activities or go out of business, which has resulted in significant unemployment throughout the State. The recession has also caused emissions to be lower than anticipated when the regulations were initially approved. Hence, in addressing concerns with respect to the California Environmental Quality Act, staff is proposing that the Board find that overriding considerations exist.

VII. ECONOMIC IMPACTS

This chapter describes the potential economic impacts of staff's proposal.

A. Legal Requirements

Sections 11346.3 and 11346.5 of the Government Code require state agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation or amendments on California jobs, business expansion, elimination, or creation, and the ability of California businesses to compete.

State agencies are also required to estimate the cost or savings to any state or local agency and school districts in accordance with instruction adopted by the Department of Finance. This estimate is to include any nondiscretionary costs or savings to local agencies and the costs or savings in federal funding to the state.

B. Off-Road Regulation Amendments

1. Cost Methodology

To estimate the economic impacts of these amendments, staff's overall methodology is similar to the one used when originally estimating the costs for the off-road regulation. The original economic impacts of the off-road regulation were based on the anticipated compliance paths of approximately 200 affected fleets. Using this data, the costs to the statewide fleet were calculated by predicting and evaluating the compliance paths for real individual fleets; these estimates were then scaled to statewide costs using the estimated horsepower in the statewide fleet (ARB, 2007a).

However, this economic analysis differs in that the impacts of the proposed amendments are based on the anticipated compliance paths of the approximately 8,800 real fleets that had been reported to DOORS as of September 20, 2010 (DOORS, 2010). This compliance plan modeling was done using OSM.[6]

For each fleet in DOORS, OSM calculated the costs the fleet would normally spend without the regulation in place. These costs are referred to as a fleet's baseline costs, and depended upon a fleet's average age and natural turnover rate. Once the baseline cost for a fleet was determined, a compliance cost was then calculated, based on a fleet's anticipated compliance path. The difference between a fleet's baseline cost, and a fleet's compliance cost is the cost attributed to the off-road regulation.

For more information on the vehicle and retrofit costs used to calculate a fleet's baseline cost and compliance costs, please see Appendix F.

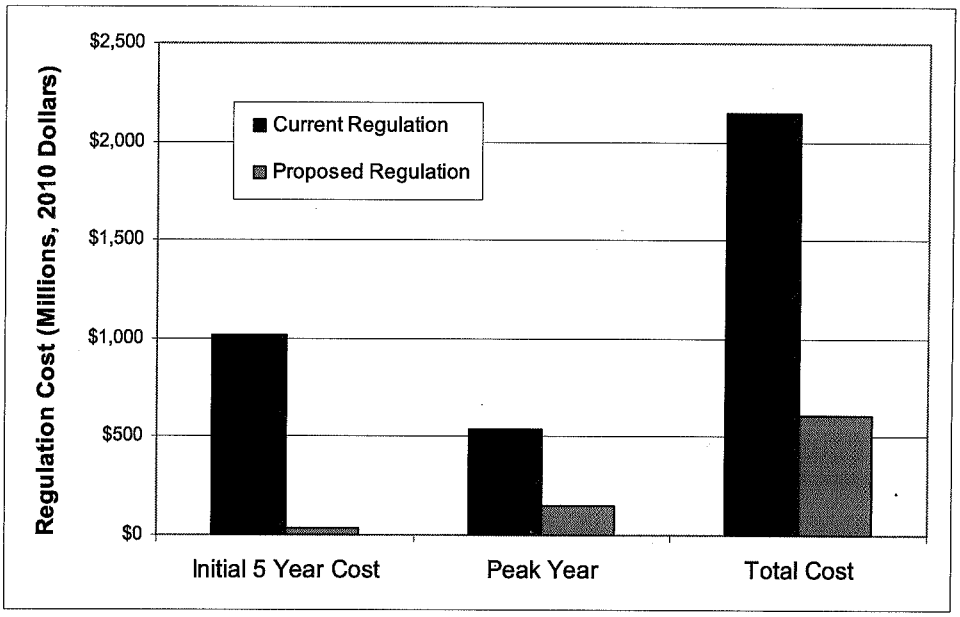
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[6] For more information on OSM and its compliance planning process, please refer to Appendix D.

2. *Statewide Fleet Costs*

The proposed amendments to the off-road regulation will provide substantial economic relief to all affected fleets, especially in the short term. As illustrated in Figure 14 below, estimated costs of the off-road regulation over the next five years would be reduced by about 97 percent, from over $1 billion[7] to approximately $33 million (2010 dollars). Total costs over the life of the off-road regulation would be reduced by 72 percent, which represents a cost savings of over $1.5 billion (2010 dollars). Peak year costs would be reduced by almost 73 percent (from $542 million to $146 million, 2010 dollars) and the peak year cost delayed from 2013 to 2019.

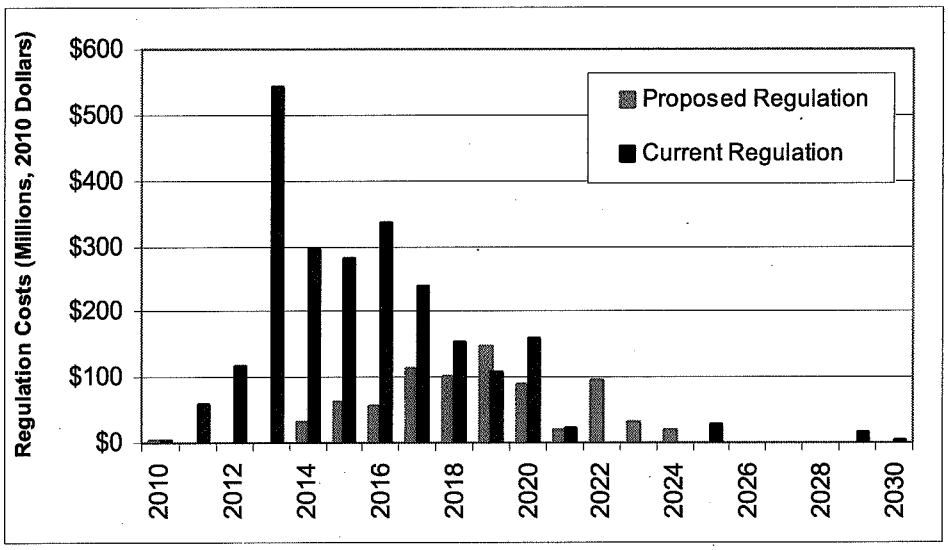
Figure 14: Cost of Proposed Off-Road Regulation Down Substantially



As shown in Figure 15 below, the costs of the proposed amended regulation would no longer be as front loaded as the current off-road regulation and are significantly less than the statewide year-by-year costs of the regulation. In the beginning years, the compliance costs for a fleet would be on average 97 percent less than originally estimated.

[7] The current regulation costs presented in this analysis have been updated and therefore differ from the costs presented in the original staff report for the off-road regulation. Please see Appendix F for additional information.

Figure 15: Current vs. Proposed Off-road Regulation Yearly[8] Compliance Costs



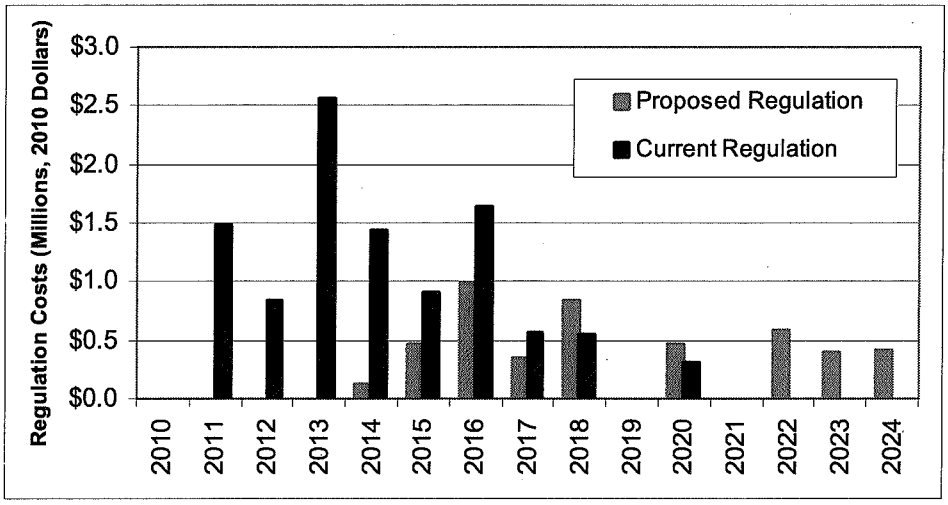
For a discussion on cost effectiveness, please see Chapter VI.

3. Cost Analysis for an Actual Fleet

To further analyze the savings expected from the proposed amendments, staff evaluated a real fleet of 30,000 horsepower (490 vehicles) reported to DOORS. Under the current regulation, this large fleet's compliance costs[9] would have totaled $7.9 million (2010 dollars) over the life of the regulation. However, it is now expected that the total compliance cost for this fleet would be reduced by over 84 percent, which represents a compliance cost savings of over $6.7 million (2010 dollars). Figure 16 below compares the sample fleet's yearly costs for the current regulation and the proposed amended regulation.

[8] Costs are shown for the compliance year the actions were taken to meet (i.e. if a fleet took actions to meet the Jan. 1, 2019 requirements, the costs are shown for 2019).
[9] Costs above normal operating costs.

Figure 16: Sample Fleet Costs for Current vs. Proposed Regulation



For this fleet, the proposed regulation would reduce peak year costs by 61 percent, reduce the compliance costs over the next five years by 98 percent, and reduce overall costs by 84 percent.

4. Impacts of the Major Amendments

Below is a description of the potential cost impacts of each of the proposed major amendments to the off-road regulation.

a) *Delay of implementation*

Delaying the initial implementation date by four years would provide fleets with more time to plan for compliance and allow them to benefit from more normal turnover to cleaner vehicles before the initial fleet average targets take effect. Also, this extra time to begin implementing the off-road regulation will give fleets more opportunity to recover from the current economic downturn before having to begin to incur compliance costs. This should result in an overall cost savings for affected fleets.

b) *Combine PM and NOx requirements and reduce BACT requirements*

The largest cost savings for fleets would be from combining the PM and NOx requirements, which would reduce BACT compliance requirements. In certain cases, fleets would have their compliance requirements reduced by more than 50 percent, resulting in large cost savings for affected fleets.

Additionally, for large fleets the 2013 increase in fleet requirements (also referred to as the "balloon payment") was removed altogether, and not simply pushed back to a later compliance year. The removal of the increased 2013 requirements would result in a substantial cost savings for large fleets.

c) *Extend double retrofit credit*

The proposed amendment to extend double credit for all fleets that install highest level VDECS on their vehicles may also result in cost savings to fleets. The proposed amendment would give all fleets additional time to receive double credit for the installation of retrofits, thereby allowing such fleets to spread out their costs in later years. This should result in a cost savings to fleets that opt to take advantage of this credit.

d) *Increase low use threshold*

Staff's proposal to increase the low-use threshold from 100 hours per year to 200 hours per year would provide cost savings to fleets that have vehicles near this threshold. This would allow fleets to categorize additional vehicles as low use, and therefore avoid retrofitting or turning over those vehicles, reducing overall compliance costs for the fleet.

e) *Simpler compliance path for fleets under 500 horsepower*

This proposed amendment would provide a simpler compliance option for those smallest fleets in the state and may result cost savings for some of these fleets. For example, if an owner operator only has one Tier 2 vehicle in his fleet, under the current regulation, he would be required to install a VDECS on that vehicle at some point before 2025. However, if this same fleet owner chose to comply with this new simpler path, he would have no performance requirements (i.e., no turnover or retrofit requirements) at all, since this new path would only require the fleet's vehicles to have Tier 2 or higher engines.

f) *Increased turnover requirements*

Of all the major amendments, the increase in turnover requirements for 2022 and later is the only one that would not result in a cost savings. Because staff is proposing to increase the stringency of the fleet average targets in the later years of the regulation, fleets will need to incorporate slightly more Tier 4i and Tier 4 vehicles than were originally required. However, as shown earlier, when considering all of staff's proposed amendments together, fleets will experience a significant overall cost savings when compared to the current off-road regulation.

5. *Impacts of the Minor Amendments*

As described further below, staff expects the proposed captive attainment area fleet definition and alternative fuel provision changes to provide a cost savings for affected fleets, while the proposed changes to the adding vehicle and labeling requirements would result in a small additional cost for some fleets. All of the other proposed minor amendments are not expected to result in any additional costs or cost savings, and therefore are not mentioned below. However, as shown earlier, when considering all of staff's proposed amendments together, fleets would overall experience significant cost savings when compared to the existing off-road regulation.

a) *Captive attainment area fleet definition*

Currently in the off-road regulation, captive attainment area fleets are exempt from the NOx requirements of the regulation. However, they must still comply with the PM requirements per a timeline dictated by their fleet size. For example, under the current regulation, if a large fleet is a captive attainment area fleet, the fleet was not required to comply with the NOx turnover requirements. However, it would have been required to meet the PM requirements beginning in 2010, the first compliance date for large fleets. Under staff's proposal to reclassify all captive attainment area fleets as small fleets, medium and large captive attainment area fleets would be able to delay initial compliance requirements until the first small fleet compliance deadline in 2019, which will result in a cost savings for such fleets.

b) *Electric vehicle provisions*

Staff is proposing to remove electric vehicle horsepower from the total horsepower calculation, which will also result in removing this horsepower from all BACT calculations. For fleets with many electric vehicles (such as airport GSE fleets), this reduction in horsepower would potentially allow fleets to be reclassified to a smaller fleet size category. Additionally, if the BACT requirements are reduced (based on the decrease of the fleet's total horsepower), the cost of compliance for the fleet would further be reduced. Therefore, this amendment will result in some cost savings for fleets with electric vehicles.

c) *Labeling*

Staff is proposing a change to the labeling provision that would require a fleet to label both sides, rather than just the right hand side, of each vehicle with an EIN. Based on the 150,000 vehicles currently registered in DOORS, and assuming a cost of $10 per EIN label (Aaron, 2010; Glen, 2010; Snyder, 2010), this would equate to an additional $1.5 million (2010 dollars) in statewide costs.

Additionally, staff is proposing to require captive attainment area fleets to label their vehicles with EINs that are green with white letters, instead of red with white letters. There are currently approximately 5,000 vehicles registered as captive attainment area vehicles in DOORS; therefore, these fleets would incur an additional total cost of approximately $50,000 (2010 dollars) statewide if they choose to retain their captive attainment area status.

C. LSI Fleet Regulation Amendments

1. Methodology

Staff took information reported to them through the DOORS inventory reporting program and input it into the Off Road Model to estimate the economic impacts of the proposed changes to the off-road regulation. LSI staff had to use a different methodology to estimate the economic impacts of the LSI fleet regulation amendments for two reasons. First, only uncontrolled LHU and specialty equipment for which retrofit kits are not available are affected; the remainder of the LSI fleet must comply with the FAEL

standards and generally, already does. Second, the LSI fleet regulation does not require reporting so there is no readily available data on the operating hours of affected vehicles.

Staff estimates that there are approximately 46,000 pieces of LSI equipment subject to the LSI fleet requirements (ARB, 2006c). Based on routine turnover assumptions from the 2006 regulation, approximately 12,000 pieces would have to be retrofitted or replaced to achieve the FAEL standards. Twenty percent of these or about 2,400 pieces of LSI equipment are in small fleets and are exempt from the FAEL standards.

Of the remaining 9,600 units, manufacturer sales data indicates that approximately 5 percent of the units are specialty equipment. The broadening of the extension request provisions would be made available primarily to fleet operators with specialty equipment for which retrofit kits are not available. The two largest categories of equipment that fall into the specialty equipment category are pieces of equipment with an Underwriters Laboratories safety designation and equipment with engine displacements exceeding six liters. If retrofit kits were available for these units, they would cost around $3,500. To the extent that retrofit kits are not available, replacement cost for this equipment starts at about $50,000 per unit and can be significantly more.

Based on off-road regulation limited usage data reported through DOORS, staff estimates that an additional 20 percent of the 9,600 units are LHU. The extension of the LHU provisions would be available to any of the approximately 2,000 LSI fleets in California if they have LHU equipment. As LHU equipment may comply through either retrofit or replacement, and as LHU equipment typically is not specialty equipment, the compliance cost ranges from $3,500 for a retrofit kit to $30,000 for replacement.

2. Statewide Fleet Costs

The proposed amendments are expected to provide substantial near-term economic relief to most affected fleets. Overall, staff estimated that the proposed amendments will result in a cost savings of between $8.4 to $59.5 million (2010 dollars) over the life of the regulation.

For a more detailed breakdown of the proposed major and minor amendments, and a description of the cost methodology, please see the sections below.

3. Cost Analysis for an Actual Fleet

To further analyze the savings expected from the proposed amendments, staff looked at a real fleet of industrial sweeper/scrubbers. This fleet, depending upon whether it would retrofit or replace its LHU equipment to comply with the FAEL standards, would have incurred costs of $700,000 to $4.3 million (2010 dollars) over the next year to be in compliance with the regulation (LAUSD, 2010). The proposed amendments reduce the expected cost to this fleet by $500,000 to $3.1 million (2010 dollars).

In another example, a fleet has six high capacity Underwriters Laboratories (UL) safety certified forklifts for which retrofit kits are not available. Thus, the operator would have to replace these pieces of equipment to achieve compliance with the FAEL standards. The total cost to replace the six specialty forklifts would be about $1.0 – 1.5 million. The proposed amendments either reduce that cost by more than 90 percent if UL certified retrofit kits become available during the next four years, or give the fleet operator that additional time to plan for repower or replacement.

4. Impacts of the Major Amendments

Below is a description of the potential cost impacts of each of the proposed major amendments to the LSI fleet regulation.

a) *Extend limited hours of use provisions*

Staff's proposal to increase the LHU threshold from 0 hours per year to 200 hours per year beginning January 1, 2011, will provide some cost savings to fleets that have vehicles at or below this threshold. These fleets would be allowed to exclude LHU equipment from their FAEL standards calculations, thereby avoiding the costs of retrofitting or replacing those vehicles. As described above, this represents an average savings of about $16,750 (with a range of $3,500 to $30,000) per piece of equipment.

b) *Allow additional compliance extensions for specialty equipment*

Staff's proposal to allow additional compliance time for specialty equipment may provide significant cost savings to fleets that are able to retrofit in future years as lower emitting retrofit kits become available. Cost savings in this case are the difference between the typical retrofit cost of $3,500 and a replacement cost that can exceed $100,000. To the extent that some pieces of equipment are not retrofittable in the future, the amendments provide four additional years for compliance planning.

5. Impacts of the Minor Amendments

None of the proposed minor amendments are expected to result in any additional costs or savings, because they implement the original intent of the regulation.

D. Impacts on California Economy

The proposed amendments to both the off-road and LSI fleet regulations will not impose additional impacts on the economy, nor are they expected to adversely impact employment. The amendments are intended to provide economic relief from regulatory requirements over the next several years, and to reduce costs for all affected fleets. Staff believes this would lead to fewer fleets reducing employment as a result of either regulation, thereby benefiting overall California employment.

Although these proposed amendments are not expected to adversely impact the economy overall, these modifications could have a negative economic impact on retrofit manufacturers and installers and firms that provide repowers or equipment. Staff

anticipates that these businesses could receive fewer orders in the next few years. However, the proposed amendments to the off-road regulation provide extended and enhanced incentives that are intended to encourage early retrofitting, repowering, and replacement. Staff believes that these actions could help mitigate potential impacts on retrofit and repower jobs and businesses.

E. Potential Impacts on Small Businesses

The proposed amendments to the off-road regulation should provide an overall cost savings to small businesses by allowing fleets to delay the start of compliance and significantly lowering their compliance costs over the life of the off-road regulation. Also, the addition of the ultra small fleet provision, which requires only a phase out of a fleet's Tier 0 and 1 vehicles, would provide some very small fleets additional cost savings.

While staff believes most small businesses are small or medium fleets (under the off-road regulation), a few small businesses do meet the off-road regulation's definition of large fleet. However, because staff is proposing to delay and reduce the off-road regulation's requirements for all fleet sizes, small businesses should benefit significantly from the proposed changes, regardless of their fleet size designation.

The LSI fleet regulation does not affect small businesses, and therefore, the proposed amendments to the LSI fleet regulation are not expected to affect small businesses.

These proposed amendments could have negative impacts on retrofit manufacturers and installers and firms that provide repowers or equipment; many of these firms are small businesses. However, as stated above, staff believes that the extension and enhancement of early action incentives will help mitigate potential impacts on retrofit and repower businesses.

F. Potential Impacts on Public Agencies

The proposed amendments for both regulations would not impose any additional costs on public agencies. Because the amendments to both regulations are designed to provide economic relief from regulatory requirements, especially in the next few years, it is expected that public fleets will realize overall lower compliance costs.

VIII. ALTERNATIVES CONSIDERED

This chapter discusses the alternatives to the proposed amendments to both regulations that staff considered and why they were rejected in favor of the proposals.

A. Major Off-Road Regulation Amendments

Given the depth of the recession in the construction industry, staff considered a wide variety of options for amendment proposals. These alternatives ranged from a repeal of the regulation to proposing minimal changes. Staff also considered options such as rewriting the regulation without basing the requirements on the current regulatory language – starting 'from scratch', in effect, as well as other changes that are lesser variations of staff's proposal.

1. Repeal the Regulation

During the initial development of the off-road regulation, reducing emissions from off-road vehicles towards meeting the 2014 SIP, particularly for the South Coast Air Basin, was a driving factor for the structure of the regulation in the initial years. As the recession and inventory analysis demonstrated that meeting the 2014 SIP commitment no longer required the same level of retrofitting and early turnover currently required in the off-road regulation, industry stakeholders questioned whether the off-road regulation could be repealed, or alternatively, could be delayed for five or more years and reconsidered in the future.

While this alternative would provide the most economic relief to the construction industry and other industries using off-road diesel vehicles, staff rejected this alternative for many reasons, including:

- Based on the most current inventory information, reducing emissions from off-road vehicles is still needed to achieve PM2.5 SIP goals in the South Coast and San Joaquin Valley Air Basins in 2014, and will also be necessary to reduce ozone in both these regions in 2023. While the aggressive retrofit schedule and requirements for significant vehicle turnover from 2010 to 2014 are not as great as once needed, the 2014 SIP goals still require a (smaller) reduction in emissions from off-road vehicles by 2014.
- Repealing or delaying the regulation indefinitely would not achieve incremental progress towards cleaner air.
- Continued exposure to PM2.5 has been continually shown to have negative health impacts, and remains a mortality risk for those with long-term exposure.
- Reducing emissions from off-road vehicles is still cost effective.

Given these factors, pursuing emissions reductions from off-road vehicles, while considering the severe impact of the recession on construction and related industries, remains an important part of meeting state goals and protecting public health.

2. Make Minimal Changes

For this alternative staff considered minimal modifications to the off-road regulation that would still allow ARB to effectively enforce the regulation with consideration of the current enforcement delay. As previously discussed, ARB delayed enforcement of the regulation's first compliance date for large fleets (March 1, 2010) in part because ARB had not received authorization from U.S. EPA to fully enforce the regulation. Under this alternative, the proposed regulatory amendments would provide for some delay in the provisions of the off-road regulation and for a new compliance schedule for large fleets. This alternative included:

- Two year delay for large fleets only.
- Removing the heightened "balloon" requirements in 2013.

No other significant changes to the off-road regulation would have been proposed.

Staff rejected this alternative for the following reasons:

- The depth of the recession in the construction industry in particular demonstrates a need for greater consideration and economic relief than the minimal changes possible would provide, and would reduce emissions beyond what's needed to meet SIP commitments.
- This alternative would not improve the regulation's cost efficiency or respond to stakeholders suggestions to provide fleets with more compliance flexibility.
- This alternative would not simplify the regulation.
- Not as many off-road vehicles are candidates for successful retrofits as originally believed.

Given these factors, staff is proposing more than just the minimal changes to the regulation.

3. Make No Changes

For this alternative, staff considered making no changes to the regulation. Staff rejected this alternative for the following reasons:

- As stated above, ARB has delayed enforcement of the off-road regulation in part because of the lack of authorization from U.S. EPA to fully enforce the regulation.
- The depth of the recession, particularly as it has affected the construction industry, has reduced emissions beyond what's needed to meet state SIP commitments in the near-term and would not provide adequate economic relief to affected industries.
- This alternative would not improve the regulation's cost efficiency or respond to stakeholders suggestions to provide greater flexibility for fleets.
- This alternative would not simplify the complexity of the regulation.
- Not as many off-road vehicles are candidates for successful retrofits as originally believed.

4. Restructuring the Regulation ('from scratch')

Under this alternative, staff considered removing the current regulatory structure altogether and using the experience gained since the regulation took effect in 2008 to improve the regulation's structure and framework, aiming to improve simplicity and flexibility. Concepts considered included removing the current requirements and implementing a regulatory structure based primarily on vehicle age, or implementing a fee based on the age of vehicles, or different requirements that varied by region. Staff ultimately rejected this alternative for the following reasons:

- Any proposal staff considered would still have to account for the wide variety of vehicles and industries being regulated (as the current regulation does) and would require most or all of the same exemptions and provisions. For this reason, staff did not believe it was possible to further simplify the regulation beyond staff's final proposal.
- Regional requirements would cause confusion and result in inability of fleets to comply with the regulation, and would also be difficult to enforce because of the vehicle's ability to easily move throughout the state. Additionally, because diesel PM is a toxic air contaminant, staff did not believe it was appropriate to have a regulation limited to certain areas of the state.

5. Other Regulatory Alternatives Considered

Staff used the simulation model OSM, to evaluate other alternatives that would provide adequate economic relief to fleets given the recession. OSM allowed staff to review the impact of various proposals and different iterations of each proposal. Using this approach the following alternatives were considered.

Alternative A: The proposal staff presented at the June and July 2010 workshops (ARB, 2010d), in which staff proposed to:

- Delay the regulation two years for all fleet sizes.
- Remove the inflated 2013 requirements.
- Count turnover toward a fleet's PM BACT (or retrofit) requirements.
- Increase low use threshold.

This would have effectively lowered a fleet's retrofit requirements to 10 to 12 percent per year, down from 20 percent. This proposal would still have required a substantial number of retrofits to be installed.

- Actions would be required on up 20 percent of a fleet's horsepower annually, beginning 2012.

Alternative B: Staff also considered amending the regulation as follows:

- Delay the regulation two years for all fleet sizes.
- Remove the inflated 2013 requirements.
- Count turnover toward a fleet's PM BACT (or retrofit) requirements;
- Increase low use threshold.
- Lower PM BACT to 12 percent a year (a 40 percent reduction).
- Provide a new credit for fleets reducing horsepower from 2010 to 2011.

- Tighten the NOx requirements from 2017 to 2023 to achieve additional NOx benefits

This alternative would have effectively lowered the retrofit requirements for most fleets between two to four percent each year the fleet was required to do turnover.

- Actions would be required on, at maximum, 12 percent of a fleet's horsepower annually, beginning 2012.

Alternative C: This alternative would have reduced required retrofitting as follows:

- Delay the regulation two years for all fleet sizes.
- Remove NOx and PM requirements into a single fleet average and single BACT requirement.
- Lower combined BACT from 28 to 30 percent per year to 8 to 10 percent.

This proposal would have provided more flexibility to fleets while lowering the number of vehicles addressed in any one year to about a third of previous levels.

- Actions would be required on up to 10 percent of a fleet's horsepower annually, beginning 2012, with no separate PM requirements.

Comparison to proposed amendments: The principle difference between the final proposed amendments and Alternatives A and B was the removal of the separate PM fleet average and BACT requirements for all fleets. The major difference between the proposal and Alternative C was the four year delay for all fleets, instead of the two year delay proposed previously. Table 16 below shows the cost, cost effectiveness, and emission reductions achieved from the alternatives.

Table 16: Emissions and Costs of Various Off-road Major Amendment Alternatives Considered

Scenario	Cost	Peak Year Cost/ Peak Year[10]	Initial 5 Year Cost	NOx Benefit (tons)	PM Benefit (tons)	$/lb NOx	$/lb PM
Current Reg.	$2.15B	$542M **2013**	$1.02B	68,740	9,020	$3.31	$93.80
Alternative A	$1.77B	$316M **2016**	$450M	49,430	7,050	$5.52	$87.10
Alternative B	$1.19B	$237M **2016**	$291M	53,010	6,250	$3.02	$69.70
Alternative C	$1.21B	$241M **2017**	$255M	74,080	5,830	$3.03	$65.10
Proposal	$607M	$146M **2019**	$33M	33,870	2,070	$4.31	$76.20

[10] The peak year shown means the year of compliance date for which costs were incurred (i.e., if fleets would have maximum cost between January 1 and December 31, 2018, to meet the January 1, 2019, requirements, the peak year is shown as 2019)

As shown in the table, Alternatives A, B and C significantly reduced overall costs, peak costs, and initial five-year costs to fleets. Alternative A reduced costs primarily by delaying the start of compliance, and reducing the 2013 'balloon payment'. Alternative B further decreased costs by reducing the annual retrofit requirements by up to 90 percent for fleets that turnover vehicles in that year, and Alternative C reduced costs by completely removing mandatory retrofitting and limiting fleet turnover to no more than 10 percent of their horsepower in any one year.

Ultimately, staff selected the proposed amendments over the alternatives considered because it:

- Had the lowest overall cost from 2010 to 2030 while still allowing the state to meet its 2014 SIP commitments, and providing additional reductions towards meeting the 2023 SIP ozone targets in the South Coast air basin.
- Had the lowest cost in the initial five years (from March 1, 2009, to March 1, 2014), while achieving incremental progress beginning in 2014.
- Had the lowest peak year cost.

In addition, the proposed amendments improved the regulatory structure over the alternatives due to a number of additional factors:

- The proposed amendments would greatly simplify the regulation as fleets would no longer be required to learn and analyze separate NOx and PM structures.
- Fleets never have to retrofit, but retain the option to do so where it would be more effective than turnover.
- Because the proposed amendments no longer contain separate NOx and PM targets, all fleets would have the choice of complying via turnover, retrofitting, or a combination of the two. This means that while fleets can choose to avoid retrofitting if they so desire, it remains a compliance option which ensures a continued market for retrofits to all fleets subject to the regulation.

6. Other Off-Road Amendment Provisions

The following section discusses the proposed changes to the delays for medium and small fleets, and credit or double credit for retrofits, and alternatives to those changes that were considered and rejected in favor of the final proposal.

a) *Lesser Delay for Medium and Small Fleets*

Staff had considered a proposal that would provide a lesser delay for medium and small fleets, which was rejected for the following reasons:

- Providing a four-year delay for medium and small fleets would allow additional time for smaller businesses or agencies to recover from the recession.
- Large and medium fleets' compliance dates were offset to provide additional time for medium fleets to plan compliance, but also to prevent multiple fleet categories from having to meet their first compliance deadline on the same date. To prevent the initial deadline for medium fleets coinciding with the large fleet deadline, staff proposed a four year delay for medium fleets, from 2013 to 2017. For similar

reasons, it will benefit small fleets to also delay the initial small fleet requirements from 2015 to 2019.

b) *Provide No Credit for Retrofits*

Staff had also considered a proposal that would maintain the NOx requirements of the regulation (section 2449.1) without providing credit toward either BACT or the fleet averages for PM retrofits, effectively removing PM VDECS as a means of complying with the regulation entirely. Staff rejected this proposal for the following reasons:

- Where PM VDECS can be applied safely and effectively, they remain a cost effective method of reducing the health risk from diesel engines and extending the life of a vehicle under the regulation. Particularly for relatively high horsepower applications (for example, high horsepower loaders), retrofitting with the highest level PM VDECS may cost approximately $50,000, while a vehicle replacement with a new model could cost upward of $1,000,000 in some cases. For such applications, retrofitting to extend the vehicle life under the regulation can be an economical and efficient solution.
- Numerous fleets, manufacturers, and installation facilities have invested in PM VDECS in anticipation of the current regulation and failing to credit or incentivize PM VDECS would negatively impact the retrofit industry and fleets that have installed VDECS.
- Fleets would never be required to install retrofits, hence VDECS would remain an option only when they are (compared to turnover) cost effective, consistent with the fleet's use and maintenance of vehicles, and preferred by the fleet to vehicle turnover.

c) *Not Extending Double Credit for Retrofits*

As another alternative, staff considered leaving the double credits periods unchanged (expired on January 1, 2010 for large fleets, and March 1, 2012 for medium and small fleets). Staff rejected this alternative for the following reasons:

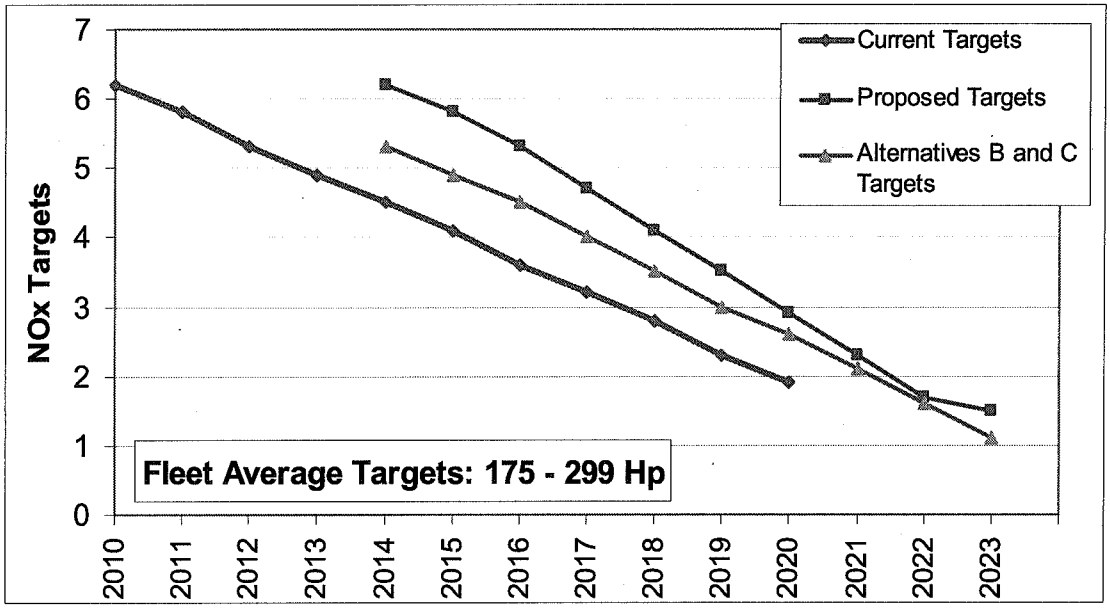
- Without double credit periods, fleets would have no incentive to invest early in retrofit technology or make incremental progress towards clean air.
- Without an extension of double credit, the fleets that invest in retrofits in the next two to three years would receive no reward or benefit over those that wait until the deadline.
- It is consistent with ARB's previous approach with initial deadlines to include double credit periods up to 12 months prior to the requirements, and in principle is the same as the approach fleets across the state were trained on and have become familiar with.

d) *Off-Road Regulation Fleet Average Target Stringency*

Staff considered alternatives that would have provided more NOx and PM benefits by 2023 through more stringent fleet average targets. Figure 17 shows the fleet average targets for the current regulation, those proposed by staff, and those considered as an

alternative to the proposed amendments (Alternatives B and C above included more stringent 2023 fleet average targets).

Figure 17: Comparison of Fleet Average Targets



As can be seen in Figure 17 staff evaluated lower final fleet average targets which are more aligned with attaining a fleet average that represents Final Tier 4, as opposed to staff's proposal which attains an Interim Tier 4 Level. Note that while only the fleet average targets for engines between 175 and 299 horsepower are shown, and that other horsepower groups would have targets that vary, this figure is representative of the trend for the various horsepower groups. As expected, staff found that more stringent final fleet averages achieved greater benefits, as expected and shown in Table 16. However, more stringent final fleet average targets resulted in higher overall regulatory costs, and did not provide the same level of cost savings to fleets as staff's proposed amendments. Because of this, staff ultimately rejected this proposal.

B. LSI Fleet Regulation Amendments

Staff considered several alternatives to the proposed amendments for the LSI fleet regulation. These alternatives included extending the compliance deadline for all LSI fleet operators, a lower limited hours of use provision, broadening the compliance extension provisions, and no change to the current regulation. These alternatives are detailed below.

1. Extend the Compliance Deadline for All Operators

Under this alternative, all LSI fleet operators would receive a two-year extension to their compliance dates. However, there were two concerns with this. First, the LSI fleet regulation has three progressively more stringent FAEL standards, with effective dates set two years apart. As of January 1, 2011, two of the three dates will have already

passed. As a result, operators have already had more than four years since adoption of the LSI fleet regulation to come into compliance with the standards. Many operators chose to procure equipment that brought their fleets not only into compliance with the near-term FAEL standard effective dates, but also the most stringent January 1, 2013 FAEL standard effective date. These operators are fully in compliance with the FAEL standards for the duration of the regulation. This brings about the second concern – that the compliance date extension would create an uneven playing field between those fleets that had not yet complied with the FAEL standards and others that already had.

Given the extent to which the LSI regulation has already been implemented, and the desire to avoid providing incentives to operators that were not yet in compliance with the LSI fleet regulation when their competitors have already made the economic commitment to comply, staff rejected this alternative.

2. Set the Limited Hours of Use Provision at 100 hours

The proposed 200-hr limited hours of use amendment would provide significant early and continued economic relief to LSI equipment operators in recognition of the recession while still achieving most of the emissions reductions necessary to protect public health.

As an alternative, staff considered proposing a 100-hour LHU provision. This is the threshold used by some ARB regulations for fully excluding equipment. This level would also result in a smaller impact on emissions benefits. However, the LSI fleet regulation and the off-road regulation have many operators in common and the off-road regulation, in consideration of the global recession and its impact on fleet operators, is proposing to establish a 200-hour LHU threshold. Staff believes consistency between the two regulations is important and improves the regulation's cost efficiency. Therefore, staff rejected the 100-hr LHU alternative and is recommending the 200-hour LHU threshold.

3. Allow Multiple One-Year Compliance Extension Periods

The LSI fleet regulation currently allows fleet operators to request to exclude equipment from the FAEL standards calculations for a period of one year if retrofit kits are not available. Staff considered proposing multiple one-year extensions in the event that retrofit kits continued to be unavailable. However, over the course of four years this proposal would double the administrative burden on both operators and ARB staff. Additionally, the one-year extension period does not accurately reflect the retrofit kit product development cycle, the longest component of which is accumulation of hours on a retrofitted device for verification purposes. Therefore, staff rejected this alternative and is proposing that operators be allowed to apply for a two-year extension, followed, in the event that a retrofit kit is still not available, by a subsequent two-year extension.

4. Make No Change

For this alternative, staff considered making no changes to the LSI fleet regulation. Staff rejected this alternative for the following reasons:

- Retrofit kits have not been available to the extent envisioned during the development of the 2006 LSI fleet regulation. For example, kit manufacturers are capable of producing kits with a UL component certification, but the market for these kits was not large enough to make development economically feasible. LSI equipment operators therefore would be required in some cases to spend as much as 10 to 50 times more than the cost of a retrofit kit to replace their equipment.
- Many pieces of low use equipment are operated too infrequently to make emission reductions cost effective, even when using retrofit kits.
- The severe recession currently hitting the industries subject to the LSI fleet regulation make compliance difficult, and some form of economic relief is needed. Staff believes taking no action would be detrimental to an already hard hit sector of the state's economy.

IX. REFERENCES

Aaron 2010. Aaron's Signs, October 21, 2010. http://www.eindecals.com/

AB 8 2X, 2009. Assembly Bill 8 2X, Chapter 6. An act to amend Section 11011 of the Government Code, to add Section 43018.2 to the Health and Safety Code, which directs ARB to amend Sections 2449.1 and 2449.2 of Title 13 of the California Code of Regulations. Approved by the Governor on February 20, 2009.

ARB, 2000. California Air Resources Board. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.* California Air Resources Board, October 2000. http://www.arb.ca.gov/diesel/documents/rrpFinal.pdf

ARB, 2003a. California Air Resources Board. *Proposed 2003 State and Federal Strategy for California State Implementation Plan, Section II Mobile Sources, Introduction and Chapter D.* California Air Resources Board, August 25, 2003. http://www.arb.ca.gov/planning/sip/stfed03/stfed03.htm

ARB, 2005. The 2005 California Air Resources Board Off-Road Diesel Equipment Survey.

ARB, 2006a. California Air Resources Board. *Staff Report: New Emission Standards, Fleet Requirements, and Test Procedures for Forklifts and Other Industrial Equipment.* California Air Resources Board, March 2006. http://www.arb.ca.gov/regact/lore2006/isor.pdf

ARB, 2006b. The 2006 California Air Resources Board Off-Road Diesel Equipment Mini-Survey.

ARB, 2006c, Form 399 Attachment, California Air Resources Board, March 25, 2006.

ARB, 2007a. California Air Resources Board. *Staff Report: Initial Statement of Reasons for Proposed Rulemaking; Regulation for In-Use Off-Road Diesel Vehicles.* California Air Resources Board, April 2007. http://www.arb.ca.gov/regact/2007/ordiesl07/isor.pdf

ARB, 2007b. California Air Resources Board. *Technical Support Document: Regulation for In-Use Off-Road Diesel Vehicles.* California Air Resources Board, April 2007. http://www.arb.ca.gov/regact/2007/ordiesl07/TSD.pdf

ARB, 2007c. California Air Resources Board. *Air Resource's Board Proposed State Strategy for California's 2007 State Implementation Plan: Revised Draft.* California Air Resources Board, April 26, 2007. http://arb.ca.gov/planning/sip/2007sip/apr07draft/covtoc.pdf http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm#April26

ARB, 2009a. California Air Resources Board. *In-Use Off-Road Diesel Vehicle Regulation Frequently Asked Questions: Low-Use Provisions.* California Air Resources Board, April, 2009. http://www.arb.ca.gov/msprog/ordiesel/faq/faqlowuse.pdf

ARB. 2009b. The California Almanac of Emissions and Air Quality - 2009 Edition. http://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm

ARB 2009c Advisory 10-414: Enforcement of the In-Use Off-road Diesel Vehicle Regulation, February 2010, http://www.arb.ca.gov/enf/advs/advs414.pdf

ARB 2010a, News Release #10-54: ARB, Contractors Agree On Proposed Changes to Rule Requiring Clean Up of Construction Equipment, October 7, 2010. http://www.arb.ca.gov/newsrel/newsrelease.php?id=159

ARB 2010b. California Air Resources Board. Workshop Presentation: Workshops Regarding the Off-Road and the Truck and Bus Inventories and Regulatory Amendments. Presented by California Air Resources Board Staff on May 6, May 12, and May 18, 2010: http://www.arb.ca.gov/msprog/ordiesel/documents/diesel2010mayfull.pdf

ARB, 2010c, Estimate of Premature Deaths Associated with Fine Particle Pollution (PM2.5) in California Using a U.S. Environmental Protection Agency Methodology, August 31, 2010 http://www.arb.ca.gov/research/health/pm-mort/pm-report_2010.pdf

ARB 2010d. Workshop on Amendments to the Off-Road Diesel Regulation. Presented by California Air Resources Board Staff on June and July 2010: http://www.arb.ca.gov/msprog/ordiesel/documents/offroadsummer2010full.pdf

California Department of Finance (CA DOF), 2010. Residential Unit and Valuation, 1975-2009 (annual), 1995-current (monthly). Last assessed February 2010. Available at: http://www.dof.ca.gov/html/fs_data/latestecondata/fs_construction.htm

Chow JC, Watson JG, Lowenthal DH, Chen LW, Motallebi N., (2010). Black and organic carbon emission inventories: review and application to California. J. Air Waite Manag Assoc. Apr;60(4):497-507.

DOORS, 2010. Diesel Off-road On-line Reporting System. https://secure.arb.ca.gov/ssldoors/doors_reporting/reporting.php

Equipment Data Associates (EDA), 2010. California Equipment Financed, 2005-current. Available at: www.EDAData.com

Glen 2010. Glen Sample Signs & Graphics, October 21, 2010. http://www.domestickers.com/calsticker.htm

Hadley, O.L. et al. 2010, Hadley, O. L., Corrigan, C. E., Kirchstetter, T. W., Cliff, S. S., and Ramanathan, V. (2010). Measured black carbon deposition on the Sierra Nevada snow pack and implication for snow pack retreat, Atmos. Chem. Phys., 10, 7505-7513, doi:10.5194/acp-10-7505.

Hansen, J.; Sato, M.; Kharecha, P.; Russell, G.; Lea, D. W.; Siddall, M. 2007. Climate change and trace gases. *Philos. Trans. R. Soc. London, Ser. A., 365* (1856), 1925–1954. Note: Hansen GWP estimates should be considered a conservative (i.e., lower bound) estimate for fossil fuel BC forcing, because he assumes a high OC/BC ratio for fossil fuel emissions.

Kean, A.J., Sawyer, R.F., Harley, R.A., 2000. A Fuel Based Assessment of Off-Road Diesel Emissions. Journal of the Air and Waste Management Association (50) 1929-1939.

Krewski et al., 2009, Krewski D, Jerrett M, Burnett RT, Ma R, Hughes E, Shi Y, Turner MC, Pope CA III, Thurston G, Calle EE, Thun MJ. 2009. Extended Follow-Up and Spatial Analysis of the American Cancer Society Study Linking Particulate Air Pollution and Mortality. HEI Research Report 140. Health Effects Institute, Boston, MA.

LAUSD, 2010. Letter from David Legg of the Los Angeles County Unified School District to Mark Williams, ARB. LAUSD compliance extension request for 237 forklifts and sweepers affected by the expiring limited hours of use provision. June 7, 2010.

MacKay, 2003. 2003 Construction Equipment Universe of Construction Equipment and Machinery. Prepared by MacKay and company for Construction Equipment Magazine, 2003. (See CARB Mailout#: MSC 99-32)

Millstein, D.E., Harley, R.A. 2009, Revised Estimates of Construction Activity and Emissions: Effects on Ozone and Elemental Carbon Concentrations in Southern California. Atmospheric Environment (43) 40: 6328-6335.

Power Systems Research, 1996; 2000. Partslink Database. (See CARB Mailout#: MSC 99-32). http://www.powersys.com

Ramanathan, V. and Carmichael, G. (2008). Global and regional climate changes due to black carbon. Nature Geoscience 156, 221-227

Snyder, 2010. Snyder Graphics, October 21, 2010. http://www.snydergraphics.com/

TIAX, 2003. California Public Fleet Heavy-Duty Vehicle and Equipment Inventory, Final Report. Report to the California Air Resources Board, march 17, 2003.

U.S. Bureau of Economic Analysis (BEA), 2009. Industry and State Level GDP, 1997-2008. Last updated: Tuesday, June 02, 2009.
Available at: http://bea.gov/regional/gsp/

U. S. Bureau of Labor Statistics (BLS), 2010. U.S. 1939-current, CA 1990-current. Statewide and National Employment (Variety Sectors). Last assessed June 2010. Available at: http://www.bls.gov/data/#employment

U.S. EIA, 2010, US Energy Information Administration, Annual Energy Outlook 2010. Available at: http://www.eia.doe.gov/oiaf/aeo/

U.S. EPA. 2009. Integrated Science Assessment for PM (Final Report). http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_isa.html

U.S. EPA. 2010. Quantitative Health Risk Assessment for Particulate Matter - Final Report. http://www.epa.gov/ttnnaaqs/standards/pm/s_pm_2007_risk.html

APPENDIX A: PROPOSED REGULATION ORDER REGULATION FOR IN-USE OFF-ROAD DIESEL VEHICLES

Amend sections 2449, 2449.1, 2449.2, and 2449.3 in title 13, article 4.8, chapter 9, California Code of Regulations (CCR) to read as follows:

(Note: The amendments are shown in underline to indicate additions and ~~strikeout~~ to indicated deletions. The amendments proposed as part of the Portable Diesel Engine Regulation amendments on January 28, 2010, are still pending, and therefore are shown below in double underline to indicate additions and ~~double strikeout~~ to indicate deletions.)

Article 4.8 In-Use Off-Road Diesel-Fueled Fleets

Section 2449 General Requirements for In-Use Off-Road Diesel-Fueled Fleets

(a) Purpose

The purpose of this regulation is to reduce oxides of nitrogen (NOx), diesel particulate matter (PM), and other criteria pollutant emissions from in-use off-road diesel-fueled vehicles.

(b) Applicability

Except as provided in the paragraphs below, the regulation applies to any person, business, or government agency who owns or operates within California any diesel-fueled or alternative diesel fueled off-road compression ignition vehicle engine with maximum power of 25 horsepower (hp) or greater that is used in a two-engine crane or to provide motive power in a workover rig or to provide motive power in any other motor vehicle that (1) cannot be registered and driven safely on-road or was not designed to be driven on-road, and (2) is not an implement of husbandry or recreational off-highway vehicle. Unless they are workover rigs, two-engine cranes, or two engine water well drilling rigs, vehicles that were designed to be driven on-road, and have on-road engines~~, and still meet the original manufacturer's on-road engine emission certification standard~~ are considered on-road and are specifically excluded from this regulation, even if they have been modified so that they cannot be registered and driven safely on-road. Off-road vehicles that were designed for off-road use ~~and have off-road engines~~ are considered off-road and are subject to this regulation, even if they have been modified so that they can be driven safely on-road.

This regulation also applies to any person who sells a vehicle with such an engine within California.

Persons who provide financing in the form of "finance leases," as defined in California Uniform Commercial Code Section 10103(a)(7), for in-use off-road diesel-fueled vehicles, do not "own" such vehicles for the purposes of this regulation.

Vehicles with engines subject to this regulation are used in construction, mining, rental, government, landscaping, recycling, landfilling, manufacturing, warehousing, ski industry, composting, airport ground support equipment, industrial, and other operations. The regulation does not cover locomotives, commercial marine vessels, marine engines, recreational vehicles, or combat and tactical support equipment. The regulation also does not cover stationary or portable equipment, equipment or vehicles used exclusively in agricultural operations, or equipment already subject to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards. Off-road diesel vehicles owned and operated by an individual for personal, non-commercial, and non-governmental purposes are exempt from the provisions of this regulation.

(c) Definitions

(1) "Agricultural operations" means (1) the growing or harvesting of crops from soil (including forest operations) and the raising of plants at wholesale nurseries, but not retail nurseries), or the raising of fowl or animals for the primary purpose of making a profit, providing a livelihood, or conducting agricultural research or instruction by an educational institution, or (2) agricultural crop preparation services such as packinghouses, cotton gins, nut hullers and processors, dehydrators, and feed and grain mills. Agricultural crop preparation services include only the first processing after harvest, not subsequent processing, canning, or other similar activities. For forest operations, agricultural crop preparation services include milling, peeling, producing particleboard and medium density fiberboard, and producing woody landscape materials.

For purposes of this regulation, a vehicle that is used by its owner for both agricultural and nonagricultural operations is considered to be a vehicle engaged in agricultural operations, only if over half of its annual operating hours are for agricultural operations.

(2) "Airport ground support equipment" (GSE) is mobile diesel-fueled off-road compression ignition vehicles used to service and support aircraft operations. GSE vehicles perform a variety of functions, including but not limited to: aircraft maintenance, pushing or towing aircraft, transporting cargo to and from aircraft, loading cargo, and baggage handling. GSE vehicles include equipment types such as baggage tugs, belt loaders, and cargo loaders.

(3) "Alternative diesel fuel" means any fuel used in a compression ignition engine that is not a reformulated diesel fuel as defined in sections 2281 and 2282 of title 13, California Code of Regulations (CCR), and does not require engine or fuel system modifications for the engine to operate, although minor modifications

(e.g., recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer-Tropsch fuels, and emulsions of water in diesel fuel. A diesel fuel containing a fuel additive will be treated as an alternative diesel fuel unless:
(A) the additive is supplied to the vehicle or engine fuel by an on-board dosing mechanism, or
(B) the additive is directly mixed into the base fuel inside the fuel tank of the vehicle or engine, or
(C) the additive and base fuel are not mixed until engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.

(4) "Alternative fuel" means natural gas, propane, ethanol, methanol, gasoline (when used in hybrid electric vehicles only), hydrogen, electricity, fuel cells, or advanced technologies that do not rely on diesel fuel. "Alternative fuel" also means any of these fuels used in combination with each other or in combination with other non-diesel fuels.

(5) "Best Available Control Technology" (BACT) means the Verified Diesel Emission Control Strategy ~~exhaust retrofit~~ and ~~accelerated~~ turnover requirements in section~~s~~ 2449.1(a)(2) ~~and 2449.2(a)(2).~~

(6) "Captive a~~A~~ttainment a~~A~~rea f~~F~~leet" means a fleet or an identified subpart of the fleet (fleet portion, consistent with section 2449(d)), in which all of the vehicles in the fleet or fleet portion operate exclusively within the following counties: Alpine, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Monterey, Plumas, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Shasta, Sierra, Siskiyou, Trinity, Tehama, and Yuba. A fleet or identified fleet portion that operates one or more vehicles outside the counties listed above is not a captive attainment area fleet. Captive Attainment Area Fleets shall be treated as small fleets even if their total maximum power exceeds 2,500 horsepower.

~~***(7) "Carryover retrofit credit"***, as calculated under section 2449.2(a)(2)(A)2., means a way of tracking retrofits accomplished in excess of those required by the BACT retrofit requirements. Fleets may take credit for such excess retrofits in order to do less retrofitting in later years.~~

(7)~~(8)~~ "Carryover BACT ~~turnover credit~~", as calculated under section 2449.1(a)(2)(A)2., means a way of tracking turnover or PM VDECS installations accomplished in excess of the BACT ~~turnover~~ requirements. Fleets may take credit for such excess turnover or PM VDECS installations to do less turnover or PM VDECS installations in later years.

(8)~~(9)~~ "Combat and t~~T~~actical s~~S~~upport e~~E~~quipment" means equipment that meets military specifications, is owned by the U.S. Department of Defense

and/or the U.S. military services or its allies, and is used in combat, combat support, combat service support, tactical or relief operations or training for such operations.

(9)~~(10)~~ "Common ownership or control" means being owned or managed day to day by the same person, corporation, partnership, or association. Vehicles managed by the same directors, officers, or managers, or by corporations controlled by the same majority stockholders are considered to be under common ownership or control even if their title is held by different business entities.

(10)~~(11)~~ "Compression ignition engine" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

(11)~~(12)~~ "Dedicated s~~S~~now r~~R~~emoval v~~V~~ehicle" means a vehicle that is operated exclusively to remove snow from public roads, private roads, or other paths from which snow must be cleared to allow on-road vehicle access. Dedicated snow removal vehicles must have permanently affixed snow removal equipment such as a snow blower or auger and may include, but are not limited to, motor graders, loaders, and snow blowers.

(12)~~(13)~~ "Diesel fuel" has the same meaning as defined in title 13, CCR, sections 2281 and 2282.

(13)~~(14)~~ "Diesel p~~P~~articulate f~~F~~ilter" means an emission control strategy that reduces diesel particulate matter emissions by directing all of the exhaust through a filter that physically captures particles but permits gases to flow through. Periodically, the collected particles are either physically removed or oxidized (burned off) in a process called regeneration.

(14)~~(15)~~ "Diesel particulate matter" (diesel PM) means the particles found in the exhaust of diesel-fueled compression ignition engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties. The Air Resources Board (ARB) has identified diesel PM as a toxic air contaminant.

~~***(16) "Diesel PM Index"*** means an indicator of a fleet's overall diesel PM emission rate. The diesel PM Index for a specific fleet is determined by summing the product of the maximum power of each engine times the diesel PM Emission Factor, and dividing by the fleet's total maximum power.~~

~~***(17) "Diesel PM Target Rate"*** means the fleet average that a specific fleet must meet in a compliance year in order to show compliance with the fleet average requirements. The Diesel PM Target Rate varies depending on a fleet's~~

~~horsepower distribution. The Diesel PM Target Rate for a specific fleet for each compliance year is determined by summing (adding) the product of the maximum power of each engine times the diesel PM target, and dividing the resulting sum by the fleet's total maximum power.~~

(15)~~(18)~~ "Emergency operation" means helping alleviate an immediate threat to public health or safety. Examples of emergency operation include repairing or preventing damage to roads, buildings, terrain, and infrastructure as a result of an earthquake, flood, storm, fire, other infrequent act of nature, or terrorism. Routine maintenance or construction to prevent public health risks does not constitute emergency operation.

(16)~~(19)~~ "Emission f~~F~~actor" means ~~PM or~~ oxides of nitrogen (NOx) emission rate in grams per brake-horsepower hour (g/bhp-hr) as shown in Appendix A.~~, unless the engine is a Post-2007 Flexibility Engine (see definition)~~.

~~(A)~~ Engines certified to Family Emission Limits and flexibility engines ~~certified before January 1, 2007~~ must still use the emission factors in Appendix A.

~~(B) For engines that have been retrofit with VDECS, the PM Emission Factor is reduced 50 percent for a Level 2 VDECS, and 85 percent for a Level 3 VDECS; the NOx Emission Factor is reduced by the percentage NOx emission reductions that are verified, if any. The PM Emission Factor is not reduced for a Level 1 VDECS.~~

(17)~~(20)~~ "Equipment i~~I~~dentification n~~N~~umber" means a unique identification number assigned by ARB to each vehicle in an owner's fleet subject to this regulation. All reporting and recordkeeping will link vehicle data with this number.

(18)~~(21)~~ "Executive Officer" means the Executive Officer of the ARB or his or her authorized representative.

(19)~~(22)~~ "Family e~~E~~mission l~~L~~imit" (FEL) means an emission level that is declared by the manufacturer to serve in lieu of an emission standard for certification purposes and for the averaging, banking, and trading program, as defined in title 13, CCR, section 2423.

(20)~~(23)~~ "Fleet" means all off-road vehicles and engines owned by a person, business, or government agency that are operated within California and are subject to the regulation. A fleet may consist of one or more vehicles. A fleet does not include vehicles that have never operated in California.

(21) "Fleet average index" means an indicator of a fleet's overall emission rate. The fleet average index for a specific fleet is determined by summing the product of the maximum power of each engine times the Emission Factor, and dividing by the fleet's total maximum power.

(22) "Fleet average target rate" means the fleet average that a specific fleet must meet in a compliance year in order to show compliance with the fleet average requirements. The fleet average target rate varies depending on a fleet's horsepower distribution. The fleet average target rate for a specific fleet for each compliance year is determined by summing (adding) the product of the maximum power (Max Hp) of each engine times the target, and dividing the resulting sum by the fleet's total maximum power.

(23)~~(24)~~ ***"Fleet o~~O~~wner"*** means, except as qualified below, the person who owns and has possession of the vehicles in the fleet.

"Rental or Leased Fleets" - Vehicles that are owned by a rental or leasing company and that are leased by the same lessee for a period of one year or more may be excluded from the rental company fleet and included in the fleet of the lessee only if such arrangement is delineated in the written lease agreement.

Vehicles that are rented or leased for a period of less than one year must be included in the fleet of the rental or leasing company. Off-road vehicles and engines subject to this regulation that are owned by a lessor and leased to a lessee under a "lease" as defined in California Uniform Commercial Code, section 10103(a)(10), for a duration of at least one year, dated prior to the effective date of these regulations, are considered part of the fleet of the lessee rather than the lessor.

(24)~~(25)~~ "Fleet s~~S~~ize c~~C~~ategory" - Fleets are classified by size as described below. A fleet must meet large fleet requirements if the total vehicles under common ownership or control would be defined as a large fleet. A fleet must meet medium fleet requirements if the total vehicles under common ownership or control would be defined as a medium fleet. Individual federal or state agencies may report as separate fleets, but all vehicles owned by agencies of the United States or the State of California agencies must meet the large fleet requirements. Permanent and year-by-year l~~L~~ow-use vehicles, dedicated snow-removal vehicles, and vehicles used solely for emergency operations need not be included in the total maximum power used to classify fleets by size.

(A) "Large f~~F~~leet" – A fleet with a total maximum power (as defined below) greater than 5,000 horsepower (hp). A fleet must meet large fleet requirements if the total vehicles under common ownership or control would be defined as a large fleet. All fleets owned by the United States, the State of California, or agencies thereof (i.e., an agency in the judicial, legislative, or executive branch of the federal or state government) will be considered as a unit whole and must meet the large fleet requirements.

(B) "Medium f~~F~~leet" – A fleet that is not a small or large fleet.

(C) "Small f~~F~~leet" – A fleet with total maximum power of less than or equal to 2,500 hp that is owned by a business, non-profit organization, or local municipality, or a local municipality fleet in a low population county

irrespective of total maximum power, or a non-profit training center irrespective of total maximum power, or a captive attainment area fleet.

(25)~~(26)~~ "Forest operations" means (A) forest fire prevention activities performed by public agencies, including but not limited to construction and maintenance of roads, fuel breaks, firebreaks, and fire hazard abatement or (B) cutting or removal or both of timber, other solid wood products, including Christmas trees, and biomass from forestlands for commercial purposes, together with all the work incidental thereto, including but not limited to, construction and maintenance of roads, fuel breaks, firebreaks, stream crossings, landings, skid trails, beds for falling trees, fire hazard abatement, and site preparation that involves disturbance of soil or burning of vegetation following forest removal activities. Forest operations include the cutting or removal of trees, tops, limbs and or brush which is processed into lumber and other wood products, and or for landscaping materials, or biomass for electrical power generation. Forest operations do not include conversion of forestlands to other land uses such as residential or commercial developments.

~~***(26)(27) "Highest Level Verified Diesel Emission Control Strategy" (VDECS)***~~ ~~means the highest level VDECS verified by ARB under its *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emission from Diesel Engines* (*Verification Procedure*), title 13, CCR, sections 2700-2710, for a specific engine as of 10 months prior to the compliance date, which (1) can be used without impairing the safe operation of the vehicle as demonstrated per section 2449(e)(8), and (2) the diesel emission-control strategy manufacturer and authorized diesel emission-control strategy dealer agree can be used on a specific engine and vehicle combination without jeopardizing the original engine warranty in effect at the time of application.~~

~~Plus designations do not matter; that is, a Level 3 Plus is the same diesel PM level as Level 3; and Level 2 Plus is the same diesel PM level as Level 2.~~

~~The highest level VDECS is determined solely based on verified diesel PM reductions, not based on verified NOx reductions. All Level 3 diesel PM devices are higher than all Level 2 diesel PM devices. Level 1 devices are never considered highest level VDECS for the purpose of this regulation.~~

(26)~~(28)~~ "Hour m~~M~~eter l~~L~~og" means a log of the hours that a vehicle operated directly taken from the vehicle's hour meter.

(27)~~(29)~~ "Implement of husbandry" is as defined in California Vehicle Code (Veh.Code) division 16.

(28)~~(30)~~ "Local m~~M~~unicipality" means a city, county, city and county, special district, or other public agency, or two or more public entities acting jointly, or the duly constituted body of an Indian reservation or rancheria. Agencies of the

United States of America or the State of California, and departments, divisions, public corporations, or public agencies of this State or of the United States are not considered local municipalities.

(29)~~(31)~~ "Low- pPopulation cCounty lLocal mMunicipality fFleet" means a fleet owned by a local municipality (as defined above) that is located in a county as defined in title 13, CCR, section 2022(b)(2) and identified in section 2022(c)(2), Table 2, or, using the criteria set forth in title 13, CCR, section 2022.1(c)(4), a local municipality not located in a low-population county that has requested and has received Executive Officer approval to be treated like a municipality in a low-population county. Fleets owned by such local municipalities shall be treated as small fleets even if their total maximum power exceeds 2,500 horsepower.

~~***(32) "Low-use vehicle"*** means a vehicle that operated in California less than 100 hours during the preceding 12-month period running from March 1 to end of February. For example, when reporting in 2009, the hours of use between March 1, 2008 and February 28, 2009 would be used to determine low-use status. To be considered a low-use vehicle, the fleet owner must submit engine operation data from a functioning non-resettable hour meter.~~

~~**(A) Vehicles used outside California** - Vehicles that operate both inside and outside of California can meet the low-use vehicle definition if they are used less than 100 hours per year in California.~~

~~**(B) Three-year rolling average** - A vehicle operated only in California for the previous three years and owned by the same owner during that period will be considered low-use if it operated on average less than 100 hours per year during that previous three-year period.~~

~~**(C) Emergency operation hours** - Hours used for emergency operations are not counted when determining low-use status.~~

(30)~~(33)~~ "Maximum power" (Max Hp) means the engine's net horsepower or net flywheel power certified to Society of Automotive Engineers (SAE) Method J1349 or International Organization for Standardization (ISO) Method 9249. If the engine's net horsepower or net flywheel power certified to SAE Method J1349 or ISO Method 9249 is not readily available, another net horsepower or net flywheel power from the manufacturer's sales and service literature or horsepower from the engine label may be used.

(31)~~(34)~~ "Model year" has the same meaning as defined in title 13, CCR, section 2421(a)(37).

(32)~~(35)~~ "Motor vehicle" has the same meaning as defined in Veh. Code section 415.

(33)~~(36)~~ "New fleet" means a fleet that is acquired or that enters California after January 1, 2011 ~~March 1, 2009~~. Such fleets may include new businesses or out-

of-state businesses that bring vehicles into California for the first time after January 1, 2011 ~~March 1, 2009.~~

~~***(37) "NOx index"*** means an indicator of a fleet's overall NOx emission rate. The NOx Index for a specific fleet is determined by summing the product of the maximum power of each engine times the NOx Emission Factor, and dividing by the fleet's total maximum power.~~

~~***(38) "NOx target rate"*** means the NOx fleet average that a specific fleet must meet in a compliance year in order to show compliance with the fleet average requirements. The NOx Target Rate varies depending on a fleet's horsepower distribution. The NOx Target Rate for a specific fleet for each compliance year is determined by summing (adding) the product of the maximum power (Max Hp) of each engine times the NOx target, and dividing the resulting sum by the fleet's total maximum power.~~

(34)~~(39)~~ "Non- pProfit tTraining cCenter" means an entity that operates a program for training in the use of off-road vehicles and that (A) is a community college program that trains students in the use of off-road vehicles or (B) qualifies as a non profit or not for profit organization under title 26 Internal Revenue Code section 501(a), (c)(3), (c)(5), or (c)(6). Any vehicles that are not used for an off-road training program are not considered part of a non-profit training center and must be considered a separate fleet.

(35)~~(40)~~ "Off-highway vehicle" is defined in Veh. Code division 16.5.

(36)~~(41)~~ "Operator lLog" means a log of the hours that a vehicle operated taken from records of vehicle operator hours.

(37)~~(42)~~ "Oxides of nitrogen" (NOx) means compounds of nitric oxide, nitrogen dioxide, and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition.

(38) "Permanent low-use vehicle" means a vehicle that a fleet owner limits to 200 hours of use in all following years, defined as the 12-month period running from January 1 through December 31. For example, if a fleet designates a vehicle as permanent low-use at any point in 2014, that vehicle cannot be used more than 200 hours between January 1, 2015, and December 31, 2015, or during any subsequent January 1 to December 31 period. To be considered a permanent low-use vehicle, the fleet owner must submit the engine hours of operation from a functioning non-resettable hour meter.

(A) Vehicles used outside California - Vehicles that operate both inside and outside of California can meet the permanent low-use vehicle definition if they are used less than 200 hours per year in California.

(B) Emergency operation hours - Hours used for emergency operations are not counted when determining permanent low-use status.

(C) Future increase in hours – Once designated as permanent low use, a vehicle may never again be used more than 200 hours per year by the fleet unless the vehicle meets the adding vehicles requirements in section 2449(d)(6). If the vehicle meets the adding vehicle requirements, the fleet may increase the use to over 200 hours per year, and report the updated status of the vehicle to remove the low-use designation.

(D) No obligation – A fleet is not obliged to designate a vehicle whose use drops below 200 hours per year as a permanent low-use vehicle. If such a vehicle is not designated as permanent low use, its use may increase beyond 200 hours per year in subsequent years without meeting the adding vehicles requirements in section 2449(d)(6).

(39) ~~*(43)*~~ ***"Post-2007 fFlexibility eEngine"*** means an engine certified on or after January 1, 2007 to the implementation flexibility standards in title 13, CCR, section 2423(d). Such flexibility engines are generally labeled as follows by the engine manufacturer:

"THIS ENGINE COMPLIES WITH CALIFORNIA EMISSION REQUIREMENTS UNDER 13 CCR 2423(d)..." or
"THIS ENGINE CONFORMS TO CALIFORNIA OFF-ROAD COMPRESSION-IGNITION ENGINE REGULATIONS UNDER 13 CCR, 2423(d)."

~~Post-2007 flexibility engines should use the emission standard to which the engine is certified. For example, a Tier 4 engine flexed back to Tier 2 emission levels should use the Tier 2 PM standard in title 13, CCR, section 2423(b)(1)(A) as the emission factor (converted from grams per kilowatt hour (g/kW-hr) to g/bhp-hr by multiplying by 0.746).~~

(40) ~~*(44)*~~ ***"Queuing"*** means the intermittent starting and stopping of a vehicle while the driver, in the normal course of doing business, is waiting to perform work or a service, and when shutting the vehicle engine off would impede the progress of the queue and is not practicable. Queuing does not include the time a driver may wait motionless in line in anticipation of the start of a workday or opening of a location where work or a service will be performed.

(41) ~~*(45)*~~ ***"Registered and driven safely on-road"*** means a vehicle meets the requirements to be registered for on-road operation in Veh. Code division 3, chap. 1, article 1, sections 4000 et seq. (i.e., required to be registered or could be registered), and the requirements to be driven safely on-road in "Equipment of Vehicles" requirements in Veh. Code division 12, chap. 1, sections 24000 et seq. and "Size, Weight, and Load" requirements in Veh. Code division 15, sections 35000 et seq. Having a California Special Construction Equipment

plate as defined in California Veh. Code sections 565 and 570 does not constitute registration.

(42)~~(46)~~ "Replacement" means the addition of off-road diesel vehicles to a fleet that had retired one or more off-road diesel vehicles of an equivalent horsepower.

(43)~~(47)~~ "Repower" means to replace the engine in a vehicle with another engine meeting a subsequent engine emissions standard (e.g., replacing a Tier 0 engine with a Tier 2 or later engine).

(44)~~(48)~~ "Responsible o~~O~~fficial" means one of the following:

(A) For a corporation: A president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation,

(B) For a partnership or sole proprietorship: a general partner or the proprietor, respectively

(C) For a municipality, state, federal, or other public agency: either a principal executive officer or ranking elected official. For the purposes of this part, a principal executive officer of a federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., a Regional Administrator of the U.S. EPA).

(45)~~(49)~~ "Retire" means to take an engine out of service and not operate it again in the State of California. To retire an engine, the vehicle with the engine may be moved outside of California, sold, or scrapped.

(46)~~(50)~~ "Snow removal operations" means removing snow from public roads, private roads, or driveways.

(47)~~(51)~~ "Specialty vehicle" means a vehicle for which no used vehicle with a cleaner engine that can serve an equivalent function and perform equivalent work is available.

(48)~~(52)~~ "Tier 0 e~~E~~ngine" means an engine not subject to the requirements in title 13, CCR, section 2423; Title 40, Code of Federal Regulations (CFR), Part 89; or Title 40, CFR, Part 1039.

(49)~~(53)~~ "Tier 1 e~~E~~ngine" means an engine subject to the Tier 1 new engine emission standards in title 13, CCR, section 2423(b)(1)(A) and/or Title 40, CFR, Part 89.112(a). This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 1 Family Emission Limits (FEL) listed in title 13, CCR, section 2423(b)(2)(A) and/or Title 40, CFR, Part 89.112(d).

(50)~~(54)~~ "Tier 2 e~~E~~ngine" means an engine subject to the Tier 2 new engine emission standards in title 13, CCR, section 2423(b)(1)(A) and/or Title 40, CFR, Part 89.112(a). This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 2 FEL listed in title 13, CCR, section 2423(b)(2)(A) and/or Title 40, CFR, Part 89.112(d).

(51)~~(55)~~ "Tier 3 e~~E~~ngine" means an engine subject to the Tier 3 new engine emission standards in title 13, CCR, section 2423(b)(1)(A) and/or Title 40, CFR, Part 89.112(a). This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 3 FEL listed in title 13, CCR, section 2423(b)(2)(A) and/or Title 40, CFR, Part 89.112(d).

(52)~~(56)~~ "Tier 4 Final e~~E~~ngine" means an engine subject to the final after-treatment-based Tier 4 emission standards in title 13, CCR, section 2423(b)(1)(B) and/or Title 40, CFR, Part 1039.101. This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 4 FEL listed in title 13, CCR, section 2423(b)(2)(B) and/or Title 40, CFR, Part 1039.101.

(53)~~(57)~~ "Tier 4 Interim e~~E~~ngine" means an engine subject to the interim Tier 4 emission standards (also known as transitional) in title 13, CCR, section 2423(b)(1)(B) and/or Title 40, CFR, Part 1039.101. This also includes engines certified under the averaging, banking, and trading program with respect to the Tier 4 FEL listed in title 13, CCR, section 2423(b)(2)(B) and/or Title 40, CFR, Parts ~~1039.101~~1039.102 and 1039.104(g).

(54)~~(58)~~ "Total maximum power" means the sum of maximum power for all of a fleet's engines that are subject to this regulation. Permanent and year-by-year l~~L~~ow-use vehicles, dedicated snow-removal vehicles, and vehicles used solely for emergency operations need not be included in the sum.

(55) "Turnover" means retiring a vehicle, designating a vehicle that formerly operated 200 hours or more per year as a permanent low-use vehicle, repowering a vehicle, rebuilding the engine to a more stringent emissions configuration, or applying a Verified Diesel Emission Control Strategy verified to reduce NOx emissions.

(56)~~(59)~~ "Two- e~~E~~ngine c~~C~~rane" means a mobile diesel-powered machine with a hoisting mechanism mounted on a specially constructed truck chassis or carrier; one engine provides motive power, and a secondary engine is used to lift and move materials and objects.

(57) "Two-engine water well drilling rig" means a mobile diesel-powered drilling rig owned by a water well drilling contractor with a current, valid C-57 license issued by the Contractors State License Board of California and used exclusively to drill water wells with a drilling mechanism mounted on a specialty constructed

truck chasses or carrier; one engine provides motive power, and a secondary engine is used to power the drilling mechanism.

(58)~~(60)~~ "Verified Diesel Emission Control Strategy" (VDECS) means an emissions control strategy~~, designed primarily for the reduction of diesel PM emissions,~~ which has been verified pursuant to the *Verification Procedures, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emission from Diesel Engines (Verification Procedure), title 13, CCR, sections 2700-2710.* VDECS can be verified to reduce PM emissions, or NOx emissions, or both. ~~VDECS can be verified to achieve Level 1 diesel PM reductions (25 percent), Level 2 diesel PM reductions (50 percent), or Level 3 diesel PM reductions (85 percent). VDECS may also be verified to achieve NOx reductions. See also definition of Highest Level VDECS.~~

(A) *"Highest level PM VDECS"* means the highest level VDECS verified by ARB to reduce PM under its Verification Procedure. The highest level is determined solely based on verified diesel PM reductions, not based on verified NOx reductions. VDECS can be verified to achieve Level 1 diesel PM reductions (25 percent), Level 2 diesel PM reductions (50 percent), or Level 3 diesel PM reductions (85 percent). All Level 3 diesel PM devices are higher than all Level 2 diesel PM devices. Level 1 PM devices are never considered highest level PM VDECS for the purpose of this regulation. Plus designations do not matter; that is, a Level 3 Plus is the same diesel PM level as Level 3; and Level 2 Plus is the same diesel PM level as Level 2. A PM VDECS shall be considered the highest level PM VDECS only if it (1) can be used without impairing the safe operation of the vehicle as demonstrated per section 2449(e)(8), and (2) the diesel emission-control strategy manufacturer and authorized diesel emission-control strategy dealer agree can be used on a specific engine and vehicle combination without jeopardizing the original engine warranty in effect at the time of application.

(B) "VDECS verified to *r*educe NOx" means VDECS verified by ARB to reduce NOx under its Verification Procedure. NOx VDECS are not verified by Level, but are verified by the percent reduction in NOx emissions from the engine achieved by the VDECS. See also definition of Verified Percent NOx Reduction.

(59) "Verified percent NOx reduction" means the verified percent reduction in NOx emissions from the engine achieved by the VDECS Verified to Reduce NOx.

(60)~~(61)~~ "VDECS f~~F~~ailure" means the condition of not achieving the emissions reductions to which the VDECS is verified. Such condition could be due to inappropriate installation, damage, or deterioration during use. If a Level 3 VDECS is emitting visible smoke, it ~~should~~shall be assumed to have failed.

(61)~~(62)~~ "Workover rig" means a mobile self-propelled rig used to perform one or more remedial operations, such as deepening, plugging back, pulling and

resetting liners, on a producing oil or gas well to try to restore or increase the well's production.

(62) "Year-by-year low-use vehicle" means a vehicle that operated in California less than 200 hours during the preceding 12-month period running from January 1 to December 31. For example, when reporting in 2014, the hours of use between January 1, 2013 and December 31, 2013 would be used to determine year-by-year low-use status. To be considered a year-by-year low-use vehicle, the fleet owner must submit engine operation data from a functioning non-resettable hour meter.

(A) Vehicles used outside California - Vehicles that operate both inside and outside of California can meet the year-by-year low-use vehicle definition if they are used less than 200 hours per year in California.

(B) Three-year rolling average - A vehicle operated only in California for the previous three years and owned by the same owner during that period will be considered year-by-year low-use if it operated on average less than 200 hours per year during that previous three-year period.

(C) Emergency operation hours - Hours used for emergency operations are not counted when determining year-by-year low-use status.

(d) Performance Requirements –

Fleets that are subject to fleet average requirements may include vehicles and systems used in place of diesel vehicles in their fleet average index and target rate calculations as described in subsection (1) below. ~~Fleets that are subject to fleet average requirements may opt to include hours of operation in the fleet average calculation as described in subsection (2) below.~~ Each fleet must meet the performance requirements in subsections ~~(3) to (10)~~(2) to (9) below. There are differing requirements for large, medium, and small fleets. If various portions of a fleet are under the control of different responsible officials because they are part of different subsidiaries, divisions, or other organizational structures of a company or agency, the fleet portions may comply with the performance requirements separately and be reported separately. However, the total maximum power of the vehicles under common ownership or control determines the fleet size. Captive attainment area fleets, non-profit training centers, and ~~F~~fleets owned by low-population county local municipalities are subject to the small fleet requirements, even if their total maximum power exceeds 2,500 horsepower. Section ~~2449(d)(4)~~2449(d)(3) describes requirements for fleets that change in size.

(1) Vehicles and Systems Used in Place of Diesel Vehicles - Fleets with electric, ~~or~~ alternative fuel, or gasoline-powered vehicles may include such vehicles in their fleet average index and target rate calculations as follows:

(A) ~~Electric and~~ Alternative Fuel and Gasoline-powered Vehicles ~~Purchased on or after January 1, 2007~~

1. Fleets may include an ~~electric and~~ alternative fuel or gasoline-powered vehicle ~~purchased on or after January 1, 2007,~~ with a maximum power 25 horsepower or greater ~~(~~or that replaced a diesel vehicle with maximum

power 25 horsepower or greater~~)~~ in their fleet average index if all of the following conditions are met:

a. The owner can demonstrate it serves a function and performs the work equivalent to that of diesel vehicles and is used for a purpose for which diesel vehicles are predominantly used,

b. The ~~electric or alternative fuel~~ vehicle is used predominantly outdoors,

c. The ~~electric or alternative fuel~~ vehicle is not already included in the fleet average emission level requirements for large spark ignition engine fleets in title 13, Section 2775.1; and

d. ~~If the vehicle is an alternative fuel vehicle, t~~The owner must demonstrate that it is certified to a NOx standard less than or equal to the Tier 1 NOx standard for the same horsepower in title 13, CCR, section 2423(b)(1)(A) and is less than or equal to the NOx emissions of a diesel engine of the same model year and horsepower.

e. If the vehicle is a gasoline-powered vehicle, the owner can identify the diesel vehicle that the gasoline-powered vehicle replaced and show that the diesel vehicle was retired from the fleet within 6 months of the date that the gasoline-powered vehicle was added to the fleet.

2. Fleets may include a diesel vehicle with a maximum power 25 horsepower or greater that has been repowered with an alternative fueled or gasoline-powered engine in their fleet average index and target rate calculations.

3. For the purposes of compliance with section 2449.1(a)(1):

a. Alternative fuel vehicles - Each alternative fuel vehicle, or diesel vehicle that has been repowered with an alternative fuel engine, shall use an Emission Factor equal to the NOx emission standard to which its engine is certified in g/bhp-hr. If the alternative fuel vehicle or engine is not certified to a NOx emission standard, the owner may apply to the Executive Officer to use an emission factor. In the application, the owner must demonstrate that the chosen emission factor is appropriate and not exceeded by the alternative fuel vehicle.

b. Gasoline-powered vehicles – Each gasoline powered vehicle, or vehicle that has been repowered with a gasoline-powered engine, shall use an Emission Factor equal to the gasoline-powered vehicle's or engine's HC+NOx certified emission standard in g/bhp-hr multiplied by 0.95.

4.~~2.~~ Fleets may include a diesel vehicle with a maximum power 25 horsepower or greater that has been converted to alternative fuel or gasoline-power in their fleet average index and target rate calculations. The Emission Factor ~~for NOx~~ remains the same as the emission factor for the diesel vehicle. ~~The Emission Factor for PM is 0.~~

~~3. For the purposes of compliance with sections 2449.1(a)(1) and 2449.2(a)(1), electric vehicles shall be credited as follows:~~

~~**a. Max Hp for Electric Vehicles** - For an electric vehicle that replaced a diesel vehicle in the owner's fleet, the maximum power of the diesel vehicle replaced may be used as the electric vehicle's *Max Hp*. For an electric vehicle added to the fleet, the fleet owner may apply to the~~

~~Executive Officer to use the maximum power of a diesel vehicle that serves the same function and performs equivalent work to that of the electric vehicle. In making his or her determination, the Executive Officer will approve the use of the minimum *Max Hp* of a diesel vehicle that would be required to perform the same functions and equivalent work. If no request to the Executive Officer is received, the electric vehicle's own maximum power rating should~~shall be used.

~~**b. Double Credit for Electric in 2010-2016** - For compliance dates in 2010 through 2016, the *Max Hp* of all electric vehicles purchased on or after January 1, 2007 may be doubled in determining the *Max Hp* that is used in calculating the Diesel PM Index, and as appropriate, NOx Index. An *Emission Factor* of 0 may be used. The *Max Hp* of each electric vehicle is included but not doubled in the calculation of Diesel PM Target Rate and NOx Target Rate.~~

~~**c. Single Credit for Electric in 2017 and Later** - For compliance dates in year 2017 and later, the *Max Hp* of all electric vehicles purchased on or after January 1, 2007 is used in determining the *Max Hp* that is used in calculating the Diesel PM and NOx Target Rates, Diesel PM Index, and, as appropriate, NOx Index. An *Emission Factor* of 0 may be used.~~

~~4. For the purposes of compliance with sections 2449.1(a)(1) and 2449.2(a)(1), each alternative fuel vehicle should~~shall use an Emission Factor equal to the emission standard to which its engine is certified in g/bhp-hr. If the alternative fuel vehicle is not certified to a NOx or diesel PM emission standard, the owner may apply to the Executive Officer to use an emission factor. In the application, the owner must demonstrate that the chosen emission factor is appropriate and not exceeded by the alternative fuel vehicle.

(B) Electric Vehicles ~~and Alternative Fuel Vehicle Purchased Prior to January 1, 2007~~

1. Fleets may include an electric vehicle with a maximum power 25 horsepower or greater ~~(~~or that replaced a diesel vehicle with maximum power 25 horsepower or greater~~)~~ in their fleet average index if all the following conditions are met:
   a. The owner can demonstrate it serves a function and performs the work equivalent to that of diesel vehicles and is used for a purpose for which diesel vehicles are predominantly used;
   b. The electric vehicle is used predominately outdoors; and
   c. The electric vehicle is not already included in the fleet average emission level requirements for large spark ignition engine fleets in title 13, Section 2775.1.
2. For the purposes of compliance with sections 2449.1(a)(1), electric vehicles shall be credited as follows:
   a.~~1.~~ **GSE Electric Vehicles Purchased Prior to January 1, 2007 -** ~~:~~ Electric airport GSE vehicles with a maximum power of 25 horsepower or greater ~~(~~or that replaced a diesel vehicle with maximum power 25

horsepower or greater~~)~~ purchased prior to January 1, 2007, may be partially counted in the fleet average calculations as follows:

i.~~a.~~ Max Hp for Electric Vehicles - For an electric vehicle that replaced a diesel vehicle in the owner's fleet, the maximum power of the diesel vehicle replaced may be used as the electric vehicle's *Max Hp*. Otherwise, the electric vehicle's own maximum power rating ~~should~~shall be used.

ii.~~b.~~ Include such vehicle's *Max Hp* times 0.2 as the *Max Hp* in calculating the Fleet Target Rate~~, Diesel PM Index,~~ and, as appropriate, ~~NOx~~ Fleet Average Index in section~~s~~ 2449.1(a)(1), along with an Emission Factor of 0.

b. Non-GSE Electric Vehicles Purchased Prior to January 1, 2007 – Electric vehicles with a maximum power of 25 horsepower or greater or that replaced a diesel vehicle with maximum power 25 horsepower or greater, purchased prior to January 1, 2007, may be counted in the fleet average calculations as follows:

i. Max Hp for Electric Vehicles - For an electric vehicle that replaced a diesel vehicle in the owner's fleet, the maximum power of the diesel vehicle replaced may be used as the electric vehicle's *Max Hp*. Otherwise, the electric vehicle's own maximum power rating shall be used.

ii. Include such vehicle's *Max Hp* as the *Max Hp* in calculating the Fleet Target Rate, and, as appropriate, the Fleet Average Index in section 2449.1(a)(1), along with an Emission Factor of 0.

c. Electric Vehicles Purchased on or after January 1, 2007

i. Max Hp for Electric Vehicles - For an electric vehicle that replaced a diesel vehicle in the owner's fleet, the maximum power of the diesel vehicle replaced may be used as the electric vehicle's *Max Hp*. For an electric vehicle added to the fleet, the fleet owner may apply to the Executive Officer to use the maximum power of a diesel vehicle that serves the same function and performs equivalent work to that of the electric vehicle. In making his or her determination, the Executive Officer will approve the use of the minimum *Max Hp* of a diesel vehicle that would be required to perform the same functions and equivalent work. If no request to the Executive Officer is received, the electric vehicle's own maximum power rating shall be used.

ii. Double Credit for Electric in 2014-2016 - For compliance dates in 2014 through 2016, the *Max Hp* of all electric vehicles purchased on or after January 1, 2007 may be doubled in determining the *Max Hp* that is used in calculating the Fleet Average Index. An Emission Factor of 0 may be used. The *Max Hp* of each electric vehicle is included but not doubled in the calculation of Fleet Average Target Rate.

iii. Single Credit for Electric in 2017 and Later - For compliance dates in year 2017 and later, the *Max Hp* of all electric vehicles

purchased on or after January 1, 2007 is used in determining the *Max Hp* that is used in calculating the Fleet Average Target Rate, and the Fleet Average Index. An Emission Factor of 0 may be used.

3. Electric vehicles need not be included when determining fleet size, or when calculating the required horsepower for the BACT requirements in section 2449.1(a)(2).

~~2. Non-GSE:~~

~~a. Fleet owners may count a non-GSE electric or alternative fuel vehicle purchased prior to January 1, 2007 in the fleet average calculations if all of the following conditions are met:~~

~~i. The owner can demonstrate it serves a function and performs the work equivalent to that of diesel vehicles and is used for a purpose for which diesel vehicles are predominantly used,~~

~~ii. the electric or alternative fuel vehicle is used predominantly outdoors,~~

~~iii. the vehicle is not already counted toward the fleet average emission level requirements for large spark ignition engine fleets in title 13, CCR, section 2775.1; and~~

~~iv. if the vehicle is alternative fuel vehicle with a certified NOx emission level, the certified NOx emission levels are lower than the NOx standard for the same model year and horsepower in section 2423(b)(1) and Title 40, CFR, Part 89.112(a) and Title 40, CFR, Part 1039.101.~~

~~b. Include such vehicle's *Max Hp* as the *Max Hp* in the calculating the Target Rate, Diesel PM Index, and, as appropriate, NOx Index in sections 2449.1(a)(1) and 2449.2(a)(1). For an electric vehicle, use an *Emission Factor* of 0. For an alternative fuel vehicle, use an Emission Factor equal to the emission standard to which its engine is certified in g/bhp-hr. If the alternative fuel vehicle is not certified to a NOx or diesel PM emission standard, the owner may apply to the Executive Officer to use an emission factor. In the application, the owner must demonstrate that the chosen emission factor is appropriate and not exceeded by the alternative fuel vehicle.~~

(C) Stationary or Portable System Used to Replace Mobile Diesel Vehicle

Fleet owners may apply to the Executive Officer to include electric portable or electric stationary systems that replace mobile diesel vehicles, such as an electric conveyor system used to replace diesel haul trucks at a mine, in the fleet average calculations. The system may be considered in the fleet average calculations by including the maximum power of the diesel vehicles replaced in the calculations of the Fleet Average Target Rate, ~~Diesel PM Index,~~ and ~~NOx~~ Fleet Average Index above, along with an Emission Factor of 0. In order to count such a system, all the following conditions must be met:

1. The owner must demonstrate that it replaced an off-road diesel fueled vehicle subject to this regulation on or after January 1, 2007, and

2. The system is not already counted toward the fleet average emission level requirements for large spark ignition engine fleets in title 13, CCR, section 2775.1 or for portable diesel engine fleets in title 17, CCR, section 93116.3.

(D) Hybrid Off-Road Vehicles

Fleets may include a hybrid off-road diesel vehicle with a maximum power 25 horsepower or greater in their fleet average index and target rate calculation. The Emission Factor for the hybrid vehicle shall be equal to the NOx emission standard to which its engine is certified in g/bhp-hr. If a fleet owner wishes to use different Emission Factor, other than the standard to which the engine is certified, the owner may apply to the Executive Officer to use an alternative emission factor. The Executive Officer shall approve the alternative emission factor if, in the fleet owner's application, the owner demonstrates that the chosen emission factor is appropriate and not exceeded by the hybrid vehicle.

~~**(D) Gasoline-Powered Vehicles Used to Replace Diesel Vehicles** - Fleets may include a gasoline-powered vehicle of 25 horsepower or greater that replaces a diesel vehicle on or after January 1, 2007 in their fleet average only if all the following conditions are met:~~

~~1. The owner can identify the diesel vehicle that the gasoline-powered vehicle replaced and show that the diesel vehicle was retired from the fleet within 6 months of the date that the gasoline-powered vehicle was added to the fleet.~~

~~2. The gasoline-powered vehicle serves the same function as the diesel vehicle that it replaced and is of similar horsepower.~~

~~3. The fleet would continue to be in compliance with the fleet average emission level requirements for large spark ignition engine fleets in title 13, CCR, section 2775.1 if the gasoline-powered vehicle that replaces a diesel vehicle were excluded from the large spark ignition average.~~

~~4. The owner must demonstrate the gasoline-powered vehicle is certified to a NOx standard less than or equal to the Tier 1 NOx standard for the same horsepower in title 13, CCR, section 2423(b)(1)(A) and less than or equal to the NOx emissions of a diesel engine of the same model year and horsepower.~~

~~If qualified, the gasoline-powered vehicle may use the maximum horsepower of the diesel vehicle replaced, a diesel PM emission factor of zero (0), and a NOx emission factor equal to the gasoline-powered vehicle's HC+NOx certified emission standard in g/bhp-hr multiplied by 0.95.~~

~~***(2) Hours in Fleet Average Option*** – As an alternative to the formulas for calculating NOx index and diesel PM index in sections 2449.1(a)(1) and 2449.2(a)(1), fleet owners may opt to include annual hours of operation for all engines in the fleet on the compliance date in the calculation as follows:~~

~~NOx Index = 1.18 times [SUM of (Max Hp for each engine in fleet on compliance date multiplied by NOx Emission Factor for each engine in fleet on~~

~~compliance date multiplied by Annual Hours of Operation for each engine in fleet on compliance date since the previous year's compliance date)] divided by [SUM of (Max Hp for each engine in fleet on compliance date multiplied by Annual Hours of Operation for each engine in fleet on compliance date since the previous year's compliance date)]~~

~~Diesel PM Index = 1.18 times [SUM of (Max Hp for each engine in fleet on compliance date multiplied by PM Emission Factor for each engine in fleet on compliance date multiplied by Annual Hours of Operation for each engine in fleet on compliance date since the previous year's compliance date)] divided by [SUM of (Max Hp for each engine in fleet on compliance date multiplied by Annual Hours of Operation for each engine in fleet on compliance date since the previous year's compliance date)]~~

~~Fleets that choose this option must have non-resettable hour meters on each vehicle in the fleet and must include hours in all index calculations for the compliance date.~~

(2)~~(3)~~ Idling - The idling limits in section ~~2449(d)(3)~~2449(d)(2) shall be effective and enforceable immediately upon this regulation being certified by the Secretary of State. Fleets must meet the following idling limits.

(A) Idling Limit - No vehicle or engines subject to this regulation may idle for more than 5 consecutive minutes. Idling of a vehicle that is owned by a rental company is the responsibility of the renter or lessee, and the rental agreement ~~should~~shall so indicate. The idling limit does not apply to:

1. idling when queuing,
2. idling to verify that the vehicle is in safe operating condition,
3. idling for testing, servicing, repairing or diagnostic purposes,
4. idling necessary to accomplish work for which the vehicle was designed (such as operating a crane),
5. idling required to bring the machine system to operating temperature, and
6. idling necessary to ensure safe operation of the vehicle.

(B) Written Idling Policy - As of March 1, 2009, medium and large fleets must also have a written idling policy that is made available to operators of the vehicles and informs them that idling is limited to 5 consecutive minutes or less.

(C) Waiver - A fleet owner may apply to the Executive Officer for a waiver to allow additional idling in excess of 5 consecutive minutes. The Executive Officer shall grant such a request upon finding that the fleet owner has provided sufficient justification that such idling is necessary.

(3)~~(4)~~ Changing Fleet Size –

(A) Small fleets that become medium or large fleets must meet the medium or large fleet requirements, respectively, on the reporting date two years subsequent to the year they became a medium or large fleet.
(B) Large fleets that become medium fleets may meet either the medium or large fleet requirements on the next reporting date. Large fleets that become small fleets may meet either the small or large fleet requirements on the next reporting date.
(C) Medium fleets that become small fleets may meet either the small or medium fleet requirements on the next reporting date. Medium fleets that become large fleets must meet the large fleet requirements on the reporting date two years subsequent to the year they became a large fleet.

(4)~~(5)~~ New Fleets

(A) New large and medium fleets – New large and medium fleets must meet the closest future large fleet average requirements~~s~~ in sections 2449.1(a)(1) ~~and 2449.2(a)(1)~~ immediately on purchasing vehicles subject to the regulation or bringing such vehicles into the State of California for the first time after January 1, 2011 ~~March 1, 2009~~. New fleets do not have the option of complying with the BACT requirements in section~~s~~ 2449.1(a)(2) ~~and 2449.2(a)(2)~~ when they enter the state for the first time. For the next applicable compliance date that must be met, the new fleet can choose to meet either the fleet average requirements, or comply with the BACT requirements. For example, if a medium fleet enters the State of California on January 1, 2012, it must meet the January 1, 2014 large fleet average requirements immediately upon entering the state. However, the next applicable compliance date for this fleet is not until the first medium fleet compliance date of January 1, 2017, at which time, the fleet may fulfill the compliance requirements by meeting either the fleet average requirements or the BACT requirements.

(B) New small fleets – New small fleets must meet the fleet average requirements in section 2449.1(a)(1)(A)1.b. for the closest future small fleet compliance date immediately upon purchasing vehicles subject to the regulation or bringing such vehicles into the State of California for the first time after January 1, 2011. New small fleets do not have the option of complying with the BACT requirements in section 2449.1(a)(2) when they enter the state for the first time. For the next applicable compliance date that must be met, the new fleet can meet either the fleet average requirements, or comply with the BACT requirements.

(C) All new fleets - New fleets must comply with the idling requirements in section ~~2449(d)(3)~~2449(d)(2) immediately upon purchasing vehicles subject to the regulation or upon bringing such vehicles into the State. New fleets must report vehicles subject to the regulation to ARB within 30 days of purchasing or bringing such vehicles into the State, in accordance with the requirements in section 2449(g).

(5)~~(6)~~ Fleet Ownership Transferred – If ownership of an entire fleet that was meeting the BACT requirements in lieu of the fleet average requirements is transferred to a new fleet owner who did not own a fleet before the transfer of ownership, the fleet may continue to meet the BACT requirements. That is, transfer of ownership to a new owner who did not own a fleet before does not automatically require the fleet to begin meeting the fleet average requirements in sections 2449.1(a)(1) ~~and 2449.2(a)(1)~~. Existing fleets may acquire other entire fleets without condition if both fleets were in compliance with the individual fleet requirements. If existing fleets acquire portions of fleets or entire fleets that did not previously comply with the regulation, however, they must meet the requirements for adding vehicles in section ~~2449(d)(7)~~2449(d)(6) when adding the entire fleet.

(6)~~(7)~~ Adding Vehicles – The requirements in (A) ~~to~~ through (C) below apply to all fleets, except they do not apply to vehicles owned by a lessor and returned to the lessor fleet at the end of a lease, during which the vehicles were included in the fleet of the lessee. Vehicles returned to a lessor fleet must, however, be included in the lessor fleet's fleet average demonstration on subsequent compliance dates. For the purposes of this requirement, a vehicle may be assumed to meet the engine emission standard tier in effect for the model year of the engine.

(A) ~~Beginning March 1, 2009~~Ban on adding Tier 0s – Effective upon the United States Environmental Protection Agency (U.S. EPA) issuing authorization for this regulation,~~Beginning March 1, 2009~~ a fleet may not add a vehicle with a Tier 0 engine to its fleet. The engine tier must be Tier 1 or higher.

(B) Tier 2 or higher –Beginning March 1, 2011, for large and medium fleets, a fleet may add a vehicle with a Tier 1 engine if and only if the vehicle has an EIN number that ARB assigned to the vehicle prior to March 1, 2011, and both the fleet selling and the fleet purchasing the vehicle with the Tier 1 engine must have reported to ARB by March 1, 2011, or have entered the state for the first time after March 1, 2011. Beginning March 1, 2011, fleets may not add a Tier 1 vehicle that did not have an EIN assigned by ARB prior to March 1, 2011. Beginning on January 1, 2013, for large and medium fleets, and January 1, 2016, for small fleets, a fleet may not add any vehicle with a Tier 1 engine. The engine tier must be Tier 2 or higher.

(C) Tier 3 or higher – Beginning January 1, 2018, for large and medium fleets, and January 1, 2023, for small fleets, a fleet may not add a vehicle with a Tier 2 engine to its fleet. The engine tier must be Tier 3 or higher.

~~**(B) Between the First and Final Target Dates** - The following requirements apply between March 1, 2010 and March 1, 2020 for large fleets, between March 1, 2013 and March 1, 2020 for medium fleets, and between March 1, 2015 and March 1, 2025 for small fleets.~~

~~**1. Fleets Meeting the Target Rates** - If a fleet met the fleet average target rates in sections 2449.1(a)(1) and 2449.2(a)(2) on the previous compliance date, when it adds a vehicle to its fleet, the fleet must~~

~~demonstrate that the fleet still meets the fleet average target rates within three months of adding the vehicle. That is, fleets may not add vehicles that cause them to exceed the most recent fleet average target rates. The added vehicle also must be included in the fleet average demonstration required in sections 2449.1(a) and 2449.2(a) on the next compliance date.~~

~~**2. Fleets Not Meeting the Fleet Average Targets** - If a fleet did not meet the fleet average requirements in sections 2449.1(a)(1) and 2449.2(a)(1) on the previous compliance date, the fleet may not add a vehicle to its fleet that would further increase its emissions above the fleet average target rate, as described below.~~

~~**a. Large and Medium Fleets** - A large or medium fleet that met the BACT requirements in sections 2449.1(a)(2) and 2449.2(a)(2) instead of the fleet average requirements in sections 2449.1(a)(1) and 2449.2(a)(1) on the most recent compliance date may not add a vehicle to its fleet unless all of the following conditions are met:~~

~~i. The engine is Tier 2 or higher. (For the purposes of this requirement, a vehicle may be assumed to meet the new engine emission standard tier in effect for the model year unless the engine is a flexibility engine certified January 1, 2007 or later to the implementation flexibility standards at title 13 CCR, section 2423(d), in which case the emission standard tier to which the engine is certified should be used.).~~

~~ii. The vehicle engine's NOx Emission Factor (after being adjusted for any VDECS) is less than or equal to the NOx Target in Table 1 for engines in the same horsepower group for the most recent compliance date.~~

~~**b. Small Fleets** – A small fleet that met the BACT requirements in section 2449.2(a)(2) instead of the fleet average requirements in section 2449.2(a)(1) on the most recent compliance date may not add a vehicle to its fleet unless the following condition is met:~~
~~The vehicle engine is Tier 2 or higher. (For the purposes of this requirement, a vehicle may be assumed to meet the new engine emission standard tier in effect for the model year unless the engine is a flexibility engine certified January 1, 2007 or later to the implementation flexibility standards at title 13 CCR, section 2423(d), in which case the emission standard tier to which the engine is certified should be used).~~

~~**(C) After the Final Target Date** - Commencing respectively on March 1, 2020 for large and medium fleets, and March 1, 2025 for small fleets, no fleet owner may add a vehicle to his fleet, unless the vehicle is equipped with an engine meeting the Tier 3, Tier 4 interim, or Tier 4 final emission standards.~~

(7)~~(8)~~ VDECS Installation – Before installing a VDECS on a vehicle, the fleet owner must ensure that:

(A) The VDECS is verified for use with the engine and vehicle, as described in the Executive Order for the VDECS.
(B) Use of the vehicle is consistent with the conditions of the Executive Order for the VDECS.
(C) The diesel emission control strategy is installed in a verified configuration.
(D) The engine ~~to be retrofit~~ on which the VDECS is to be installed is tuned up so that it meets engine manufacturer's specifications prior to VDECS installation.
(E) The VDECS label will be visible after installation.

(8)~~(9)~~ VDECS Maintenance – If a fleet owner installs a VDECS to meet the requirements in section 2449.1(a) ~~or 2449.2(a)~~, the VDECS must be kept installed until the VDECS fails or is damaged. Requirements for VDECS failure or damage are in section 2449(e)(1). The owner of a vehicle ~~retrofit~~ with a VDECS must ensure all maintenance on the VDECS and engine is performed as required by the respective manufacturers.

(9)~~(10)~~ Compliance After the Final Target Date –

~~(A)~~ Commencing respectively on January 1, 2024 ~~March 1, 2020~~, for large and medium fleets, and on January 1, 2029, for small fleets, if a ~~large or medium~~ fleet does not meet the applicable ~~NOx~~ fleet average target rate for the final target date in section 2449.1(a)(1), the fleet must continue to meet the BACT ~~turnover~~ requirements in section 2449.1(a)(2)~~(A)~~ and report annually each year until it does so. Vehicles exempt from turnover or having VDECS installed under sections 2449.1(a)(2)(A)4. and 2449.1(a)(2)(A)5., respectively, are exempt from the requirements of this paragraph.

~~(B) Except as provided below, commencing respectively on March 1, 2021 for large and medium fleets, and March 1, 2026 for small fleets, all vehicles in each fleet must be equipped with the highest level VDECS. The vehicles must be retrofit at the annual retrofit rate required in section 2449.2(a)(2)(A)1. for BACT PM retrofits, and the fleet must report annually until all vehicles have been retrofitted. In meeting the requirements of this paragraph, the fleet owner may not use any previously accrued carryover PM retrofit credits. The following engines and vehicles are exempt from the requirements of this paragraph:~~

~~1. Permanent and year-by-year low use vehicles,~~
~~2. Engines for which there is no highest level VDECS (i.e., for which there is no Level 2 or 3 VDECS, or for which there is a Level 2 or 3 VDECS which cannot be used without impairing the safe operation of the vehicle as demonstrated per section 2449(e)(8)),~~
~~3. Engines equipped with an original equipment manufacturer diesel particulate filter that came new with the vehicle,~~
~~4. Engines already retrofit with a Level 2 or 3 VDECS that was the highest level VDECS available at time of installation, and~~
~~5. Vehicles in large and medium fleets that have not yet met the NOx fleet average target rate for the final target date in section 2449.1(a)(1).~~

(e) Special Provisions/Compliance Extensions

(1) VDECS Failure **-** In the event of a failure or damage of a VDECS, the following conditions apply:

(A) Failure or Damage During the Warranty Period. If a VDECS fails or is damaged within its warranty period and it cannot be repaired, the fleet owner must replace it with the same level VDECS or higher for the vehicle within 90 days of the failure.

(B) Failure or Damage Outside the Warranty Period.

1. Before Final Target Date - If a VDECS fails or is damaged outside of its warranty period before January 1, 2024 ~~March 1, 2021~~ for large and medium fleets, or before January 1, 2029 ~~March 1, 2026~~ for small fleets, and cannot be repaired, and if the fleet could not meet an applicable fleet average target for the most recent compliance date without the failed VDECS, the fleet owner must replace the failed or damaged VDECS within 90 days of its failure, with the highest level VDECS available for the engine at time of failure.

2. After Final Target Date - If a VDECS fails or is damaged outside of its warranty period on or after January 1, 2024 ~~March 1, 2021~~ for large and medium fleets, or on or after January 1, 2029 ~~March 1, 2026~~ for small fleets, and cannot be repaired, the fleet owner must replace the failed or damaged VDECS within 90 days of its failure with the highest level VDECS available for the engine at time of failure, regardless of whether the fleet met the applicable fleet average requirement for the most recent compliance date.

(2) Fuel-based Strategy VDECS -

(A) If a fleet owner determines that the highest level VDECS for a large percentage of his fleet would be a Level 2 fuel verified as a diesel emission control strategy, and implementation of this VDECS would require installation of a dedicated storage tank, then the fleet owner may request prior approval from the Executive Officer to allow use of the level 2 fuel-based strategy across its fleet.

(B) Waiver for Discontinuation of Fuel Verified as a Diesel Emission Control Strategy. If a fleet owner has relied upon a fuel verified as a diesel emission control strategy to meet an applicable fleet average requirement and has to discontinue use of the fuel due to circumstances beyond the fleet owner's control, the fleet owner may apply to the Executive Officer no later than 30 days after discontinuing use of the fuel for a compliance waiver of up to two years to provide it time to return to compliance with the applicable fleet average requirement. The Executive Officer then has 30 days to act upon the request. Fleets that did not meet the applicable fleet average requirement in the most recent compliance year may not apply for this waiver.

(3) Exemption for Vehicles Used for Emergency Operations - Vehicles used solely for emergency operations are exempt from the performance requirements in sections 2449(d), 2449.1(a), ~~2449.2(a)~~ and ~~2449.3(d)~~2449.2(d) but still must be labeled and reported in accordance with sections 2449(f) and (g). Vehicles used solely for emergency operations need not be included when calculating fleet average indices or target rates, when determining fleet size, or when calculating the required horsepower for the BACT ~~turnover and retrofit~~ requirements in section~~s~~ 2449.1(a)(2) ~~and 2449.2(a)(2)~~.

Owners of vehicles brought into California for emergency operations that last longer than three months must report such entry to ARB and request an equipment identification number within three months of entering the state. Vehicles used solely for emergency operations and that stay in California for less than three months do not have to be labeled. For vehicles used both for emergency operations and for other purposes, hours of operation accrued when the vehicle is used for emergency operations do not need to be included when determining whether the vehicle meets the permanent or year-by-year low-use vehicle definition.

(4) Special Provisions for Snow Removal Vehicles - Dedicated snow removal vehicles are exempt from the performance requirements in sections 2449(d), 2449.1(a), ~~2449.2(a)~~ and ~~2449.3(d)~~2449.2(d) but still must be labeled and reported in accordance with sections 2449(f) and (g). Dedicated snow removal vehicles need not be included when calculating fleet average indices or target rates, when determining fleet size, or when calculating the required horsepower for the BACT ~~turnover and retrofit~~ requirements in section~~s~~ 2449.1(a)(2) ~~and 2449.2(a)(2)~~. Publicly owned vehicles used exclusively to support snow removal operations (such as a loader without a special snow removal attachment), but which do not meet the dedicated snow removal vehicle definition, are exempt from the performance requirements in sections 2449(d), 2449.1(a), ~~2449.2(a)~~ and ~~2449.3(d)~~2449.2(d) but still must be labeled and reported in accordance with sections 2449(f) and (g).

(5) Use of Experimental Diesel Emission Control Strategies - If a fleet owner wishes to use an experimental, or non-verified, diesel emission control strategy, the owner must first obtain approval from the Executive Officer for a compliance extension. To obtain approval, the owner must demonstrate either that (A) a VDECS is not available or not feasible or not safe for their vehicle or application, or (B) that use of the non-verified strategy is needed to generate data to support verification of the strategy. The owner or operator shall keep documentation of this use in records as specified by the Executive Officer. The application must include emissions data and detailed control technology description demonstrating the experimental control achieves at least a Level 2 diesel PM emission reduction. If the application demonstrates that the strategy achieves at least 50 percent reductions in diesel PM, it may be treated like a Level 2 VDECS. If the application demonstrates that the strategy achieves at least 85 percent

reductions in diesel PM, it may be treated like a Level 3 VDECS. If the application demonstrates that the strategy achieves a NOx reduction over 15%, the NOx reduction may be counted.

Upon approval by the Executive Officer, each vehicle engine ~~retrofit~~ with the experimental strategy will be allowed to operate for a specified time period necessary to make a determination that the experimental strategy can achieve the projected emissions reductions. The vehicle equipped with the experimental strategy will be considered to be in compliance during the specified time period. A fleet owner who participates in an experimental diesel emission control program approved by the Executive Officer may retain carryover ~~retrofit PM~~ BACT credits ~~or carryover turnover credits~~ actually accumulated during the experiment, regardless of whether the experiment achieved the projected emissions reductions or whether the strategy is eventually verified. If a strategy installed in an experimental diesel emission control program approved by the Executive Officer fails to be verified or is removed, it will no longer count in the fleet's fleet average calculations. The fleet owner must bring the fleet into compliance prior to the expiration of the experimental diesel emission control strategy extension.

(6) Compliance Extension for Equipment Manufacturer or Installer Delays - A fleet owner who has purchased new equipment (including VDECS) or vehicles in order to comply with this regulation, will be excused from immediate compliance if the new equipment or vehicles have not been received due to manufacturing or installer delays as long as all the conditions below are met:

(A) The equipment or vehicle was purchased, or the fleet owner and seller had entered into contractual agreement for the purchase, at least four months prior to the required compliance date, or - for a VDECS purchased to replace a failed or damaged VDECS – the fleet owner and seller had entered into contractual agreement for the purchase within 60 days of the VDECS failure.

(B) Proof of purchase, such as a purchase order or signed contract for the sale, including engine specifications for each applicable piece of equipment, must be maintained by the fleet owner and provided to an agent or employee of ARB upon request.

(C) The new equipment or vehicles are immediately placed into operation upon receipt.

(D) Documentation from the manufacturer or the installer that there is a delay, such that the equipment or vehicle will be received or installed after the compliance date.

(7) Exemption for Permanent and Year-by-year Low-Use Vehicles – Permanently designated and year-by-year ~~l~~Low-use vehicles are exempt from the performance requirements in sections ~~2449(d)(4)~~2449(d)(3) through ~~2449(d)(6)~~2449(d)(5) and ~~2449(d)(8)~~2449(d)(7) through ~~2449(d)(10)~~2449(d)(9), 2449.1(a), ~~2449.2(a)~~ and ~~2449.3(d)~~2449.2(d), but still must meet the idling limits in section ~~2449(d)(3)~~2449(d)(2) ~~and adding vehicles requirements in section~~

~~2449(d)(7)~~ and be labeled and reported in accordance with sections 2449(f) and (g). Permanent and year-by-year l~~L~~ow-use vehicles need not be included when calculating fleet average indices or target rates, when determining fleet size, or when calculating the required horsepower for the BACT ~~turnover and retrofit~~ requirements in section~~s~~ 2449.1(a)(2) ~~and 2449.2(a)(2).~~

Vehicles that formerly met the permanent low-use vehicle definition, but whose use increases to 200 hours per year or greater must meet the adding vehicles requirements in section ~~2449(d)(7)~~2449(d)(6) and ~~meet the BACT requirements or~~ be included in the fleet average calculation by the next compliance date. For example, a formerly designated permanent low-use engine that exceeds ~~100~~200 hours per year between January ~~March~~ 1, ~~2013~~2015 and December 31, 2015 ~~February 28, 2014~~ must be included in the fleet average indices and target rates reported in ~~2014~~2016. Vehicles that formerly met the year-by-year low-use vehicle definition, but whose use increases to 200 hours per year or greater do not have to meet the adding vehicles requirements in section 2449(d)(6), but must be included in the fleet average calculation by the next compliance date.

(8) VDECS That Impairs Safe Operation of Vehicle - A fleet owner may request that the Executive Officer find that a VDECS ~~should~~shall not be considered the highest level VDECS available because (A) it cannot be safely installed or operated in a particular vehicle application, or (B) its use would make compliance with federal or state requirements for safety or health, or an ongoing local air district permit condition, such as for use of a diesel oxidation catalyst, technologically infeasible. If a VDECS manufacturer states that there is no safe or appropriate method of mounting its VDECS on the requesting party's vehicle, then the VDECS will not be considered safe. The Executive Officer shall accept the official findings of the responsible federal or state agency (i.e., the federal or state agency that promulgates safety requirements) that compliance with the requirements of this regulation would make compliance with the federal and state safety or health requirements technologically infeasible. In the absence of such a declaration by the VDECS manufacturer or official findings of a responsible federal or state agency, the requesting party shall provide other documentation to support its claims. Documentation must include published reports and other findings of federal, state or local government agencies, independent testing laboratories, engine or equipment manufacturers, or other equally reliable sources. The request will only be approved if the requesting party has made a thorough effort to find a safe method for installing and operating the VDECS, including considering the use of mirrors, various locations for VDECS mounting, and use of an actively regenerated VDECS. The Executive Officer shall review the documentation submitted and any other reliable information that he or she wishes to consider and shall make his or her determination based upon the totality of the evidence. Upon finding that a VDECS cannot be installed without violating the safety standards prescribed under federal or state requirements for safety or health, the Executive Officer shall issue a determination that there is no highest level VDECS available. The Executive Officer shall inform the

requesting party, in writing, of his or her determination, within 60 days of receipt of the request. Parties may appeal the Executive Officer's determination as described in (A) and (B) below. During the appeal process described in (A) and (B) below, the requesting party may request the administrative law judge to stay compliance until a final decision is issued. If the stay is granted and the Executive Officer denies the requesting party's request, the requesting party has six months from the date of the Executive Officer's final written decision to bring his or her fleet back into compliance.

(A) Appeals – Hearing Procedures -

1. Any party whose request has been denied may request a hearing for the Executive Officer to reconsider the action taken by sending a request in writing to the Executive Officer. A request for hearing shall include, at a minimum, the following:
   a. name of the requesting party;
   b. copy of the Executive Officer's written notification of denial;
   c. a concise statement of the issues to be raised, with supporting facts, setting forth the basis for challenging the denial (conclusory allegations will not suffice);
   d. a brief summary of evidence in support of the statement of facts required in c. above; and
   e. the signature of an authorized person requesting the hearing
2. A request for a hearing shall be filed within 30 days from the date of issuance of the notice of the denial.
3. A hearing requested pursuant to this section shall be heard by a qualified and impartial hearing officer appointed by the Executive Officer. The hearing officer may be an employee of the ARB, but may not be any employee who was involved with the denial at issue. In a request for reconsideration, the hearing officer, after reviewing the request for hearing and supporting documentation provided under paragraph 1. above, shall grant the request for a hearing if he or she finds that the request raises a genuine and substantial question of law or fact.
4. If a hearing is granted, the hearing officer shall schedule and hold, as soon as practicable, a hearing at a time and place determined by the hearing officer.
5. Upon appointment, the hearing officer shall establish a hearing file. The file shall consist of the following:
   a. the determination issued by the Executive Officer which is the subject of the request for hearing;
   b. the request for hearing and the supporting documents that are submitted with it;
   c. all documents relating to and relied upon by the Executive Officer in making the initial determination to deny the requesting party's original claim; and
   d. correspondence and other documents material to the hearing.

6. The hearing file shall be available for inspection by the applicant at the office of the hearing officer.
7. An applicant may appear in person or be represented by counsel or by any other duly-authorized representative.
8. The ARB may be represented by staff or counsel familiar with the regulation and may present rebuttal evidence.
9. Technical rules of evidence shall not apply to the hearing, except that relevant evidence may be admitted and given probative effect only if it is the kind of evidence upon which reasonable persons are accustomed to relying in the conduct of serious affairs. No action shall be overturned based solely on hearsay evidence, unless the hearsay evidence would be admissible in a court of law under a legally recognized exception to the hearsay rule.
10. Declarations may be used upon stipulation by the parties.
11. The hearing shall be recorded either electronically or by a certified shorthand reporter.
12. The hearing officer shall consider the totality of the circumstances of the denial, including but not limited to, credibility of witnesses, authenticity and reliability of documents, and qualifications of experts. The hearing officer may also consider relevant past conduct of the applicant including any prior incidents involving other ARB programs.
13. The hearing officer's written decision shall set forth findings of fact and conclusions of law as necessary.
14. Within 30 days of the conclusion of a hearing, the hearing officer shall submit a written proposed decision, including proposed finding as well as a copy of any material submitted by the hearing participants as part of that hearing and relied on by the hearing officer, to the Executive Officer. The hearing officer may recommend to the Executive Officer any of the following:
    a. uphold the denial as issued;
    b. modify the denial; or
    c. overturn the denial in its entirety.
15. The Executive Officer shall render a final written decision within 60 working days of the last day of hearing. The Executive Officer may do any of the following:
    a. adopt the hearing officer's proposed decision;
    b. modify the hearing officer's proposed decision; or
    c. render a decision without regard to the hearing officer's proposed decision.

(B) Appeals – Hearing Conducted by Written Submission. In lieu of the hearing procedure set forth in (A) above, an applicant may request that the hearing be conducted solely by written submission. In such case the requestor must submit a written explanation of the basis for the appeal and provide supporting documents within 20 days of making the request. Subsequent to such a submission the following shall transpire:

1. ARB staff shall submit a written response to the requestor's submission and documents in support of the Executive Officer's action no later than 10 days after receipt of requestor's submission;
2. The applicant may submit one rebuttal statement which may include supporting information, as attachment(s), but limited to the issues previously raised;
3. If the applicant submits a rebuttal, ARB staff may submit one rebuttal statement which may include supporting information, as attachment(s), but limited to the issues previously raised; and
4. The hearing officer shall be designated in the same manner as set forth in section 2449(e)(8)(A)3. above. The hearing officer shall receive all statements and documents and submit a proposed written decision and such other documents as described in section 2449(e)(8)(A)13. above to the Executive Officer no later than 30 working days after the final deadline for submission of papers. The Executive Officer's final decision shall be mailed to the applicant no later than 60 days after the final deadline for submission of papers.
5. The Executive Officer shall render a final written decision within 60 working days of the last day of hearing. The Executive Officer may do any of the following:
   a. adopt the hearing officer's proposed decision;
   b. modify the hearing officer's proposed decision; or
   c. render a decision without regard to the hearing officer's proposed decision.

(9) Compliance Flexibility for Delays in Availability of Tier 3 or Tier 4 Vehicles- If the Executive Officer finds that there is a delay in availability of vehicles with engines meeting the Tier 3 or Tier 4 interim or final emission standards so that vehicles with Tier 3 or Tier 4 interim or final engines to meet a fleet's needs are not available or not available in sufficient numbers or in a sufficient range of makes, models, and sizes, then the Executive Officer may grant an extension to the fleet from the requirements in sections 2449.1(a)(1)~~, 2449.2(a)(1),~~ and 2449.1(a)(2)~~. and 2449.2(a)(2).~~ If such a delay affects a group of fleets, the Executive Officer may issue an extension to all fleets with similar characteristics. Any such delay must be documented based on verifiable information from the fleet regarding its vehicle needs and/or verifiable information from the equipment manufacturer, engine manufacturer, distributor, and/or dealer regarding the unavailability of appropriate vehicles with Tier 3 or Tier 4 interim or final engines.

(10) Exemption for Vehicles Awaiting Sale - Vehicles in the possession of dealers, financing companies, or other entities who do not intend to operate the vehicle nor offer the vehicle for hire, that are operated only to demonstrate functionality to potential buyers or to move short distances while awaiting sale or for maintenance purposes are exempt from all requirements in sections 2449, 2449.1, and 2449.2~~, and 2449.3~~.

(11) Exemption for Vehicle Used Over Half the Time for Agriculture - A vehicle that is used by its owner for agricultural operations for over half of its annual operating hours but that is not used exclusively for agricultural operations is exempt from the performance requirements in section 2449(d), and 2449.1(a), ~~and 2449.2(a),~~ but still must be labeled and reported in accordance with sections 2449(f) and (g). Vehicles used exclusively for agricultural operations are completely exempt from the performance, labeling, and reporting requirements. A vehicle that is rented or leased for use by others is exempt only if it is exclusively used for agricultural operations.

(12) Exemption for Vehicles Used Solely on San Nicolas or San Clemente Islands - Vehicles used solely on San Nicolas or San Clemente Islands are exempt from all requirements in section 2449. If the land use plans for the islands are changed to allow use by the general public of the islands, this exemption shall no longer be applicable.

(13) Exemption for Job Corps Vehicles – Vehicles used by the Job Corps nonprofit apprenticeship training program are exempt from the performance requirements in sections 2449(d), 2449.1(a), ~~2449.2(a)~~ and ~~2449.3(d)~~2449.2(d) but still must be labeled and reported in accordance with sections 2449(f) and (g).

(14) Two-Engine Cranes – Both engines in a two-engine crane are subject to this regulation. For purposes of the rounding provisions in section 2449.1(a)(2)(~~a~~A)~~7~~8., neither engine in the two-engine crane is required to be turned over until the horsepower required to be turned over under section 2449.1(a)(2)(A)1. is at least half the sum of the maximum power of the primary and secondary engine in the two-engine crane.

(15) On-road Registered Vehicles with Off-road Engines – If a workover rig or other on-road registered vehicle subject to this regulation with an off-road engine is repowered and will be registered and driven on-road, it must be repowered with an on-road certified engine of the same model year or newer as the engine being replaced.

(16) Two-Engine Water Well Drilling Rigs – Both engines in a two-engine water well drilling rig are subject to this regulation. For the purposes of the rounding provisions in section 2449.1(a)(2)~~(a)7~~ A.8., neither engine in the two-engine water well drilling rig is required to be turned over until the horsepower required to be turned over under section 2449.1(a)(2)(A)1. is at least half the sum of the maximum power of the primary and secondary engine in the two-engine water well drilling rig.

(17) Fleets with 500 hp or less – Fleets with 500 hp or less total maximum power may meet the optional compliance schedule listed in Table 1 instead of the small fleet requirements in 2449.1(a)(1)(A)1.b. and 2449.1(a)(2)(A)1.c. This percent of

engine hp must be met or exceeded, and the rounding provisions in section 2449.1(a)(2)(A)8 do not apply. For compliance with this section, all vehicles in the fleet must be included; no vehicles qualify for exemptions.

Optional Compliance Schedule for Fleets with 500 HP or Less

Compliance Date: March 1 of Year	Percent of Fleet (by horsepower) Which Must Have a Tier 2 or Higher Engine
2019	25
2022	50
2026	75
2029	100

Fleets with 500 hp or less may choose to comply with either the above optional compliance schedule or the small fleet requirements. If the fleet alternates from the BACT schedule to the optional compliance path above, the fleet must comply with the most recent requirements of the optional compliance schedule. For example a fleet switching to the optional compliance schedule above in 2025 must meet the 2022 requirements of the optional compliance schedule. A fleet switching to BACT from the optional compliance schedule must begin meeting the fleet average or BACT requirements for small fleets on the next compliance date for small fleets. If a fleet grows larger than 500 hp, that fleet must begin meeting the fleet average or BACT requirements for small fleets on the next compliance date for the applicable fleet size category.

(f) Labeling –
All vehicles with engines subject to the regulation must be labeled with an ARB-issued equipment identification number (EIN). Electric and alternative fuel vehicles, stationary or portable systems, and gasoline-powered vehicles used to replace diesel vehicles under section 2449(d)(1)~~(C)~~ must also be labeled with an ARB-issued EIN. ARB will issue unique EIN to the fleet owner for each vehicle subject to the regulation in response to the initial reporting described in section 2449(g)(1) and, for vehicles added in the 30 days before the annual reporting date, the annual reporting described in section 2449 (g)(2). Vehicles with two engines that provide motive power will receive two EINs. All owners of vehicles subject to the regulation must comply with the following labeling requirements.

(1) Application for EIN for added vehicle – Notwithstanding the requirements for vehicles used for emergency operations in section 2449(e)(3), if a fleet owner adds a vehicle to his California fleet or brings a vehicle into California from outside the state, the fleet owner has 30 days from the date of purchase or the date the vehicle enters California to apply to ARB for an EIN or, if the vehicle already has an EIN, to inform ARB of the purchase using forms approved by the Executive Officer for submittal of required reporting information. If the reporting date under section 2449(g)(2) occurs before 30 days after purchase, the annual reporting may serve as the application for an EIN.

Applications for an equipment identification number ~~should~~shall be submitted electronically per the guidelines approved by the Executive Officer for electronic data reporting, or mailed or delivered to ARB at the address listed immediately below:

California Air Resources Board
Mobile Source Control Division (In-Use Off-road Diesel)
P.O. Box 2815
Sacramento, CA 95812.

(2) Affixing Equipment Identification Number – Within 30 days of receipt of the ARB-issued EIN, fleet owners shall permanently affix or paint the EIN(s) on the vehicle in clear view according to the following specification:

(A) The EIN shall be white on a red background, unless the vehicle is part of a Captive Attainment Area Fleet, in which case the EIN shall be white on a green background.

(B) The EIN shall be located in clear view on ~~the right (starboard)~~both sides of the outside of the vehicle approximately 5 feet above the ground, or, if the vehicle is not 5 feet tall, lower on the vehicle.

(C) Each character shall be at least 3 inches (7.6 centimeters) in height and 1.5 inches (3.8 centimeters) in width.

(D) The EIN shall be maintained in a manner that retains its legibility for the entire life of the vehicle.

(E) Vehicles reported to ARB prior to January 1, 2013, may apply a label to the right (starboard) side of the vehicle only, except that the vehicle must have an identical EIN label placed on the left (port) side of the vehicle by January 1, 2013.

(F) Vehicles that are part of a Captive Attainment Area fleet and reported to ARB prior to January 1, 2013, may be labeled with an EIN that is in white on a red background, except that the vehicle must have the EIN label replaced by one displaying white on a green background by January 1, 2013.

(g) Reporting –

Reporting is required for each and every fleet. Large and medium fleets may report separately for different divisions or subsidiaries of a given company or agency. Fleet owners may submit reporting information using forms (paper or electronic) approved by the Executive Officer.

(1) Initial reporting – All fleet owners must submit the information in section 2449(g)(1)(A) through (G) to ARB by their initial reporting date. In the initial reporting, fleet owners must report information regarding each vehicle subject to this regulation that was in their fleet on March 1, 2009. Systems or non-diesel fueled vehicles that are used in place of a vehicle that would be subject to this regulation must also be reported. The initial reporting date for large fleets is April 1, 2009. The initial reporting date for medium fleets is June 1, 2009. The initial reporting date for small fleets is August 1, 2009. Notwithstanding the

aforementioned reporting dates, the initial reporting date for two-engine water well drilling rigs is April 1, 2011. Reports must include the following information:

(A) Fleet Owner –

1. Fleet owner's name;
2. Corporate parent name (if applicable);
3. Corporate parent taxpayer identification number (if applicable);
4. Company taxpayer identification number;
5. Address;
6. Responsible person name;
7. Responsible person title;
8. Contact name;
9. Contact phone number;
10. Contact email address (if available);
11. Whether the fleet owner is a low population county local municipality fleet;
12. Whether the fleet owner has an approval from the Executive Officer to be treated as if in a low-population county;
13. Whether the fleet owner is a non-profit training center;
14. Whether the fleet has an idling policy documented and available to employees;
15. Whether the fleet is using a fuel-based strategy as an emissions control strategy;
16. Whether the fleet is a Captive Attainment Area Fleet.

(B) Vehicle List – A list of each vehicle subject to this regulation along with the following information for each vehicle:

1. Vehicle type;
2. Vehicle manufacturer;
3. Vehicle model;
4. Vehicle model year;
5. Vehicle serial number; (i.e., for workover rigs and two-engine cranes and two-engine water well drilling rigs, vehicle identification number);
6. Whether the vehicle is a permanent or year-by-year low-use vehicle;
7. If the vehicle is a permanent or year-by-year low-use vehicle, whether the vehicle was operated outside of California during the previous compliance year;
8. Whether the vehicle is a specialty vehicle;
9. Whether the vehicle is a vehicle used solely for emergency operations;
10. Whether the vehicle is a dedicated snow removal vehicle;
11. Whether the vehicle is used for agricultural operations for over half of its annual operating hours;
12. Whether the vehicle is an electric vehicle that replaced a diesel vehicle;
13. Whether the vehicle has had a VDECS installed, or been ~~retrofit,~~ repowered, or replaced with Surplus Off-road Opt-in for NOx program funding and, if so, the start and end dates of the contract period;
14. Whether the vehicle has had a VDECS installed, or been ~~retrofit,~~ repowered, or replaced with Carl Moyer program funding;

15. Whether the vehicle has had a VDECS installed ~~been retrofit~~ through a demonstration program, and - if so - which program;
16. EIN if it has already been assigned.
17. License plate number, if vehicle has a license plate.

(C) Engines - For each engine that powers a vehicle listed per section 2449(g)(1)(B) report the following information.

1. Engine manufacturer;
2. Engine model;
3. Engine family (if any);
4. Engine serial number;
5. Engine model year;
6. Engine maximum power;
7. Engine displacement;
8. Whether the engine is a repower and – if so – date repowered;
9. If the engine is a Post-2007 flexibility engine, an engine certified to on-road standards, or an engine certified by ARB or U.S. Environmental Protection Agency to a lower emission standard than shown in Appendix A, the emission standard to which the engine is certified and the certification Executive Order or certificate number;
10. Whether the engine has been rebuilt to a more stringent emissions configuration.

(D) Verified Diesel Emission Control Strategies - For each VDECS that is installed on an engine listed per section 2449(g)(1)(C) report the following information.

1. VDECS Manufacturer;
2. VDECS Family;
3. Verification level;
4. Verified percent NOx reduction (if any);
5. Date installed;
6. VDECS Serial Number.

(E) Non-Diesel Vehicle Used in Place of a Diesel Vehicle - For each electric, alternative fueled, or gasoline fueled vehicle, report the information listed in sections 2449(g)(1)(B)1. through 2449(g)(1)(B)5. and sections 2449(g)(1)(C)1. through 2449(g)(1)(C)6. as well as

1. Date purchased;
2. If the vehicle replaced a diesel vehicle in the fleet, the horsepower of the diesel vehicle replaced and the date replaced;
3. If not electric, the NOx and PM emission factor;

(F) Stationary or Portable Systems Used in Place of a Diesel Vehicle - For stationary or portable systems that are used in place of a diesel vehicle, report the following information:

1. Description of the system;
2. Type and number of vehicles that would otherwise be used;
3. Horsepower of the vehicle(s) that would otherwise be used;

(G) Credit for Early Actions - Fleet owners claiming credit for early action must report information required under sections 2449(g)(1)(B)1. through

2449(g)(1)(B)5. and sections 2449(g)(1)(C)1. through 2449(g)(1)(C)6. for each vehicle for which credit is claimed. As appropriate, the following information must also be reported:

1. For each vehicle within the fleet that was repowered with a Tier 1 or newer engine prior to March 1, 2009, the date of repower;
2. For each vehicle within the fleet that ~~was retrofit with the~~ had the highest level PM VDECS installed ~~available at the time of retrofit~~ prior to March 1, 2009, the date of installation ~~retrofit~~ and whether Carl Moyer Incentive Program funding was used to pay for the VDECS ~~retrofit;~~
3. Fleet owners claiming early credit for retirement or replacement of any vehicles per section 2449.1(a)(2)(A)~~(2)~~.a.ii., or 2449.1(a)(2)(A)~~(2)~~.a.iv. ~~or 2449.2(a)(2)(A)(2)a.iv.~~ must report information on each and every vehicle within the fleet between March 1, 2006 and March 1, 2010, as required under sections 2449(g)(1)(B)1. through 2449(g)(1)(B)4. and sections 2449(g)(1)(C)1. through 2449(g)(1)(C)6. as well as the date of any purchase and/or retirement between March 1, 2006 and March 1, 2010.
4. ~~Fleet owners claiming credit for reduced activity in the fleet per section 2449.1(a)(2)(A)(2)a.iv. or 2449.2(a)(2)(A)2.a.iii. must report to the Executive Officer the total hours of use for each vehicle in the fleet, excepting vehicles claimed for early retirement credit, for the twelve month period January 1, 2007, to December 31, 2007 as well as the twelve month period March 1, 2009, to February 28, 2010. Fleets that do not have hourly reporting records of each vehicle in the fleet must submit to the Executive Officer copies of information that is verifiable and substantively demonstrates a reduction in fleet activity from July 1, 2007, to March 1, 2010.~~

(2) Annual Reporting and ~~Compliance Certification~~ Responsible Official Affirmation of Reporting – All fleet owners must review and update the information submitted under section 2449(g)(1) annually, and submit the information in section 2449(g)(2)(A) through (C) to ARB by the reporting date of each subsequent reporting year. The ~~large fleet~~ reporting date for all fleets is March 1~~April 1, the medium fleet reporting date is June 1, and the small fleet reporting date is August 1~~. Fleet owners must report information regarding each vehicle subject to this regulation as it was on December 31 ~~March 1~~ of the year prior to the reporting year (for example, by March 1, 2018, fleets must report each vehicle as it was at the end of the day on December 31, 2017). Large fleets must report annually each year from 2010 to ~~2021~~ 2023. Medium fleets must report annually each year ~~2012 to 2021~~2016 to 2023. Small fleets must report annually each year from ~~2014 to 2026~~2018 to 2028. Any fleet that fails to meet the fleet average target rate for the final target date in section 2449.1(a)(1) ~~or 2449.2(a)(1)~~ must continue to report annually each year until it does so. ~~After the final target date in 2449.2(a)(1), any fleet that is required to apply VDECS under section 2449.2(a)(2) must continue to report each year until the March 1 after all such retrofits are complete.~~ Any fleet that operates permanent ~~designated~~ or year-by-year low-use vehicles must continue to report annually for

each permanent or year-by-year low-use vehicle for as long as the fleet owns or operates the vehicle. Fleets may use forms (paper or electronic) approved by the Executive Officer for submittal of the required reporting information.

(A) ~~Compliance Certification~~ Responsible Official Affirmation of Reporting – Each year that annual reporting is required, a fleet shall submit to ARB ~~A~~an affirmation ~~certification~~ signed by a responsible official or a designee thereof that the information reported is accurate and that the fleet is in compliance with the regulation. The ~~certification~~ affirmation must be submitted on a form (paper or electronic) approved by the Executive Officer. If a designee signs the ~~compliance certification~~ affirmation of reporting, a written statement signed by the responsible official designating the designee must be attached to the ~~compliance certification~~ affirmation of reporting and submitted to ARB. This written statement designating the designee must only be attached the first time a designee signs the affirmation of reporting. If a new designee is appointed at a later time, another written statement signed by the responsible official designating a new designee must be submitted. If the fleet is a Captive Attainment Area Fleet, the ~~certification~~ affirmation must certify that the fleet's vehicles did not operate outside the counties listed in 2449(c)(6) in the prior year.

(B) Changes Since Last Reporting - If any information reported per section 2449(g)(1) has changed since either the initial or last annual report filed with ARB, the fleet owner must, in its next annual report identify such changes. Such changes include vehicles removed from the fleet, vehicles added to the fleet through purchase or by bringing into California, vehicles newly designated as permanent or year-by-year low-use or specialty vehicles, repowers, and VDECS installed ~~retrofits.~~ If there are no changes, the fleet shall indicate that there have been no changes since the last report.

(C) Engine Hour Meter Readings – Engine hour meter readings must be reported for each engine in the following cases.

~~1. If the fleet has chosen the hours in fleet average option, the fleet owner shall report two engine hour meter readings, one from on or before March 1 of the prior year and one from on or after March 1 of the current year, and the dates of reading for every engine in the fleet.~~

1.~~2.~~ For vehicles that fleet owners intend to designate as year-by-year low-use, report two engine hour meter readings, one from on or before January 1 ~~March 1~~ of the prior year and one from on or after December 31 ~~March 1~~ of the prior year, and the dates of reading. If using the three-year rolling average definition of year-by-year low-use, report two hour meter readings, one from on or before January 1 ~~March 1~~ of the first year of the three year period and one from on or after December 31 ~~March 1~~ of the third year ~~current year~~. For vehicles that fleet owners intend to designate as permanent low-use vehicles, report one engine hour meeting reading from on or before January 1 of the current year. For each year thereafter, report the engine hour meeting reading from on or after December 31 of the prior year. Permanent and year-by-year l~~L~~ow-use vehicles used in emergency operations, must report the total hours

used in emergency operations. Additionally, for vehicles designated as permanent or year-by-year low-use that operate both inside and outside California, the fleet owner shall submit a log that contains the following information.

a. Each date the vehicle entered California and the hour meter reading upon entry;

b. Each date the vehicle exited California and the hour meter reading upon exit.

2.~~3.~~ For vehicles that are used in agricultural operations, the fleet owner shall report two engine hour meter readings, one from on or before January 1 ~~March 1~~ of the prior year and one from on or after December 31 ~~March 1~~ of the prior ~~current~~ year, and the dates of such readings. Also the fleet owner shall report~~,~~ the total number of hours the vehicle has been used in non-agricultural use.

(3) New Fleet Reporting – New fleets must submit the information in section 2449(g)(1)(A) through (G) to ARB for vehicles subject to the regulation within 30 days of purchase or bringing such vehicles into the State. Beginning the first January 1 ~~March 1~~ that is more than 30 days after the date of purchase or bringing a vehicle into the State, new fleets must comply with the annual reporting requirements in section 2449(g)(2).

(4) Selling Vehicles – Any person selling a vehicle with an engine subject to this regulation in California must notify ARB within 30 days from the date the vehicle was sold. If the reporting date under section 2449(g)(2) occurs within 30 days of the vehicle being sold, the annual reporting may serve as the notification to ARB that the vehicle was sold.

(h) Record keeping –

Fleet owners must maintain copies of the information reported under section 2449(g), as well as the records described in section 2449(h) below, and provide them to an agent or employee of the ARB within five business days upon request. Records must be kept at a location within the State of California.

(1) Changes Since Last Reporting Period - Documentation of any additions, deletions, or changes to the fleet since the last reporting. Documentation may include bills of sale, purchase orders, or other documentation.

(2) Vehicles Not Yet Labeled - For newly purchased or acquired vehicles or vehicles recently brought into the state that have not yet been labeled per section 2449(f)(2), records must be kept of the vehicle purchase date or the date the vehicle entered the state.

(3) Engines Rebuilt to a More Stringent Emissions Configuration - Records of engines that are rebuilt to a more stringent emissions configuration in accordance with Title 40, CFR, Part 89.130 and Part 1068.120 must be kept as

long as the engine remains in operation. For a fleet to claim credit for rebuild to a more stringent emissions configuration of a Tier 1 engine rated at or above 37 kW that is exempt from the requirements in Title 40, CFR, Part 89.130 and title 13, CCR, section 2423(l), the Tier 1 engine must be rebuilt in accordance with the rebuild practices of those sections and the fleet must keep the records that would have been required if the engine were not exempt from those requirements. Records must include the following information:

(A) The name of the company that performed the rebuild, address, contact name, and contact phone number for that company;
(B) An invoice, or proof of purchase of the engine rebuild;
(C) The date(s) the engine upgrade was performed;
(D) All records required under Title 40, CFR, Part 1068.120 or, for engines exempt from Title 40, CFR, Part 1068.120, the records that would be required if the engine were not exempt;
(E) All records required under title 13, CCR, section 2423(l) or, for engines exempt from 13, CCR, section 2423(l), the records that would be required if the engine were not exempt.

(4) VDECS Failure – Records of any VDECS failure and replacement.

(5) VDECS Serial Numbers – Records of the serial numbers of the VDECS installed on each vehicle.

(6) Manufacturer Delay – For any vehicles or VDECS for which the fleet owner is utilizing the equipment manufacturer delay provision in section 2449(e)(6), proof of purchase, such as a purchase order or signed contract for the sale, including engine specifications for each applicable piece of equipment or vehicle.

(7) Records Pertaining to Executive Officer Approval – Records of Executive Officer approval of any of the following:

(A) A waiver to allow additional idling in excess of 5 consecutive minutes;
(B) Upon discontinuation of a fuel verified as a Diesel Emission Control Strategy, approval for up to two years additional time to come back into compliance with the applicable fleet average requirement;
(C) A finding that a VDECS ~~should~~shall not be considered the highest level VDECS available due to safety concerns;
(D) Approval to use the maximum power of a diesel vehicle that serves the same function as an electric vehicle;
(E) Approval of an alternative fuel vehicle NOx emission standard;
(F) Approval of a vehicle designation as a specialty vehicle;
(G) Approval of and experimental diesel PM control strategy;
(H) Approval to grant an extension to the fleet from the requirements when Tier 4 vehicles are not available;
(I) Approval to use a fuel strategy as an emissions control strategy as in section 2449(e)(2);

~~*(8) Credit for Reduced Activity – Each fleet owner that claims credit for reduced fleet activity with vehicle specific data per sections 2449.1(a)(2)(A)(2)a.iv. or 2449.2(a)(2)(A)2.a.iii. shall maintain the records setting forth the total hours of use of each vehicle in the fleet for each of the twelve month periods indicated in 2449(g)(1)(G)4. A fleet that submits non-vehicle specific data claiming credit for reduced fleet activity, per sections 2449.1(a)(2)(A)(2)a.v. or 2449.2(a)(2)(A)(2)a.iv., must keep a record of all of the information submitted to ARB to support its claim of reduced fleet activity.*~~

~~*(9)*~~ ***Credit for Early Retirement or Replacement*** – Each fleet owner that claims credit for the retirement or replacement of vehicles from March 1, 2006, to March 1, 2010, per sections 2449.1(a)(2)(A)2.a.ii. or 2449.1(a)(2)(A)~~(2)~~.a.iv. ~~or 2449.2(a)(2)(A)(2)a.iv.~~ shall maintain records substantiating the fleet's claim of previous ownership for those vehicles.

*****(~~10~~) Record Retention*** – Each fleet owner shall maintain the records for each vehicle subject to the regulation and for the overall fleet as long as the owner has a fleet or January 1 ~~March 1~~, 2030, whichever is earlier. If vehicle ownership is transferred, the seller shall convey the vehicle records including vehicle data per section 2449(g)(1)(B), engine data per section 2449(g)(1)(C), and VDECS data per section 2449(g)(1)(D) to the buyer. If fleet ownership is transferred, the seller shall convey the fleet records including fleet data per sections 2449(g)(1)(A) through (G) to the buyer. Any person selling a vehicle with an engine subject to this regulation in California must maintain records of the disclosure of regulation applicability required by Section 2449(j) for three years after the sale.

(i) Right of Entry –

For the purpose of inspecting off-road vehicles and their records to determine compliance with these regulations, an agent or employee of ARB, upon presentation of proper credentials, has the right to enter any facility (with any necessary safety clearances) where off-road vehicles are located or off-road vehicle records are kept.

(j) Disclosure of Regulation Applicability –

Any person selling a vehicle with an engine subject to this regulation in California must provide the following disclosure in writing to the buyer on the bill of sale, "When operated in California, any off-road diesel vehicle may be subject to the California Air Resources Board In-Use Off-road Diesel Vehicle Regulation. It therefore could be subject to retrofit or accelerated turnover requirements to reduce emissions of air pollutants. For more information, please visit the California Air Resources Board website at http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm."

(k) Penalties –

Any person who fails to comply with the performance requirements of this regulation, who fails to submit any information, report, or statement required by this regulation, or who knowingly submits any false statement or representation in any application, report, statement, or other document filed, maintained, or used for the purposes of compliance with this regulation may be subject to civil or criminal penalties under sections 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.1, 42402.2, 42402.4, 42403, and 43016 of the Health and Safety Code. In assessing penalties, the Executive Officer will consider factors, including but not limited to the willfulness of the violation, the length of time of noncompliance, whether the fleet made an attempt to comply, and the magnitude of noncompliance.

(l) ARB Certificate of Reported Compliance –

After the initial reporting required by section 2449(g)(1) and the annual reporting and ~~compliance certification~~ responsible official affirmation of reporting required by section 2449(g)(2) is received by ARB, if the report~~ing~~ and affirmation indicates the fleet is in compliance with the requirements of the in-use off-road diesel vehicle regulation, ARB will provide the fleet with a Certificate of Reported Compliance with the In-Use Off-road Diesel Vehicle Regulation. The certificate may be revoked if ARB subsequently discovers that the reports submitted to ARB have material errors or omissions.

(m) Severability –

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of section 2449, 2449.1, or 2449.2~~, or 2449.3~~ of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

**Note: Authority cited: Sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39656, 39658, 39659, 39665, 39667, 39674, 39675, 40000, 41511, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.1, 42402.2, 42402.4, 42403, 43000, 43000.5, 43013, 43016, 43018, and 43018.2, Health and Safety Code. Reference: Sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39656, 39657, 39658, 39659, 39665, 39667, 39674, 39675, 40000, 41511, 42400, 42400.1, 42400.2, 42402.2, 43000, 43000.5, 43013, 43016, 43018, and 43018.2, Health and Safety Code.

Section 2449.1 ~~NOx~~ Performance Requirements

(a) Performance Requirements

Each fleet must meet the fleet average requirements in this section by January ~~March~~ 1 of each year or demonstrate that it met the best available control technology (BACT) requirements as described in section 2449.1(a)(2). ~~There are differing requirements for large and medium fleets. Small fleets are not subject to the NOx performance requirements.~~

If various portions of a fleet are under the control of different responsible officials because they are part of different subsidiaries, divisions, or other organizational structures of a company or agency, the fleet portions may comply with the performance requirements separately and be reported separately. A fleet may have some fleet portions that meet the definition of captive attainment area fleet and some fleet portions that do not. However, the total maximum power of the vehicles under common ownership or control determines the fleet size. Once a fleet begins to comply and report separately as fleet portions, the fleet portions must continue to comply and report separately, and the fleet portions must meet the adding vehicle requirements in section ~~2449(d)(7)~~2449(d)(6) just as if they were separate fleets.

Captive attainment area fleets, and f~~F~~leets owned by low-population county local municipalities, are subject to the small fleet requirements, even if their total maximum power exceeds 2,500 horsepower. ~~Captive attainment area fleets are not subject to the NOx performance requirements.~~ Section ~~2449(d)(4)~~2449(d)(3) describes requirements for fleets that change size.

(1) Fleet Average Requirements

(A) Fleet Average Requirements for Large and Medium Fleets

1. ~~NOx~~ Fleet Average - For each compliance date, a ~~large or medium~~ fleet ~~that is not a captive attainment area fleet~~ must demonstrate that its ~~NOx~~ Fleet Average Index was less than or equal to the calculated ~~NOx~~ Fleet Average Target Rate.

The equation for calculating ~~NOx~~ Fleet Average Target Rate is below:

~~NOx~~ Fleet Average Target Rate = [SUM of (*Max Hp* for each engine in fleet multiplied by *Target* for each engine in fleet) for all engines in fleet] divided by [SUM of (Max *Hp*) for all engines in fleet]

where Target ~~is the NOx target~~ in g/bhp-hr is shown in ~~from~~ Table 1. To find the Target for each engine, read the value for the appropriate row based on the compliance year and the appropriate column based on the engine's maximum power from Table 1 for medium and large fleets, and Table 2 for small fleets.

The equation for calculating ~~NOx~~ Fleet Average Index is below:

~~NOx~~ Fleet Average Index = [SUM of (*Max Hp* for each engine in fleet multiplied by ~~NOx~~ *Emission Factor* multiplied by the *VDECS Factor* for each engine in fleet) for all engines in fleet] divided by [SUM of (Max *Hp*) for all engines in fleet]

VDECS Factor

VDECS	VDECS Factor
No VDECS Installed	1
Highest Level PM VDECS	0.7
Highest Level PM VDECS with NOx Reduction	(1 Minus (0.3 + (Verified Percent NOx Reduction Divided by 170)))
NOx Reduction (Not Highest Level PM VDECS)	(1 Minus (Verified Percent NOx Reduction Divided by 170))

a. **Fleet average targets for large and medium fleets -** Table 1 shows the targets used to calculate the ~~NOx~~ Fleet Average Target Rate for each compliance date for large and medium fleets. The Emission Factors are defined in Appendix A.

Table 1 – Large and Medium Fleet ~~NOx~~ Targets For Use in Calculating ~~NOx~~ Fleet Average Target Rates [g/bhp-hr]

	Targets for each Max Hp Group							
Compliance Date: January 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2014 (Large Fleets Only)	5.8	6.5	7.1	6.4	6.2	5.9	6.1	7.2
2015 (Large Fleets Only)	5.6	6.2	6.7	6	5.8	5.5	5.6	6.8
2016 (Large Fleets Only)	5.3	5.8	6.2	5.5	5.3	5.1	5.2	6.5
2017	5.0	5.4	5.5	4.9	4.7	4.5	4.6	6.0
2018	4.7	5.0	4.8	4.3	4.1	4.0	4.0	5.5
2019	4.4	4.6	4.1	3.7	3.5	3.4	3.4	5.0
2020	4.1	4.2	3.4	3.1	2.9	2.8	2.9	4.5
2021	3.8	3.8	2.7	2.5	2.3	2.2	2.3	4.0
2022	3.5	3.4	2.0	1.9	1.7	1.7	1.7	3.5
2023	3.3	3.0	1.4	1.3	1.5	1.5	1.5	3.5

	~~NOx Targets for each Max Hp Group~~							
~~Compliance Date: March 1 of Year~~	~~25-49 hp~~	~~50-74 hp~~	~~75-99 hp~~	~~100-174 hp~~	~~175-299 hp~~	~~300-599 hp~~	~~600-750 hp~~	~~>750 hp~~
~~2010 (large fleets only)~~	~~5.8~~	~~6.5~~	~~7.1~~	~~6.4~~	~~6.2~~	~~5.9~~	~~6.1~~	~~7.2~~
~~2011 (large fleets only)~~	~~5.6~~	~~6.2~~	~~6.7~~	~~6.0~~	~~5.8~~	~~5.5~~	~~5.6~~	~~6.8~~
~~2012 (large fleets only)~~	~~5.3~~	~~5.8~~	~~6.2~~	~~5.5~~	~~5.3~~	~~5.1~~	~~5.2~~	~~6.5~~
~~2013~~	~~5.1~~	~~5.5~~	~~5.7~~	~~5.1~~	~~4.9~~	~~4.7~~	~~4.8~~	~~6.1~~
~~2014~~	~~4.9~~	~~5.1~~	~~5.2~~	~~4.7~~	~~4.5~~	~~4.3~~	~~4.4~~	~~5.7~~
~~2015~~	~~4.6~~	~~4.8~~	~~4.8~~	~~4.3~~	~~4.1~~	~~3.9~~	~~4.0~~	~~5.3~~
~~2016~~	~~4.4~~	~~4.4~~	~~4.3~~	~~3.8~~	~~3.6~~	~~3.5~~	~~3.6~~	~~4.9~~
~~2017~~	~~4.2~~	~~4.1~~	~~3.8~~	~~3.4~~	~~3.2~~	~~3.1~~	~~3.2~~	~~4.5~~
~~2018~~	~~4.0~~	~~3.7~~	~~3.3~~	~~3.0~~	~~2.8~~	~~2.7~~	~~2.7~~	~~4.1~~
~~2019~~	~~3.7~~	~~3.4~~	~~2.8~~	~~2.6~~	~~2.3~~	~~2.3~~	~~2.3~~	~~3.8~~
~~2020~~	~~3.5~~	~~3.2~~	~~2.4~~	~~2.2~~	~~1.9~~	~~1.9~~	~~1.9~~	~~3.4~~

b. **Fleet average targets for small fleets -** Table 2 shows the targets used to calculate the Fleet Average Target Rate for each compliance date for small fleets. The Emission Factors are defined in Appendix A.

Table 2 – Small Fleet Targets
For Use in Calculating Fleet Average Target Rates [g/bhp-hr]

	Targets for each Max Hp Group							
Compliance Date: January 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2019	5.8	6.5	7.1	6.4	6.2	5.9	6.1	7.2
2020	5.6	6.2	6.7	6.0	5.8	5.5	5.6	6.8
2021	5.3	5.8	6.2	5.5	5.3	5.1	5.2	6.5
2022	5.0	5.4	5.5	4.9	4.7	4.5	4.6	6.0
2023	4.7	5.0	4.8	4.3	4.1	4.0	4.0	5.5
2024	4.4	4.6	4.1	3.7	3.5	3.4	3.4	5.0
2025	4.1	4.2	3.4	3.1	2.9	2.8	2.9	4.5
2026	3.8	3.8	2.7	2.5	2.3	2.2	2.3	4.0
2027	3.5	3.4	2.0	1.9	1.7	1.7	1.7	3.5
2028	3.3	3.0	1.4	1.3	1.5	1.5	1.5	3.5

(2) BACT Requirements – Each year, each fleet must determine if it will be able to meet the fleet average requirements for the next January ~~March~~ 1 compliance date, and if not, the following BACT requirement must be met. If a fleet does not meet the ~~NOx~~ Fleet Average Target ~~r~~Rate in section 2449.1(a)(1), it must meet the BACT ~~turnover~~ requirements in section 2449.1(a)(2)(A) below.

(A) ~~Turnover~~ BACT Requirements for Fleets Not Meeting ~~NOx~~ Fleet Average Target Rate – A fleet may meet the ~~turnover~~ BACT requirements by performing turnover as defined in section 2449(c)(55) or applying the highest level PM VDECS as defined in section 2449(c)(58)(A). ~~retiring a vehicle, designating a vehicle as a low-use vehicle, repowering a vehicle, rebuilding the engine to a more stringent emissions configuration, or applying a VDECS verified to achieve NOx reductions. If repowering a vehicle or rebuilding the engine to a more stringent emissions configuration, the new engine must be Tier 2 or higher and must be a higher tier than the engine replaced or rebuilt. The method for counting VDECS verified to achieve NOx reductions is specified in section 2449.1(a)(2)(A)8.~~

1. ~~Turnover~~ BACT Rate – If a fleet does not meet the ~~NOx~~ Fleet Average Target Rate in section 2449.1(a)(1), it must demonstrate that it has turned over or applied the highest level PM VDECS to the required percent of the total maximum power of the fleet that existed on January ~~March~~ 1 of the previous year since January ~~March~~ 1 of the previous year and on or before December 31 of the previous year. Any carryover ~~turnover~~ BACT credit previously accrued may be applied towards the BACT requirements ~~turnover required~~ in a later year. The required ~~turnover~~ percentages of fleet horsepower to turn over or apply the highest level PM VDECS to ~~percents to demonstrate on~~ for each compliance date are described below in a. through c. ~~e.~~

a. Large fleets –

i. 2014: 4.8 percent

ii: 2015 to 2017: 8 percent

iii. 2018 to 2023: 10 percent

b. Medium fleets –

i. 2017: 8 percent

ii. 2018 to 2023: 10 percent

c. Small fleets –

2019 to 2028: 10 percent

~~a) 2010: 8 percent.~~

~~b) 2011 and 2012 4.8 percent.~~

~~c) 2013:~~

~~i. 14.4 percent for large fleets that did not meet the NOx fleet average target in 2011 or 2012,~~

~~ii. 11. 2 percent for large fleets that met the NOx fleet average target in 2011 but not 2012, and~~

~~iii. 8 percent for large fleets that met the NOx fleet average target in 2012 and for all medium fleets.~~

~~d) 2014 and 2015: 8 percent.~~

~~e) 2016 and later: 10 percent.~~

2. Carryover ~~turnover~~ BACT credit –

a. Beginning - All fleets may earn or accumulate credits for taking early action in accordance with the following sections i through vi, but with the exception of such credits for taking early action, all fleets begin with zero carryover BACT credit on January 1, 2013. ~~All fleets begin with zero carryover turnover credit on March 1, 2009. All fleets may begin accumulating carryover turnover credit on March 1, 2009.~~ To claim credit, fleets must submit to ARB and retain records as described in sections 2449(g) and (h).

i. Credit for Early Repowers and Rebuilds to More Stringent Emissions Standards – Credit for early repowers can only be claimed for engines that remain in the fleet on the compliance date that the credit is taken. Fleets that have repowered their vehicles with Tier 1 or higher engines or rebuilt the engine from a lower Tier to a Tier 1 or more stringent emissions standard before March 1, 2009 will accumulate a carryover BACT ~~turnover~~ credit (in horsepower) equal to: the maximum power of the vehicles repowered and the engines rebuilt in accordance with the preceding ~~the maximum power of Tier 1 or higher repower engines installed in affected vehicles before March 1, 2009~~. Fleets that repower their Tier 0 or Tier 1 vehicles with Tier 2 or higher engines, or rebuild the engines in their Tier 0 or Tier 1 vehicles to a Tier 2 or more stringent emissions standard, by the following deadlines, will accumulate a carryover BACT credit (in horsepower) equal to the maximum power of the vehicles repowered and the engines rebuilt in accordance with the preceding:

1. Large fleets: January 1, 2013
2. Medium fleets: January 1, 2016
3. Small fleets: January 1, 2018

~~The credit can only be claimed for engines that remain in the fleet in the year that the credit is taken.~~

ii. Credit for Early Replacement – Fleets that have replaced their Tier 0 vehicles at an average rate greater than 8 percent of total maximum power per year between March 1, 2006 and March 1, 2009 will accumulate carryover turnover credit (in horsepower) equal to: [(Total maximum power of Tier 0 vehicles retired between March 1, 2006 and March 1, 2009) minus (Total maximum power of Tier 0 vehicles added between March 1, 2006 and March 1, 2009) minus (Total credit for early retirement claimed under section (iii ~~vi~~) below)] minus [(Total maximum power of fleet on

March 1, 2007 times 0.08) plus (Total maximum power of fleet on March 1, 2008 times 0.08) plus (Total maximum power of fleet on March 1, 2009 times 0.08)]. Tier 0 vehicles repowered with newer engines are counted under (i) above and shall not be counted under (ii).

iii. Double Credit for Early VDECS Installations ~~NOx Retrofits~~ ~~–~~If fleets install a VDECS by the deadlines shown below for the applicable fleet size, fleets ~~that have installed VDECS that have been verified as achieving NOx reductions on their vehicles before March 1, 2011~~ will accumulate carryover ~~turnover~~ BACT credit (in horsepower) equal to: 2 times the ~~multiplied by~~ ~~(Verified Percent NOx Reduction divided by 60 percent) multiplied by~~ ~~(M~~ maximum power on which VDECS ~~verified to achieve NOx reductions~~ are installed ~~before March 1, 2011)~~ by the applicable deadline:

1. Large fleets: January 1, 2013
2. Medium fleets: January 1, 2016
3. Small fleets: January 1, 2018

Fleets that install VDECS verified to reduce NOx by the same deadlines will accumulate an additional carryover BACT credit (in horsepower) equal to: 2 times the (Verified Percent NOx Reduction divided by 120 percent) multiplied by (Maximum power of the engines on which fleets install VDECS verified to reduce NOx).

~~**iv. Credit for Reduced Fleet Activity**– Fleets that demonstrate a reduction in fleet activity will accumulate carryover turnover credit (in horsepower). Fleet activity is defined as the sum of [(Total maximum power of the vehicle) times (Number of hours the vehicle was operated in the applicable 12 month period)] for each vehicle in the fleet.~~

~~1. Carryover turnover credit generated from reduced activity may only be applied toward the March 1, 2010, or March 1, 2011 compliance dates.~~

~~2. Fleets that receive credit for the retirement of any vehicle prior to March 1, 2010, per section (v) below, can not count that vehicle in the calculation of reduced activity credit.~~

~~3. Carryover turnover credit shall be calculated for the fleet, not including those vehicles retired for credit under section (v) below, as:~~

~~[(Fleet activity for January 1, 2007, to December 31, 2007) minus (Fleet activity for March 1, 2009, to February 28, 2010, including vehicles added to the fleet) divided by (fleet activity for January 1, 2007, to December 31, 2007)] multiplied by (Total maximum power of fleet on July 1, 2007)~~

~~4. Fleet owners must use vehicle specific data, including but not limited to hour meter logs or operator logs linking operators to specific vehicles, from July 1, 2007, to March 1, 2010, as described in section 2449(g)(1)(G)4 to document vehicle activity.~~

~~5. Fleets that do not have hour meter logs or vehicle-specific operator logs or equivalent records that are verifiable and substantively demonstrate activity for all vehicles in the fleet:~~

~~A. May use other verifiable indicators that are directly related to reduced vehicle operation to demonstrate an overall reduction in fleet activity from July 1, 2007, to March 1, 2010, including but not limited to records of overall off-road diesel fuel use for the fleet, as described in section 2449(g)(1)(G)4. However, such fleets must subtract the total credit for early retirement claimed under section (v) below from their reduced activity credit.~~

~~B. May use indicators, including but not limited to revenue or total vehicle operator employment, that demonstrate a reduction in business or staffing but that do not directly correspond to vehicle or fleet activity. To qualify for a credit using such indirectly-correlated indicators, the fleet must be able to provide some evidence of overall reduced fleet activity. The Executive Officer will grant a fleet using such indicators a maximum 20 percent credit for demonstrated reduced activity not directly related to vehicular operation. Such fleets must also subtract from the 20 percent reduced activity credit any credits received for early retirement claimed under section (v) below credit. Fleets must not apply for credit using indicators that would demonstrate reduced business or staffing if the fleet has information or records that demonstrate the fleet has not reduced overall vehicle activity.~~

iv ~~v~~. Credit for Early Retirement – Fleets that reduce overall horsepower from March 1, 2006, to March 1, 2010, accumulate carryover BACT ~~turnover~~ credit (in horsepower) equal to 0.5 times the following: [(Total maximum horsepower of the fleet on March 1, 2006, including low-use vehicles) minus (Total maximum horsepower of the fleet on March 1, 2010, including low-use vehicles)]. In accordance with Section 2449.1(a)(2)(A)2.c, large fleets may use any such credit to meet any BACT requirements that Section 2449.1(a)(2)(A)(1) may require them to meet in the year ending January 1, 2015, or in any subsequent year. Notwithstanding Section 2449.1(a)(2)(A)2.c, large fleets may not use any such credit to meet any BACT requirements that Section

2449.1(a)(2)(A)(1) may require them to meet in the year ending on January 1, 2014.

v. Credit for Reduced Fleet Horsepower– Fleets that reduce their overall horsepower from March 1, 2010, to February 28, 2011, will accumulate carryover BACT credit (in horsepower) equal to: (Total maximum horsepower of the fleet on March 1, 2010) minus (Total maximum horsepower of the fleet on February 28, 2011).

vi. Credit for Interim Replacement – Fleets that replace over 8 percent of the fleet's total maximum power in Tier 0 and Tier 1 vehicles in any one year in any one of the specified periods will accumulate carryover BACT credit (in horsepower) equal to: (Combined total of maximum power of Tier 0 and Tier 1 vehicles retired over the year) minus (Combined total of maximum power of Tier 0 or Tier 1 vehicles added over the year) minus (Total maximum power of fleet at the end of the year times 0.08). In each year, the replacement or retirement of vehicles will be summed from January 1 to December 31 of that year, excepting 2011, during which the replacement or retirement will be summed from March 1 to December 31. Fleets shall exclude Tier 0 vehicles repowered with Tier 1 or higher engines, or rebuilt to a Tier 1 or more stringent emissions standard, from all such calculations.
1. Large fleets: March 1, 2011 to December 31, 2012
2. Medium fleets: March 1, 2011 to December 1, 2015
3. Small fleets: March 1, 2011 to December 1, 2017

b. Accumulating carryover BACT ~~turnover~~ credit –

~~**i. 2010-2015 -**~~ Beginning on January 1,2013 for large fleets, on January 1, 2016 for medium fleets, and on January 1, 2018 for small fleets, ~~From March 1, 2010 through March 1, 2015 for large fleets and from March 1, 2013 through March 1, 2015 for medium fleets~~ a fleet will accumulate~~s~~ carryover ~~turnover~~ credit each year it turns over or applies the highest level PM VDECS to more than the required percent of its maximum power specified in section 2449.1(a)(2)(A)1. The amount accumulated is the maximum power that has been turned over or to which highest level PM VDECS has been applied in excess of the percentage required ~~percent~~ in the 12 months prior to January ~~March~~ 1 of the year for ~~in~~ which the carryover BACT credit is being calculated. ~~From March 1, 2010, through March 1, 2012, a medium fleet accumulates carryover turnover credit each year the total horsepower it turns over exceeds 8 percent of its maximum power.~~

~~**ii. After 2015 -** After March 1, 2015, a fleet will accumulate carryover turnover credit each year it turns over more than 10 percent of its maximum power. The amount accumulated is the maximum power~~

~~turned over in the 12 months prior to March 1 of the year in which the carryover is calculated plus the carryover turnover credit used minus the required 10 percent.~~

~~**iii. Repower Credit** – From March 1, 2010 through March 1, 2012, a for medium fleets that did not accumulate any credit under (i) above shall accumulate carryover turnover credit each year equal to the total maximum power of Tier 2 or higher repower engines installed in affected vehicles in the 12 months prior to March 1 of the year in which the carryover is calculated. From March 1, 2010 through March 1, 2011, a large fleet that did not accumulate any credit under (i) above shall accumulate carryover turnover credit each year equal to the total maximum power of Tier 2 or higher repower engines installed in affected vehicles in the 12 months prior to March 1 of the year in which the carryover is calculated.~~

c. **Using carryover BACT ~~turnover~~ credit** - Accumulated carryover BACT ~~turnover~~ credit may be applied to meeting the BACT ~~turnover~~ requirements of section 2449.1(a)(2)(A)1 in a later year. The amount of carryover BACT ~~turnover~~ credit used to meet the BACT ~~turnover~~ requirements in any one year is subtracted from the carryover BACT ~~turnover~~ credit total available in subsequent years. The amount of actual turnover or horsepower the highest level PM VDECS was installed on ~~or retrofits~~ plus the amount of carryover BACT ~~turnover~~ credit used must equal the minimum BACT requirements described in ~~turnover required by~~ section 2449.1(a)(2)(A)1.

3. Order of BACT Requirements ~~*Turnover*~~ - All Tier 0 and Tier 1 engines in a fleet ~~that were not subject to a PM standard for new engines (Tier 0 and Tier 1 with no PM standard, i.e., Tier 1 engines between 50 and 174 horsepower)~~, except those in vehicles that qualify for an exemption from the BACT requirements ~~under section 2449.1(a)(2)(A)4~~., must be turned over before the turnover of any other higher tier engines may be counted toward the BACT ~~turnover~~ requirements in section 2449.1(a)(2)(A) or toward accumulating carryover BACT ~~turnover~~ credit. A fleet may, however, receive carryover BACT ~~turnover~~ credit per section 2449.1(a)(2)(A)2.a.iii. and 2449.1(a)(2)(A)9 for a VDECS ~~verified to achieve NOx reductions~~ installed on an engine, regardless of the engine's tier.

4. Exemptions from BACT for medium and large fleets – ~~A vehicle is exempt from the turnover of section 2449.1(a)(2)(A)1. if all vehicles in the fleet that do not qualify for an exemption under this section have been turned over and the vehicle meets one of the following conditions:~~ For medium and large fleets, a vehicle is exempt from the BACT requirements of section 2449.1(a)(2)(A)1. if it qualifies for one or more of the exemptions set forth in section 2449(e) or meets one of the conditions listed in section a through e below. A fleet that does not meet the fleet

averages in section 2449.1(a)(1)(A)(1) must meet the BACT requirements with the vehicles that do not qualify for an exemption under either Section 2449(e) or this section, provided that nothing shall require a fleet to apply a VDECS to any vehicle. Where all of the vehicles in a fleet qualify for an exemption under either this section or section 2449(e), the fleet is exempt from the BACT and fleet average requirements in that year. The exemptions set forth in this section do not lower the total maximum power on which the BACT requirements are calculated.

a. On the compliance date, the vehicle is less than 10 years old from the date of manufacture;

b. The vehicle meets all of the following specialty vehicle criteria:
   i. The fleet has turned over all other vehicles first,
   ii. No repower is available for the specialty vehicle, as demonstrated to the Executive Officer,
   iii. A used vehicle with a cleaner engine is not available to serve a function and perform the work equivalent to that of the specialty vehicle, as demonstrated to the Executive Officer, and
   iv. The specialty vehicle has ~~been retrofit with~~ the highest level VDECS installed,

c. The vehicle ~~has~~ had ~~been retrofitted within the last six years with~~ a Level 2 or 3 PM VDECS installed within the last six years ~~that~~ and such VDECS was highest level PM VDECS at the time of the installation ~~retrofit~~, or

d. The vehicle has a Tier 4 interim or Tier 4 final engine.

e. The vehicle has the highest level PM VDECS installed prior to January 1, 2013, ~~March 1, 2011~~, except that this exemption may be applied to no more than 15 percent of a fleet's total horsepower as of January 1, 2013 ~~March 1, 2010~~.
   i. If before January 1, 2013, the fleet has installed the highest level PM VDECS on more than 15 percent of the fleet's January 1, 2013, total horsepower, the fleet may apply this exemption to any vehicles with the highest level PM VDECS installed, as long the total horsepower of those vehicles does not exceed the 15 percent exemption threshold established in sectione. above.
   ii. The highest level PM VDECS must remain on the vehicle in order to maintain this exemption. If a VDECS fails, the fleet must replace the VDECS in accordance with section 2449(e)(1) to maintain this exemption for the vehicle.

5. Exemptions from BACT for Small Fleets – For small fleets, a vehicle is exempt from the BACT requirements of section 2449.1(a)(2)(A)1. if it qualifies for one or more of the exemptions set forth in section 2449(e) or meets one of the conditions listed in section a through e below. A fleet that does not meet the fleet averages in section 2449.1(a)(1)(A)(1) must meet the BACT requirements with the vehicles that do not qualify for an exemption under either Section 2449(e) or this section, provided that

nothing shall require a fleet to apply a VDECS to any vehicle. Where all of the vehicles in a fleet qualify for an exemption under either this section or section 2449(e), the fleet is exempt from the BACT and fleet average requirements in that year. The exemptions set forth in this section do not lower the total maximum power on which the BACT requirements are calculated.

a. On the compliance date, the vehicle is less than 10 years old from the date of manufacture;

b. The vehicle meets all of the following specialty vehicle criteria described above in section 2449.1(a)(2)(A)4.b.

c. There is no highest level VDECS available for the vehicle's engine as of 10 months prior to the compliance date (i.e., there is no Level 2 or 3 VDECS, or there is no Level 2 or 3 VDECS which can be used without impairing the safe operation of the vehicle as demonstrated per section 2449(e)(8)),

d. The vehicle's engine is equipped with an original equipment manufacturer diesel particulate filter that came new with the vehicle, or the vehicle has a Tier 4 interim or Tier 4 final engine.

e. The vehicle's engine has already been retrofitted with a Level 2 or 3 VDECS that was the highest level PM VDECS available at time of installation. An engine with a Level 2 VDECS that was not the highest level VDECS at time of installation does not qualify for this exemption.

6 ~~5~~. Delay Tier 2 ~~1~~ turnover - All vehicles with a Tier 2 ~~1~~ or higher engine are exempt from the BACT ~~turnover~~ requirements throughuntil ~~the compliance year ending~~ January 1, 2015 ~~March 1, 2013~~ (i.e., the first turnover of or VDECS installations on Tier 2 ~~1~~ or higher engines would be required between January 1, 2015 and December 31, 2015 ~~March 2, 2012 and March 1, 2013~~), provided that all Tier 0 and Tier 1 vehicles in the fleet owner's fleet that do not qualify for an exemption under section 2449.1(a)(2)(A)4. have been turned over.

7 ~~6~~. Designating vehicle as permanent low-use – In the year in which a fleet designates ~~A fleet may designate~~ a vehicle that was formerly used ~~100~~200 hours or more per year as a permanent low-use vehicle, ~~by limiting its use to less than 100 hours per year and committing to keep its use less than 100 hours per year,~~ the fleet will accumulate carryover BACT credit (in horsepower) equal to the maximum power of such vehicle. Only the designation of a vehicle that was formerly used 200 hours or more per year as a permanent low-use vehicle will qualify a fleet to receive such carryover BACT credit. For example, a fleet could designate a vehicle used 500 hours in 2016 as permanent low use on December 31, 2016, for credit toward the January 1, 2017 requirements, and limit the vehicle hours from January 1, 2017, to December 31, 2017 (and all future years) to 200 or less.

~~a. Only vehicles formerly used 100 hours or more per year may be so designated. Vehicles so designated may be counted toward the turnover requirements.~~

b. ~~Once designated as low-use, a vehicle may never again be used more than 100 hours per year by the fleet unless the vehicle meets the adding vehicles requirements in section 2449(d)(7).~~

~~c. A fleet is not obliged to designate a vehicle whose use drops below 100 hours per year as low-use, or to count it toward the turnover requirements. If such a vehicle is not designated as low-use, its use may increase beyond 100 hours per year in subsequent years.~~

8 ~~7~~. Rounding - If the horsepower to meet BACT requirements~~d to be turned over~~ under section 2449.1(a)(2)(A) is less than half of the maximum power of the lowest horsepower engine in the fleet that is subject to the BACT ~~turnover~~ requirements, the next engine is not required to be turned over or have a highest level PM VDECS applied to it. However, on the next year's compliance date, any horsepower not accounted for ~~turned over~~ due to this rounding provision must be added to the BACT requirements~~d turnover~~ under section 2449.1(a)(2)(A). Once the required horsepower ~~to be turned over~~ equals or exceeds half of the maximum power of the next engine in the fleet that is subject to the BACT ~~turnover~~ requirements, the next engine must be turned over or have a highest level PM VDECS applied to it.

9 ~~8~~. ~~Turnover~~ BACT Credit for NOx VDECS ~~Retrofits~~ - VDECS ~~that have been~~ verified ~~as achieving~~ to reduce NOx ~~reductions~~ may be used to satisfy the BACT ~~turnover~~ requirements in section 2449.1(a)(2)(A)1 on each compliance date as follows:

For VDECS verified to reduce NOx but not as achieving PM reductions, BACT ~~Turnover~~ credit for NOx VDECS ~~retrofits~~ equals (Verified Percent NOx Reduction divided by 60 percent) multiplied by (Maximum power of the vehicle to which the the VDECS was applied to ~~on which VDECS verified to achieve NOx reductions was installed in last 12 months~~).

For VDECS verified to reduce NOx and that are also the highest level PM VDECS, or for VDECS that have been verified as achieving NOx reductions and is installed on an engine that also has a highest level PM VDECS that is verified separately, BACT credit for VDECS verified to reduce NOx equals (Verified Percent NOx Reduction divided by 120 percent) multiplied by (Maximum power of the vehicle to which the the VDECS was applied to).

This credit is applied in addition to credit for installing the highest level PM VDECS in section 2449.1(a)(2)(A)2.b. BACT ~~Turnover~~ credit for NOx VDECS ~~retrofits~~ may be applied to meet the ~~turnover~~ BACT requirements of section 2449.1(a)(2)(A)1 or to accumulate carryover BACT ~~turnover~~ credit.

10. Delayed Requirements for Early Compliance – Large fleets are exempt from the January 1, 2014 performance requirements if the sum of the fleet's NOx credits on March 1, 2010, exceeded 8 percent of the fleet's March 1, 2009 horsepower. To determine eligibility, ARB will take the sum of: Early Repower credit gained under 2449.1(a)(2)(A)(2)(a)i. plus Early Replacement credit gained under 2449.1(a)(2)(A)(2)(a)ii. plus Early VDECS credit for VDECS under 2449.1(a)(2)(A)(2)(a)iii. plus credit for Early Retirement gained under 2449.1(a)(2)(A)(2)(a)iv. plus turnover credit gained from March 1, 2009, to February 28, 2010, that was not accounted for under section 2449.1(a)(2)(A)(2)(a)iv. If the sum of these credits exceeds (Total maximum power of the fleet on March 1, 2009 times 0.8), then the fleet will not be required to meet either the January 1, 2014, fleet average or the January 1, 2014 BACT requirements. This provision shall not have the effect of reducing any credit that any fleet would otherwise have the right to receive in 2014 or in any subsequent year, even if such credit provided all or part of the basis for a finding that such fleet had NOx credits on March 1, 2010, in excess of 8 percent of such fleet's horsepower on March 1, 2009.

Note: Authority cited: Sections 39002, 39515, 39516, 39600, 39601, 39602, 40000, 41511, 43000, 43000.5, 43013, 43016, 43018, and 43018.2, Health and Safety Code. Reference: Sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39656, 39657, 39658, 39659, 39665, 39667, 43000, 43000.5, 43013, 43016, 43018, and 43018.2, Health and Safety Code.

~~Section 2449.2 PM Performance Requirements~~

~~(a) Performance Requirements -~~

~~Each fleet must meet the fleet average requirements in section 2449.2(a)(1) by March 1 of each year or demonstrate that it met the best available control technology (BACT) requirements as described in section 2449.2(a)(2). There are differing requirements for large and medium, and small fleets. If various portions of a fleet are under the control of different responsible officials because they are part of different subsidiaries, divisions, or other organizational structures of a company or agency, the fleet portions may comply with the performance requirements separately and be reported separately. However, the total maximum power of the vehicles under common ownership or control determines the fleet size. Fleets owned by low-population county local municipalities are subject to the small fleet requirements, even if their total maximum power exceeds 2,500 horsepower. Section 2449(d)(4) describes requirements for fleets that change size.~~

~~(1) Fleet Average Requirements~~

~~(A) Fleet Average Requirements for Large and Medium Fleets~~

~~1. Diesel PM Fleet Average~~ ~~- For each compliance date, a large or medium fleet must demonstrate that its Diesel PM Index was less than or equal to the calculated Diesel PM Target Rate.~~

~~The equation for calculating Diesel PM Target Rate is below:~~

~~Diesel PM Target Rate = [SUM of (*Max Hp* for each engine in fleet multiplied by *Target* for each engine in fleet) for all engines in fleet] divided by [SUM of (Max *Hp*) for all engines in fleet]~~

~~where Target is the Diesel PM target in g/bhp-hr from Table 2. To find the Target for each engine, read the value for the appropriate row based on the compliance year and the appropriate column based on the engine's maximum power from Table 2.~~

~~The equation for calculating Diesel PM Index is below:~~

~~Diesel PM Index = [SUM of (*Max Hp* for each engine in fleet multiplied by PM *Emission Factor* for each engine in fleet) for all engines in fleet] divided by [SUM of (Max *Hp*) for all engines in fleet]~~

~~Table 2 shows the targets used to calculate the Diesel PM Target Rate for each compliance date for large and medium fleets. The Emission Factors are defined in Appendix A.~~

Table 2 – Large and Medium Fleet PM Targets
For Use in Calculating PM Target Rates [g/bhp-hr]

	PM Targets for each Max Hp Group							
Compliance Date: March 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2010 (large fleets only)	0.46	0.60	0.62	0.33	0.23	0.18	0.20	0.30
2011 (large fleets only)	0.46	0.60	0.62	0.33	0.23	0.18	0.20	0.30
2012 (large fleets only)	0.39	0.43	0.46	0.26	0.16	0.14	0.14	0.24
2013	0.39	0.43	0.46	0.26	0.16	0.14	0.14	0.24
2014	0.29	0.23	0.24	0.18	0.11	0.11	0.11	0.18
2015	0.29	0.23	0.24	0.18	0.11	0.11	0.11	0.18
2016	0.21	0.18	0.19	0.14	0.08	0.08	0.08	0.11
2017	0.21	0.18	0.19	0.14	0.08	0.08	0.08	0.11
2018	0.12	0.12	0.13	0.10	0.06	0.06	0.06	0.08
2019	0.12	0.12	0.13	0.10	0.06	0.06	0.06	0.08
2020	0.08	0.08	0.07	0.06	0.03	0.03	0.03	0.06

(B) Fleet Average Requirements for Small Fleets - Small fleets must meet a PM fleet average beginning in 2015. To meet the PM fleet average, for each compliance date, a small fleet must demonstrate that its Diesel PM Index was less than or equal to the calculated Diesel PM Target Rate.

The equations for calculating Target Rates and Diesel PM Index are below:

Diesel PM Target Rate = [SUM of ((Max Hp for each engine in fleet multiplied by Target for each engine in fleet)] divided by [SUM of (Max *Hp*) for all engines in fleet]

where Target is the PM target in g/bhp-hr from Table 3. To find the Target for each engine, read the value for the appropriate row based on the compliance year and the appropriate column based on the engine's maximum power from Table 3.

Diesel PM Index = [SUM of (*Max Hp* multiplied by PM *Emission Factor*) for each engine in fleet] divided by [SUM of (Max *Hp*) for all engines in fleet]

Table 3 shows the targets used to calculate the Diesel PM Target Rate for each compliance date for small fleets. The Emission Factors are defined in Appendix A.

Table 3 – Small Fleet PM Targets
For Use in Calculating PM Target Rates [g/bhp-hr]

	PM Targets for each Max Hp Group							
Compliance Date: March 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2015	0.46	0.60	0.62	0.33	0.23	0.18	0.20	0.30
2016	0.46	0.60	0.62	0.33	0.23	0.18	0.20	0.30
2017	0.39	0.43	0.46	0.26	0.16	0.14	0.14	0.24
2018	0.39	0.43	0.46	0.26	0.16	0.14	0.14	0.24
2019	0.29	0.23	0.24	0.18	0.11	0.11	0.11	0.18
2020	0.29	0.23	0.24	0.18	0.11	0.11	0.11	0.18
2021	0.21	0.18	0.19	0.14	0.08	0.08	0.08	0.11
2022	0.21	0.18	0.19	0.14	0.08	0.08	0.08	0.11
2023	0.12	0.12	0.13	0.10	0.06	0.06	0.06	0.08
2024	0.12	0.12	0.13	0.10	0.06	0.06	0.06	0.08
2025	0.08	0.08	0.07	0.06	0.03	0.03	0.03	0.06

(2) BACT Requirements – Each year, each fleet must determine if it will be able to meet the fleet average requirements for the next March 1 compliance date, and if not, the following BACT requirement must be met. If a fleet does not meet the Diesel PM Target Rate in section 2449.2(a)(1), it must meet the BACT Retrofit Requirements in section 2449.2(a)(2)(A). Fleets that fail to meet both an applicable NOx target rate in section 2449.1(a)(1) and the Diesel PM Target Rates in section 2449.2(a)(1) in a compliance year must first meet the BACT turnover requirements in section 2449.1(a)(2) in that year and then meet the BACT Retrofit Requirements in section 2449.2(a)(2)(A) in that year.

(A) PM Retrofit Requirements for Fleets Not Meeting Diesel PM Target Rate

1. PM Retrofit Rate - If a fleet does not meet the Diesel PM Target Rate in section 2449.2(a)(1), it must demonstrate that it has retrofit the required percent of its total maximum power (not including specialty vehicles retrofitted and exempted from turnover in section 2449.1(a)(2)(A)4.b.) with highest level VDECS since March 1 of the previous year. Any carryover retrofit credit previously accrued may be applied towards the retrofits required. If the VDECS is not new (i.e., is being reused), it must have been taken from a vehicle that is no longer operating in California. Fleets may count acquisition of vehicles with Tier 4 interim or Tier 4 final engines or retirement of Tier 0 vehicles toward the retrofit requirement as described below. The required retrofit percents to demonstrate on each compliance date are described below in a. through d.

a. 2010: 20 percent.

b. 2011 and 2012:

c. 2013 and later: 36 percent for large fleets that did not meet the PM fleet average target in 2011 or 2012, 28 percent for large fleets that met the PM fleet average target in 2011 but not 2012, and 20

~~percent for large fleets that met the PM fleet average target in 2012 and for all medium fleets.~~

~~d. 2014: 20 percent.~~

~~**a. Turnover to Tier 4 In Lieu of Retrofitting** - If since March 1 of the previous year, a fleet acquired Tier 4 interim or Tier 4 final engines already equipped with an original equipment manufacturer diesel particulate filter or vehicles equipped with such engines, the total maximum power of the Tier 4 interim and Tier 4 final engines may be counted toward the required hp to be retrofit under section 2449.2(a)(2)(A)1. or used to accumulate carryover PM retrofit credit if during that same period, the fleet also retired Tier 0, 1, 2, or 3 engines with that total maximum power or greater.~~

~~**b. Retirement of Tier 0 Vehicles in Lieu of Retrofitting for Fleets with Reduced Horsepower** - If since March 1 of the previous year, a fleet's total maximum power has decreased, the lesser of the total maximum power of Tier 0 vehicles retired since March 1 of the previous year and the total horsepower by which the fleet has been decreased may be counted toward the required hp to be retrofit under section 2449.2(a)(2)(A)1. Such retirement of Tier 0 vehicles may not be used to accumulate carryover PM retrofit credit. Retired Tier 0 vehicles that are counted toward the required hp to be retrofit under this subsection may not be used in subsection a. above to demonstrate that the fleet retired Tier 0, 1, 2, or 3 engines with at least the total maximum power of the Tier 4 engines added.~~

~~**b. c. Conversion** **or Repower of Diesel Vehicles to Alternative Fuel or Gasoline-Powered** - Fleets that convert or repower a diesel vehicle subject to the regulation to alternative fuel or gasoline-powered may count the max power of the vehicle converted or repowered toward the required hp to be retrofit under section 2449.2(a)(2)(A)1. or to accumulate carryover PM BACT retrofit credit.~~

~~***2. Carryover PM retrofit credit*** –~~

~~**a. Beginning** - All fleets for vehicles remaining in their fleets begin with zero carryover retrofit credit on March 1, 2011 2009. All fleets may begin accumulating carryover retrofit credit on March 1, 2009.~~

~~**i. Double Credit for Early PM Retrofits** – Fleets that have installed the highest level VDECS on their vehicles before January 1, 2010 will accumulate a carryover retrofit credit equal to: 2 multiplied by total maximum power of engines on which highest level VDECS was installed before January 1, 2010, unless the contract for funding the VDECS stipulates single credit for installation of the VDECS.~~

~~**ii. Credit for Other PM Retrofits Before Initial Compliance Date** – Small and medium fleets that install highest level VDECS on their vehicles before March 1, 2012 will accumulate carryover retrofit credit equal to; 2 multiplied by total maximum power of engines on~~

~~which highest level VDECS was installed. Small fleets that install highest level VDECS on their vehicles between March 1, 2012 and February 28, 2014 accumulate carryover PM BACT retrofit credit equal to total maximum power of engines on which highest level VDECS was installed.~~

~~iii. **Credit for Reduced Fleet Activity**~~ – ~~Fleets that demonstrate a reduction in fleet activity will accumulate carryover retrofit credit (in horsepower). Fleet activity is defined as the sum of [(Total maximum power of the vehicle) times (Number of hours the vehicle was operated in the applicable 12 month period)] for each vehicle in the fleet.~~

~~1. Carryover retrofit credit generated from reduced activity may only be applied toward the March 1, 2010, or March 1, 2011 compliance dates.~~

~~2. Fleets that receive credit for the retirement of any vehicle prior to March 1, 2010, per section (iv) below, can not count that vehicle in the calculation of reduced activity credit.~~

~~3. Carryover retrofit credit shall be calculated for the fleet, not including those vehicles retired for credit under section (iv) below, as:~~

~~[(Fleet activity for January 1, 2007, to December 31, 2007) minus (Fleet activity for March 1, 2009, to February 28, 2010, including vehicles added to the fleet) divided by (fleet activity for January 1, 2007, to December 31, 2007)] multiplied by (Total maximum power of fleet on July 1, 2007)~~

~~4. Fleet owners must use vehicle specific data, including but not limited to hour meter logs or operator logs linking operators to specific vehicles, from July 1, 2007, to March 1, 2010, as described in section 2449(g)(1)(G)4 to document vehicle activity.~~

~~5. Fleets that do not have hour meter logs or vehicle-specific operator logs or equivalent records that are verifiable and substantively demonstrate activity for all vehicles in the fleet:~~

~~A. May use other verifiable indicators that are directly related to reduced vehicle operation to demonstrate an overall reduction in fleet activity from July 1, 2007, to March 1, 2010, including but not limited to records of overall off-road diesel fuel use for the fleet, as described in section 2449(g)(1)(G)4. However, such fleets must subtract the total credit for early retirement claimed under section (iv) below from their reduced activity credit.~~

~~B. May use indicators, including but not limited to revenue or total vehicle operator employment, that demonstrate a~~

reduction in business or staffing but that do not directly correspond to vehicle or fleet activity. To qualify for a credit using such indirectly-correlated indicators, the fleet must be able to provide some evidence of overall reduced fleet activity. The Executive Officer will grant a fleet using such indicators a maximum 20 percent credit for demonstrated reduced activity not directly related to vehicular operation. Such fleets must also subtract from the 20 percent reduced activity credit any credits received for early retirement claimed under section (iv) below. Fleets must not apply for credit using indicators that would demonstrate reduced business or staffing if the fleet has information or records that demonstrate the fleet has not reduced overall vehicle activity.

iv. Credit for Early Retirement – Fleets that reduce overall horsepower from March 1, 2006, to March 1, 2010, begin with carryover retrofit credit (in horsepower) equal to: (Total maximum horsepower of the fleet on March 1, 2006) minus (Total maximum horsepower of the fleet on March 1, 2010).

b. Accumulating carryover PM BACT retrofit credit – Beginning March 1, 2011 for large fleets, March 1, 2013 for medium fleets, and March 1, 2015 for small fleets, a fleet will accumulate carryover retrofit credit each year the total horsepower it retrofits plus the carryover retrofit credit it uses exceeds the required percent of its maximum power specified in section 2449.2(a)(2)(A)1. The amount accumulated is the maximum power retrofit plus the carryover retrofit credit used minus the required percent in the past 12 months prior to March 1. A large fleet also accumulates carryover retrofit credit on March 1, 2010 if the sum of the double retrofit credit earned from March 1, 2009 to January 1, 2010 plus the single retrofit credit earned from January 1, 2010 to March 1, 2010 exceeds 20 percent of its maximum horsepower. The amount accumulated is the sum of double credit retrofit credit earned from March 1, 2009 to January 1, 2010 plus the single credit earned from January 1, 2010 to March 1, 2010 in excess of 20 percent of fleet's maximum horsepower in the past 12 months.

c. Using carryover PM retrofit credit - Accumulated carryover retrofit credit may be applied to meeting the retrofit requirements of section 2449.2(a)(2)(A)1. in a later year. The amount of carryover retrofit credit used to meet the retrofit requirements in any one year is subtracted from the carryover retrofit credit total available in subsequent years. The amount of actual retrofit plus the amount of carryover retrofit credit used must equal the minimum BACT retrofit rate required by section 2449.2(a)(2)(A)(1).

3. Order of PM Retrofit – No Level 2 VDECS may be counted toward the retrofit requirements in section 2449.2(a)(2)(A) until all engines in vehicles

~~older than 5 years for which the highest level VDECS available is a Level 3 VDECS have been retrofit, except for specialty vehicles utilizing the exemption in section 2449.1(a)(2)(A)4.b. for which Level 2 is the highest level VDECS.~~

~~***4. Exemptions*** – A vehicle is exempt from the retrofit requirements in section 2449.2(a)(2)(A)1. if all vehicles in the fleet that do not qualify for an exemption under the following conditions have been retrofitted, and the vehicle meets one of the following conditions:~~

~~a. On the date of compliance, the vehicle is less than 5 years old from the vehicle's date of manufacture,~~

~~b. There is no highest level VDECS available for the vehicle's engine (i.e., there is no Level 2 or 3 VDECS, or there is no Level 2 or 3 VDECS which can be used without impairing the safe operation of the vehicle as demonstrated per section 2449(e)(8)),~~

~~c. The vehicle's engine is equipped with an original equipment manufacturer diesel particulate filter that came new with the vehicle, or~~

~~d. The vehicle's engine has already been retrofitted with a Level 2 or 3 VDECS that was the highest level VDECS available at time of installation. An engine with a Level 2 VDECS that was not the highest level VDECS at time of installation does not qualify for this exemption.~~

~~***5. Rounding*** - If the horsepower required to be retrofit under section 2449.2(a)(2)(A) is less than half of the maximum power of the lowest horsepower engine in the fleet that is subject to the retrofit requirements, the next engine is not required to be retrofitted. However, on the next year's compliance date, any horsepower not retrofit due to this rounding provision must be added to the required retrofit under section 2449.2(a)(2)(A). Once the required horsepower to be retrofit equals or exceeds half of the maximum power of the next engine in the fleet that is subject to the retrofit requirements, the next engine must be retrofitted.~~

~~***(3) Adding Vehicles After the Final Target Date*** – Commencing respectively on March 1, 2020 for large and medium fleets, and March 1, 2025 for small fleets, if a fleet owner adds a vehicle to his fleet and the engine did not come with an original equipment manufacturer diesel particulate filter, it must be equipped with the highest level VDECS within 3 months of acquisition.~~

~~Note: Authority cited: Sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39656, 39658, 39659, 39665, 39667, 39674, 39675, 40000, 41511, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.1, 42402.2, 42402.4, 42403, 43000, 43000.5, 43013, 43016, 43018, and 43018.2, Health and Safety Code. Reference: Sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39656, 39657, 39658, 39659, 39665, 39667, 39674, 39675, 40000, 41511, 42400, 42400.1, 42400.2, 42402.2, 43000, 43000.5, 43013, 43016, 43018, and 43018.2, Health and Safety Code.~~

~~2449.3~~2449.2 Surplus Off-Road Opt-In for NOx (SOON) Program

(a) ***Purpose***

To achieve additional reductions of oxides of nitrogen (NOx) emissions from in-use off-road diesel-fueled vehicles in California. The reductions must be surplus to those that would otherwise be achieved through implementation of title 13, California Code of Regulations, sections 2449, and 2449.1 ~~and 2449.2~~, "Regulation for In-Use Off-Road Diesel Vehicles".

(b) ***Applicability***

(1) ***District Applicability*** - Section ~~2449.3~~2449.2 applies to any air quality management district or air pollution control district (jointly referred to hereafter as air district) whose governing board elects to opt into the provisions of this section as set forth in section ~~2449.3(f)~~2449.2(f) below.

(2) ***Fleet Applicability*** – Section ~~2449.3~~2449.2 applies to a fleet that:
(A) Operates individual vehicles within the air district;
(B) As of January 1, 2008, on a statewide level, consisted of more than 40 percent Tier 0 and Tier 1 vehicles, and;
(C) Has a statewide fleet with maximum power greater than 20,000 horsepower (hp). excluding the hp from engines in two-engine cranes and the hp from single engine cranes formerly subject to the Cargo Handling Equipment Regulation and the hp from two-engine water well drilling rigs.

(c) ***Definitions***

The definitions in title 13, CCR, section 2449(c) apply, along with the following definitions:

(1) ***Contract period*** means the period of time in which the vehicle participates in the program and is under contract to the air district to achieve additional emission reductions.
(2) ***Operated within the district*** means a vehicle that currently operates within the boundaries of the air district and, during the three years immediately prior to the solicitation deadline, operated at least one hundred hours per year and operated more hours within the boundaries of the air district than in any other district.
(3) ***Project*** means actions on one vehicle to reduce NOx emissions, such as retrofit, repower, or vehicle replacement, for which funding is requested.
(4) ***Solicitation*** means a public announcement by the air district, requesting that fleets submit grant applications to the air district to participate in emission reduction incentive programs under this section.
(5) ***Solicitation deadline*** means the last day, as provided in the solicitation, that an application may be physically received by the air district.

(d) ***Requirements***

(1) If an air district, having held a public hearing and opted into the SOON program and made the program mandatory per section ~~2449.3(e)(9)~~2449.2(e)(9), issues a

solicitation for applications for funding under the SOON program, and if the solicitation so requires, a fleet that meets the applicability criteria of subsection (b) on the date of the solicitation must, before the solicitation deadline, do the following:

(A) **Report to District and ARB** - File a report, in a format approved by the Executive Officer, of all information required under section 2449(g) with the air district and ARB on its statewide fleet and that part of the fleet that has operated within the air district, as defined in section (c)(2) above. If the solicitation deadline is before April 1, 2009, the fleet must provide information regarding the fleet as it existed on January 1, 2008. If the solicitation deadline is on or after April 1, 2009, the fleet must provide the information that was reported to ARB on the most recent April 1 reporting date.

(B) **Calculate ~~NOx~~ fleet average index** - Determine the ~~NOx~~ fleet average index for vehicles that operated within the air district for the year in which the solicitation deadline occurs according to the formula in section 2449.1(a)(1)(A)1.

(C) **Calculate ~~NOx~~ fleet average target rate** - Determine the ~~NOx~~ fleet average target rate for vehicles that operated within the air district for the year in which the solicitation deadline occurs according to the formula in section 2449.1(a)(1)(A)1, and using the ~~NOx~~ targets set forth in Table 1 below. If there is no ~~NOx~~ fleet average target rate for the year in which the solicitation deadline occurs, the nearest future target rate ~~should~~shall be used.

Table 1: ~~NOx~~ Targets for each Max Hp Group [g/bhp-hr]

Compliance Date: January~~March~~ 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2011	5.6	6.2	6.7	6.0	5.4	5.1	5.3	6.4
2014	~~4.9~~ 5.8	~~5.1~~ 6.5	~~5.2~~ 7.1	~~4.7~~ 6.4	~~2.8~~ 3.9	~~2.7~~ 3.7	~~2.7~~3.7	~~4.2~~ 5.3
2017	~~4.2~~ 5.0	~~4.1~~ 5.4	~~3.8~~ 5.5	~~3.4~~ 4.9	~~1.5~~ 2.2	~~1.5~~ 2.2	~~1.5~~ 2.2	~~3.2~~ 4.3
2020	~~3.5~~ 4.1	~~3.2~~ 4.2	~~2.4~~ 3.4	~~2.2~~ 3.1	~~0.9~~ 1.4	~~0.9~~ 1.3	~~0.9~~ 1.4	~~2.6~~ 3.4
2023	~~3.5~~ 3.3	~~3.2~~ 3.0	~~2.4~~ 1.4	~~2.2~~ 1.3	~~0.9~~ 0.7	~~0.9~~ 0.7	~~0.9~~ 0.7	~~2.6~~ 2.7

(D) **Apply for funding** – Except as provided in section ~~2449.3(d)(2)~~2449.2(d)(2) and ~~2449.3(e)(3)~~2449.2(e)(3) below, a fleet for which the ~~NOx~~ fleet average index, as calculated in section ~~2449.3(d)(1)(B)~~2449.2(d)(1)(B), is greater than the ~~NOx~~ fleet average target rate, as calculated in section ~~2449.3(d)(1)(C)~~2449.2(d)(1)(C), must apply for SOON funding. The application submitted must be completed according to the guidelines and conditions established under the solicitation and, if the necessary NOx retrofits, repower, or vehicle replacements are available, must indicate how NOx retrofits, repowers, or vehicle replacements for which funding is requested will bring the ~~NOx~~ fleet average index for vehicles that operated within the air district from where it would have been under compliance with section 2449.1 to less than or equal to the ~~NOx~~ fleet average target rate calculated in section ~~2449.3(d)(1)(C)~~2449.2(d)(1)(C). The application must

also indicate whether the fleet wants the application to be given high priority for SOON program funding by the district. The funding priority shall be determined under the air district guidelines developed per section ~~2449.3(f)(2)~~2449.2(f)(2).

(E) **Achieve NOx reductions** - Fleets that receive SOON program funding must complete the actions for which they were funded per the conditions of the solicitation. Fleets that do not receive requested SOON program funding are not required to take actions beyond compliance with the in-use off-road diesel vehicle regulation, as specified in sections 2449, and 2449.1~~, and 2449.2~~.

(2) **Fleets not meeting the applicability provisions** - A fleet that operates individual vehicles within the air district, but does not meet the applicability provisions of sections ~~2449.3(b)(2)(B)~~2449.2(b)(2)(B) and ~~2449.3(b)(2)(C)~~2449.2(b)(2)(C), are not required to file a report with the ARB or the air district under section ~~2449.3(d)(1)~~2449.2(d)(1). It is also not required to apply for funding under subsection (d)(1)(D), but may file a report with ARB or the air district under section ~~2449.3(d)(1)~~2449.2(d)(1) and apply for funding if the ~~NOx~~ fleet average index calculated for its fleet operating within the air district exceeds the ~~NOx~~ fleet average target rate, and the fleet would like to qualify for funding. If the air district approves the fleet's application for funding, the fleet must achieve the NOx reductions as set forth in subsection (d)(1)(E). Participating in the SOON program in one year does not obligate the fleet to participate in subsequent years.

(3) **Air districts that opt into the SOON program** – Districts must prioritize requested projects based on the optimum NOx cost-effectiveness and on whether the fleet requesting the SOON program funding has requested high priority for SOON program funding. Air districts must report to ARB, in a format approved by the Executive Officer, all projects funded under the SOON program, including the equipment identification number of all vehicles funded.

(e) ***Special Provisions*** –

(1) ***Accounting for the in-use off-road diesel vehicle rule*** -

(A) Reductions achieved through the SOON program must be surplus, over the entire contract period, to those required by the "Regulation for In-Use Off-Road Diesel Vehicles", sections 2449 and 2449.1 ~~2449.2~~ above.

(B) During the contract period, vehicles equipped with NOx retrofits, repowered with new engines, or that have been replaced using SOON program funding, cannot use this lower emission rate to calculate the Fleet Average Targets, Fleet Average Indices, ~~NOx indices, PM indices, NOx target rates, PM target rates,~~ turnover credit and retrofit credit under section~~s~~ 2449.1 ~~and 2449.2~~. Instead, for the purposes of calculating the Fleet Average Targets, Fleet Average Indices, ~~NOx indices, PM indices, NOx target rates, PM target rates,~~ turnover credit and retrofit credit under section~~s~~ 2449.1 ~~and 2449.2~~, these vehicles must be reflected as if the actions taken under the SOON program did not occur. Actions taken using SOON program funding may be used for determining compliance under section~~s~~ 2449.1 ~~and 2449.2~~ after the completion of the SOON program project contract period for that vehicle. For example, if a Tier 0 vehicle is repowered with a Tier 3 engine with SOON

program funds, for purposes of compliance with sections ~~2449.1 and 2449.2~~, that vehicle is still treated as if it were a Tier 0 until the end of the contract period for the SOON program project.

(C) If a fleet pays for a retrofit that is installed concurrently with a repower or vehicle replacement funded with SOON program funding, the fleet may count the retrofit toward determining compliance under section ~~2449.2~~2449.1. If a fleet's vehicle is repowered using SOON program funding with a Tier 4 engine that comes with an original engine manufacturer diesel particulate filter, and if the fleet pays a portion of the repower costs such that it offsets the cost of an equivalent retrofit diesel particulate filter, the fleet may count the retrofit toward determining compliance under section ~~2449.2~~2449.1.

(2) ***Turnover in section 2449.1*** - A fleet may apply to the Executive Officer for an extension from the requirements in section 2449.1(a)(2)(A) if, using the accounting provisions in section ~~2449.3(e)(1)~~2449.2(e)(1), section 2449.1(a)(2)(A) would require, prior to March 1, 2014, a fleet to turn over vehicles that are Tier 2 or better. The exemptions in section 2449.1(a)(2)(A)4.a. and section 2449.1(a)(2)(A)5. for vehicles less than 10 years old and Tier 1 vehicles do not apply to the SOON program.

(3) ***Compliance plans*** - In addition to a SOON program application, a fleet applying for SOON program funding must prepare and submit to the air district a compliance plan, in the format described in the district guidelines, laying out the actions it is required to take under sections 2449.1 ~~and 2449.2~~ and the actions for which it is applying for funding under section ~~2449.3~~2449.2. Compliance plans must demonstrate that in the absence of any actions taken to satisfy section ~~2449.3~~2449.2, the fleet will be able to meet the requirements of sections 2449.1 ~~and 2449.2~~ through the remaining actions set forth in the plan.

(4) ***Surplus*** - Participation in the SOON program does not reduce the actions required for any fleet to comply with any requirements in the statewide in-use off-road diesel vehicle regulation under sections 2449.1 ~~and 2449.2~~.

(5) ***Tracking devices*** - An air district may require any vehicle repowered, retrofitted, or replaced with incentive money through the SOON program to be equipped with a vehicle location device (per the air district's guidelines and conditions for receiving funding) to ensure that the vehicle is used in the air district for the required percent of operating hours.

(6) ***Particulate Matter Retrofits*** -

a. The exemption from retrofit requirements for vehicles less than 5 years old in section ~~2449.2(a)(2)(A)4.a.~~2449.1(a)(2)(A)5. does not apply to vehicles that are replaced or repowered with SOON program funds.

b. If a fleet has a vehicle that has been retrofitted within the last six years with a Level 2 or 3 VDECS, which was the highest level VDECS at the time of retrofit, the fleet may but is not required to apply for SOON funding for that vehicle.

c. A fleet that receives SOON funding to repower or replace a vehicle is not required to install the highest level VDECS along with the repower or replacement.

(7) ***Funding Guidelines*** - Projects funded under the SOON program with Carl Moyer program money must be administered consistent with applicable Carl Moyer program guidelines, except as noted in section

~~2449.3(e)(6)c~~2449.2(e)(6)c. If a project is funded from other sources, the SOON program must be administered consistent with any applicable guidelines. The air district shall develop guidelines for administration of the SOON program, as provided in section ~~2449.3(f)(2)~~2449.2(f)(2).

(8) ***Vehicles Scheduled to Leave District*** – A fleet that has operated within the air district as defined in section ~~2449.3(e)(1)~~2449.2(c)(1) but that is planning to move vehicles out of the air district such that the vehicles will not operate enough hours in the air district to qualify for SOON funding may leave such vehicles out of the ~~NOx~~ fleet average index calculation in section ~~2449.3(d)(1)(B)~~2449.2(d)(1)(B), the ~~NOx~~ fleet average target rate calculation in section ~~2449.3(d)(1)(C)~~2449.2(d)(1)(C), and the application for funding in section ~~2449.3(d)(1)(D)~~2449.2(d)(1)(D). The fleet must submit a statement under penalty of perjury to the district for each such vehicle stating its intent to move each such vehicle out of the district.

(9) ***Voluntary or Mandatory Nature of SOON***- An air district, having held a public hearing and opted into this regulation, may issue a solicitation for applications for funding under the SOON program.

a. For fleets in the South Coast Air Quality Management District and San Joaquin Valley Air Pollution Control District, solicitations with a deadline before April 2, 2009, shall be voluntary. For solicitations with a deadline on or after April 2, 2009, the South Coast Air Quality Management District and San Joaquin Valley Air Pollution Control District may elect to make participation by fleets voluntary or mandatory.

b. In any district other than the South Coast Air Quality Management District or San Joaquin Valley Air Pollution Control District, for solicitations with a deadline before April 2, 2010, participation by fleets is voluntary. For solicitations with a deadline on or after April 2, 2010, the district may choose to make participation by fleets voluntary or mandatory.

c. The solicitation shall announce the air district's decision regarding voluntary or mandatory participation.

(f) Local Air District Opt-In

(1) To participate in the SOON program, an air district's governing board must hold a formally noticed public hearing, where public comment is taken, and, by majority vote, elect to opt into the program. As part of this hearing, for years when section ~~2449.3(e)(9)~~2449.2(e)(9) gives the district a choice between a voluntary and mandatory SOON program, the air district's governing board must decide whether participation by fleets is voluntary or mandatory.

(2) ***District Guidelines*** - An air district opting into section ~~2449.3~~2449.2 must develop, through a public process including a duly noticed public workshop and formally noticed public hearing, additional administrative provisions necessary to implement this section, including, but not limited to, funding guidelines (as required under section ~~2449.3(e)(7)~~2449.2(e)(7)), compliance planning requirements, and reporting and monitoring requirements. Funding guidelines may include limitations on the cost-effectiveness of projects that may be funded and must include the method used for prioritizing projects based on cost-effectiveness and whether applying fleets requested high priority for SOON

program funding, and a description of any requirements on fleets that receive SOON funding to pay part of the SOON project cost. Compliance planning guidelines must indicate the format and length of compliance plans. Air district guidelines may include a pre-application process that collects vehicle data (model year, horsepower, hours of use) and then requires full SOON project applications only for vehicles likely to receive funding.

(3) ***ARB Approval of District Guidelines*** - Before any guidelines, including administrative or funding guidelines, approved by an air district take effect, they must be approved by the Executive Officer. Air district staff shall submit proposed guidelines to the Executive Officer before they are acted on by the district's governing board. The Executive Officer will respond within 30 days with a description of any required changes to the proposed guidelines necessary for Executive Officer approval. In evaluating proposed air district guidelines, the Executive Officer shall consider, among other factors, the adequacy of cost-effectiveness criteria, whether fleet requests for high priority for SOON funding are given preference, and uniformity of district guidelines between air districts. After guidelines are adopted by a district's governing board, air district staff shall submit the adopted guidelines to the Executive Officer. The Executive Officer will respond within 30 days with approval or a description of any required changes to the guidelines.

(4) ***ARB Authority*** – ARB has sole authority to enforce the requirements of section ~~2449.3~~2449.2. The Executive Officer retains the authority to review any district's administration of section ~~2449.3~~2449.2 and to address any unforeseen circumstances or events.

Note: Authority cited: Sections 39002, 39515, 39516, 39600, 39601, 39602, 43000, 43000.5, 43013, 43016, and 43018, Health and Safety Code. Reference: Sections 39002, 39515, 39516, 39600, 39601, 39602, 39650, 39656, 39657, 39658, 39659, 39665, 39667, 43000, 43000.5, 43013, 43016, and 43018, Health and Safety Code.

Appendix A –

Use the values in these tables ~~unless engine is a Post-2007 Flexibility Engine, or~~ unless the engine is an engine certified to on-road standards.

Engines certified to on-road standards ~~should~~shall use the standard to which the engine is certified. ~~Flexibility engines certified January 1, 2007 or later should~~shall ~~use the emission standard to which the engine is certified.~~ Engines certified to Family Emission Limits and flexibility engines ~~certified before January 1, 2007~~, ~~should~~shall still use the emission factors in the table below.

Replacement engines produced per title 13, CCR, section 2423(j) ~~should~~shall use the engine model year of the engine replaced. For an engine certified to an emission standard lower than that shown in these tables for its model year, the emission standard to which the engine is certified may be used, provided that the certification Executive Order or certificate number is provided along with the initial and annual reporting required by section 2449(g)(1) and 2449(g)(2).

If the model year of an engine is unknown because it is missing a serial number, manufacturer's build code, and/or an engine family number, and the engine manufacturer or authorized representative is unable to determine the model year of the engine by examining the engine's build and components, such an engine shall be treated as a 1969 model year engine. If a manufacturer can bracket the model year of an engine (for example that an engine was built between 1987 and 1994) by examining the engine's build and components, the earliest date the engine could have been manufactured shall be used as the model year of that engine (in the example, 1987).

~~For engines that have been retrofit with VDECS, the PM Emission Factor is reduced 50 percent for a Level 2 VDECS, and 85 percent for a Level 3 VDECS; the NOx Emission Factor is reduced by whatever percentage NOx emission reductions are verified. The PM Emission Factor is not reduced for a Level 1 VDECS.~~

PM Emissions Factors by Horsepower and Year (g/bhp-hr)								
Engine Model Year	Horsepower Group							
	25-49	50-74	75-99	100-174	175-299	300-599	600-750	Over 750
1900-1969	0.950	1.200	1.200	1.100	1.100	0.950	0.950	0.950
1970-1971	0.950	1.200	1.200	0.940	0.940	0.810	0.810	0.810
1972-1987	0.950	1.200	1.200	0.780	0.780	0.680	0.680	0.680
1988	0.950	0.980	0.980	0.540	0.540	0.490	0.490	0.490
1989-1995	0.950	0.980	0.980	0.540	0.540	0.490	0.490	0.490
1996	0.950	0.980	0.980	0.540	0.40	0.40	0.40	0.500
1997	0.950	0.980	0.980	0.600	0.40	0.40	0.40	0.500
1998	0.950	1.090	1.090	0.600	0.40	0.40	0.40	0.500
1999	0.60	1.090	1.090	0.600	0.40	0.40	0.40	0.500
2000	0.60	1.090	1.090	0.600	0.40	0.40	0.40	0.40
2001	0.60	1.090	1.090	0.600	0.40	0.15	0.40	0.40
2002	0.60	1.090	1.090	0.600	0.40	0.15	0.15	0.40
2003	0.60	1.090	1.090	0.22	0.15	0.15	0.15	0.40
2004	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.40
2005	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.40
2006	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.15
2007	0.45	0.30	0.30	0.22	0.15	0.15	0.15	0.15
2008	0.22	0.22	0.30	0.22	0.15	0.15	0.15	0.15
2009	0.22	0.22	0.30	0.22	0.15	0.15	0.15	0.15
2010	0.22	0.22	0.30	0.22	0.15	0.15	0.15	0.15
2011	0.22	0.22	0.30	0.22	0.015	0.015	0.015	0.07
2012	0.22	0.22	0.015	0.015	0.015	0.015	0.015	0.07
2013	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.07
2014	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.07
2015 and later	0.02	0.02	0.015	0.015	0.015	0.015	0.015	0.03

NOx Emissions Factors by Horsepower and Year (g/bhp-hr)								
Engine Model Year	Horsepower Group							
	25-49	50-74	75-99	100-174	175-299	300-599	600-750	Over 750
1900 – 1969	7.2	14.8	14.8	15.9	15.9	15.2	15.2	15.2
1970 – 1971	7.2	14.8	14.8	14.8	14.8	14.1	14.1	14.1
1972 – 1979	7.2	14.8	14.8	13.6	13.6	13.0	13.0	13.0
1980 – 1987	7.2	14.8	14.8	12.5	12.5	11.9	11.9	11.9
1988	7.1	9.9	9.9	9.3	9.3	8.9	8.9	8.9
1989 – 1995	7.1	9.9	9.9	9.3	9.3	8.9	8.9	8.9
1996	7.1	9.9	9.9	9.3	6.9	6.9	6.9	8.9
1997	7.1	9.9	9.9	6.9	6.9	6.9	6.9	8.9
1998	7.1	6.9	6.9	6.9	6.9	6.9	6.9	8.9
1999	6.2	6.9	6.9	6.9	6.9	6.9	6.9	8.9
2000	6.2	6.9	6.9	6.9	6.9	6.9	6.9	6.9
2001	6.2	6.9	6.9	6.9	6.9	4.2	6.9	6.9
2002	6.2	6.9	6.9	6.9	6.9	4.2	4.2	6.9
2003	6.2	6.9	6.9	4.3	4.3	4.2	4.2	6.9
2004	4.9	4.9	4.9	4.3	4.3	4.2	4.2	6.9
2005	4.9	4.9	4.9	4.3	4.3	4.2	4.2	6.9
2006	4.9	4.9	4.9	4.3	2.6	2.6	2.6	4.2
2007	4.9	4.9	4.9	2.6	2.6	2.6	2.6	4.2
2008	4.9	3.0	3.0	2.6	2.6	2.6	2.6	4.2
2009	4.9	3.0	3.0	2.6	2.6	2.6	2.6	4.2
2010	4.9	3.0	3.0	2.6	2.6	2.6	2.6	4.2
2011	4.9	3.0	3.0	2.6	1.5	1.5	1.5	2.6
2012	4.9	3.0	2.5	2.5	1.5	1.5	1.5	2.6
2013	3.0	3.0	2.5	2.5	1.5	1.5	1.5	2.6
2014	3.0	3.0	2.5	2.5	0.3	0.3	0.3	2.6
2015 and later	3.0	3.0	0.3	0.3	0.3	0.3	0.3	2.6

APPENDIX B: LSI FLEET REQUIREMENTS REGULATION

Proposed Amendments to California Code of Regulations, Title 13, Sections 2775, 2775.1, and 2775.2 for Large Spark-Ignition (LSI) Engine Fleet Requirement

PROPOSED REGULATION ORDER

Amend Article 2, Large Sparks Ignition (LSI) Engine Fleet Requirements, within Chapter 15, Division 3, Title 13, California Code of Regulations, and new sections 2775, 2775.1, and 2775.2 to read as follows:

Article 2. Large Spark-Ignition (LSI) Engine Fleet Requirements

Section 2775. Applicability.

(a) General Applicability. This article applies to operators of off-road large spark-ignition (LSI) engine forklifts, sweepers/scrubbers, industrial tow tractors or airport ground support equipment operated within the State of California in the conduct of business with:

(1) 25 horsepower or more (greater than 19 kilowatts for 2005 and later model year engines), and

(2) greater than 1.0 liter displacement.

(b) Exemptions.

(1) Small Fleets as defined in subsection (d).

(2) Rental or lease equipment operated in California no more than 30 aggregated calendar days per year shall be exempt from the requirements of this article.

(3) Off-road military tactical vehicles or equipment exempt from regulation under the federal national security exemption, 40 CFR, subpart J, section 90.908, are exempt from the requirements of this article. Vehicles and equipment covered by the definition of military tactical vehicle that are commercially available and for which a federal certificate of conformity has been issued under 40 CFR Part 90, subpart B, shall also be exempt from the requirements of this article.

(c) Each part of this article is severable, and in the event that any part of this chapter or article is held to be invalid, the remainder of the article shall remain in full force and effect.

(d) Definitions. The definitions in Section 1900 (b), Chapter 1, and Section 2431 (a), Chapter 9 of Title 13 of the California Code of Regulations apply to this article. In addition, the following definitions apply to this article:

"Aggregated Operations" means all of an operator's California facilities for which equipment purchasing decisions are centrally made. Facilities that budget and make equipment purchasing decisions independent of a government or corporate headquarters are assumed to be independent and therefore are not required to be aggregated for the purpose of determining fleet size.

"Agricultural Crop Preparation Services" means packinghouses, cotton gins, nut hullers and processors, dehydrators, feed and grain mills, and other related activities that fall within the United States Census Bureau NAICs (North American Industry Classification System) definition for Industry 115114 – "Postharvest Crop Activities," as published in the North American Industry Classification System – United States, 2002.

"Agricultural Operations" means (1) the growing or harvesting of crops from soil (including forest operations) and the raising of plants at wholesale nurseries, but not retail nurseries, or the raising of fowl or animals for the primary purpose of making a profit, providing a livelihood, or conducting agricultural research or instruction by an educational institution, or (2) agricultural crop preparation services.

For purposes of this regulation, a vehicle that is used by its owner for both agricultural and non-agricultural operations is considered to be a vehicle engaged in agricultural operations, only if over half of its annual operating hours are for agricultural operations.

"Airport Ground Support Equipment," "Ground Service Equipment," or "GSE" means any large spark-ignition engine or electric-powered equipment capable of and used for performing the work normally performed by an LSI engine-powered piece of equipment contained in the 24 categories of equipment included in section B.3. of Appendix 2 of the South Coast Ground Support Equipment Memorandum of Understanding, dated November 27, 2002 except that equipment that falls into the "other" category, whether spark-ignited or electric, shall not be considered GSE for the purposes of this regulation. Specifically included in this definition are those categories of GSE equipment designed for on-road use, but not licensed for on-road use ("On-Road Equivalent" GSE).

"Baseline Inventory" means an inventory of equipment as defined in this subdivision that reflects all equipment ~~owned~~operated at the time of the inventory.

"Boneyard" means a grouping of decommissioned or retired LSI engine-powered pieces of equipment at a location geographically separated from operational fleets subject to the fleet average requirements and intended for sale, scrap or other disposition.

"Certification Standard" means the level to which an LSI engine is certified, in grams per kilowatt-hour of hydrocarbon and oxides of nitrogen, combined, as identified in an Executive Order (EO) issued by the Executive Officer of the California Air Resources Board.

"Dehydrators" means sun drying of fruits, vegetables, tomatoes, dates, prunes, raisins and olives, or artificially drying and dehydrating fruits, vegetables, tomatoes, dates, prunes, raisins, grapes, and olives.

"Emission Control System" means any device or system employed with a new or in-use off-road LSI-engine vehicle or piece of equipment that is intended to reduce emissions. Examples of LSI emission control systems include, but are not limited to, closed-loop fuel control systems, fuel injection systems, three-way catalysts, and combinations of the above.

"Equipment" or "Pieces of Equipment" means one or more forklifts, industrial tow tractors, sweeper/scrubbers, or pieces of airport ground support equipment as defined in this section.

"Executive Officer" means the Executive Officer of the California Air Resources Board, or his or her delegate.

"Executive Order" means a document signed by the Executive Officer that specifies the standard to which a new LSI engine is certified or the level to which an LSI retrofit emission control system is verified.

"Facility" means any structure, appurtenance, installation, and improvement on land that operates and/or garages one or more pieces of equipment.

"Facility Sample" means the selection of one or more individual facilities from an operator's California facilities for comparison to the operator's aggregate fleet inventory for fleet average calculation.

"Fleet Average Emission Level" means the arithmetic mean of the combined hydrocarbon plus oxides of nitrogen emissions certification standard or verification absolute emissions level for each ~~piece of~~ applicable LSI engine with an emission control system ~~equipment~~ and the default emission rate of 12.0 g/bhp-hr (16.0 g/kW-hr) for each uncontrolled LSI engine comprising an operator's fleet. LSI engines installed in equipment meeting the boneyard, in-field equipment, or retired equipment definitions shall not be included in fleet average emission level compliance calculations. For the purposes of calculating the fleet average, electric-powered equipment shall be considered to have combined hydrocarbon plus oxides of nitrogen emissions level of zero (0). Electric-powered equipment of less than 19 kilowatts shall be allowed to be included in the fleet average calculation provided that it meets the airport ground support equipment, forklift, industrial tow tractor, or sweeper/scrubber definition and ~~the operator can demonstrate that the equipment~~ performs, with similar efficiency, the same function as ~~the work equivalent of~~ an LSI engine-powered piece of equipment. For the purposes of calculating the fleet average for a non-forklift fleet, each piece of On-Road Equivalent GSE shall be considered to have a combined hydrocarbon plus oxides of nitrogen emissions level as follows: 1.1 g/bhp-hr (1.5 g/kW-hr) for purposes of determining compliance with the 1/1/2009 standard;

0.8 g/bhp-hr (1.1 g/kW-hr) for purposes of determining compliance with the 1/1/2011 standard; and 0.7 g/bhp-hr (0.9 g/kW-hr) for purposes of determining compliance with the 1/1/2013 standard. For the purpose of calculating the fleet average, fleet operators shall be permitted to exclude at their discretion any electric- powered equipment that could otherwise be used to lower the LSI fleet's average emission level.

"Forklift" means an electric Class 1 or 2 rider truck or a large spark-ignition engine-powered Class 4 or 5 rider truck as defined by the Industrial Truck Association. Electric Class 3 trucks are not forklifts for the purposes of this regulation.

"Industrial Tow Tractor" means an electric or large spark-ignition engine-powered Class 6 truck as defined by the Industrial Truck Association. Industrial tow tractors are designed primarily to push or pull non-powered trucks, trailers, or other mobile loads on roadways or improved surfaces. Industrial tow tractors are commonly referred to as tow motors or tugs. Industrial tow tractors are distinct from airport ground support equipment tugs for the purposes of this regulation.

"In-field equipment" means agricultural operations LSI equipment that is used no more than half of its annual operating hours in agricultural crop preparation services.

"Label" means a permanent material that is welded, riveted or otherwise permanently attached to the engine block or other major component in such a way that it will be readily visible after installation of the engine in the equipment. If the equipment obscures the label on the engine, the equipment manufacturer must attach a supplemental label such that it is readily visible. The label will state the emission standard or verification absolute emissions level to which the engine ~~or equipment~~ was certified.

"Large Fleet" means an operator's aggregated operations in California of 26 or more pieces of equipment.

"Leased forklift" for use in agricultural crop preparation services means a forklift under a contract or agreement for a term or period of one year or more that may include an option to purchase the forklift.

"LSI Retrofit Emission Control System" means an emission control system employed exclusively with an in-use off-road LSI-engine vehicle or piece of equipment.

"Manufacturer" means the manufacturer granted new engine certification or retrofit emission control system verification.

"Medium Fleet" means an operator's aggregated operations in California of 4 to 25 pieces of equipment.

"Memorandum of Understanding Signatories" or "MOU Signatories" means any of the airlines that entered into the South Coast Ground Support Equipment Memorandum of Understanding, dated November 27, 2002.

"Military tactical vehicles or equipment" means vehicles or pieces equipment that meet military specifications, are owned by the U.S. Department of Defense and/or the U.S. military services or its allies, and are used in combat, combat support, combat service support, tactical or relief operations, or training for such operations.

["Model Year" means the manufacturer's annual production period, which includes January 1 of a calendar year or, if the manufacturer has no annual production period, the calendar year.][1]

["New Engine" means an engine's ownership has not been transferred to the ultimate consumer.]

"Non-forklift fleet" means an operator's aggregated operations in California of four (4) or more sweeper/scrubbers, industrial tow tractors, or pieces of airport ground support equipment, alone or in combination.

["Off-Road Large Spark-ignition Engines" or "LSI Engines" means any engine that produces a gross horsepower of 25 horsepower or greater (greater than 19 kilowatts for 2005 and later model years) or is designed (e.g., through fueling, engine calibrations, valve timing, engine speed modifications, etc.) to produce 25 horsepower or greater (greater than 19 kilowatts for 2005 and later model years). If an engine family has models at or above 25 horsepower (greater than 19 kilowatts) and models below 25 horsepower (at or below 19 kilowatts), only the models at or above 25 horsepower (above 19 kilowatts) would be considered LSI engines. The engine's operating characteristics are significantly similar to the theoretical Otto combustion cycle with the engine's primary means of controlling power output being to limit the amount of air that is throttled into the combustion chamber of the engine. LSI engines or alternate fuel-powered LSI internal combustion engines are designed for powering, but not limited to powering, forklift trucks, sweepers, generators, and industrial equipment and other miscellaneous applications. All engines and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act, as amended, and as defined by regulation of the Environmental Protection Agency, are specifically excluded from this category. Specifically excluded from this category are: 1) engines operated on or in any device used exclusively upon stationary rails or tracks; 2) engines used to propel marine vessels; 3) internal combustion engines attached to a foundation at a location for at least 12 months; 4) off-road recreational vehicles and snowmobiles; and 5) stationary or transportable gas turbines for power generation.]

[1] Bracketed definitions are replicated for ease of use and presentation clarity from Section 1900 (b), Chapter 1, or Section 2431 (a), Chapter 9, of Title 13 of the California Code of Regulations.

"Operator" means a person with legal right of possession and use of LSI engine equipment other than a person whose usual and customary business is the rental or leasing of LSI engine equipment. Operator includes a person whose usual and customary business is the rental or leasing of LSI engine equipment for any LSI engine equipment used more than 50 hours per year for purposes other than ~~not solely possessed or used for~~ rental or leasing.

"Rental forklift" for use in agricultural crop preparation services means a forklift under a contract or agreement for a term or period of less than one year that may include an option to renew the contract or agreement.

"Repower" means a new or remanufactured engine and parts offered by the OEM or by a non-OEM rebuilder that has been demonstrated to the ARB to be functionally equivalent from a durability standpoint to the OEM engine and components being replaced.

"Retired equipment" means LSI equipment with an operational non-resettable hour meter that has been removed from service and rendered inoperable using the following procedures:

1. Remove fuel and the starter battery from the piece of equipment. For propane-fueled LSI engines, the operator may simply remove the fuel canister.

2. Remove the steering wheel from the piece of equipment.

3. Store the retired equipment at a central location, apart from operational equipment, either within the facility or elsewhere, and employ lockout/tagout controls. At a minimum, place a lockout box on either the propane connector or the positive cable to the starter battery. Operators planning to scrap a piece of equipment need not use a lockout box, but may instead sever the positive battery cable more than six inches from the connector.

4. Record the initial hour meter reading at the time of decommission and write the date of decommission and the initial meter reading in permanent ink in a readily visible location on a non-removable surface of the piece of equipment. Additionally, record the hour meter serial number, if available. Continue to record meter readings at quarterly intervals (every three months), and sign under penalty of perjury. Retain records in accordance with the LSI record keeping requirements in section 2775.2.

5. Develop an inventory for all retired pieces of equipment at the date of first retirement and sign, under penalty of perjury, that the equipment is retired for the purposes of the LSI Fleet Regulation.

Retired equipment may remain at the facility for up to one year. After one year, the retired equipment must either be removed from the facility or reentered into FAEL standards calculations.

"Retrofit" means the application of an emission control system to a non-new LSI engine.

"Serial Number" means an engine serial number and date of engine manufacture (month and year) that are stamped on the engine block or stamped on a metal label riveted or permanently attached to the engine block. Engine manufacturers must keep records such that the engine serial number can easily be used to determine if an engine was certified for the applicable model year, and beginning January 1, 2007, the standard to which the engine was certified.

"Small Fleet" means an operator's aggregated operations in California of 1 to 3 forklifts and/or 1 to 3 pieces of non-forklift equipment.

"Sweeper/scrubber" means an electric or large spark-ignition engine-powered piece of industrial floor cleaning equipment designed to brush and vacuum up small debris and litter or scrub and squeegee the floor, or both.

"Specialty Equipment" means a piece of equipment with unique or specialized performance capabilities that allow it to perform prescribed tasks and as approved by the Executive Officer.

["Ultimate Purchaser" means the first person who in good faith purchases a new LSI engine or equipment using such engine for purposes other than resale.]

"Uncontrolled LSI Engine" means pre-2001 uncertified engines and 2001-2003 certified uncontrolled LSI engines. The default emission rate for an uncontrolled LSI engine is 16.0 grams per kilowatt-hour of hydrocarbon plus oxides of nitrogen.

"Verification" means a determination by the Executive Officer that the LSI emission control system meets the requirements of this Procedure. This determination is based on both data submitted or otherwise known to the Executive Officer and engineering judgement.

"Verification Level" means one of four emission reduction classifications that apply to the performance capability of retrofit emission control systems as described in Title 13, California Code of Regulations, Section 2782(f), Table 1, as set forth in Table 1:

Table 1. LSI Engine Retrofit System Verification Levels

Classification	*Percentage Reduction (HC+NOx)*	*Absolute Emissions (HC+NOx)*
LSI Level 1 [1]	> 25% [2]	Not Applicable
LSI Level 2 [1]	> 75% [3]	3.0 g/bhp-hr [3] (4.0 g/kW-hr)
LSI Level 3a [1]	> 85% [4]	0.5, 1.0, 1.5, 2.0, 2.5 g/bhp-hr (0.7, 1.3, 2.0, 2.7, 3.4 g/kW- hr)
LSI Level 3b [5]	Not Applicable	0.5, 1.0, 1.5, 2.0 g/bhp-hr (0.7, 1.3, 2.0, 2.7 g/kW- hr)

Notes:

(1) Applicable to uncontrolled engines only

(2) The allowed verified emissions reduction is capped at 25% regardless of actual emission test values

(3) The allowed verified reduction for LSI Level 2 is capped at 75% or 3.0 g/bhp-hr (4.0 g/kW-hr) regardless of actual emission test values

(4) Verified in 5% increments, applicable to LSI Level 3a classifications only

(5) Applicable to emission-controlled engines only

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43018, Health and Safety Code. Reference: Sections 43013, 43017, and 43018, Health and Safety Code.

Section 2775.1. Standards.

(a) Operators of forklift and/or non-forklift fleets shall first determine the size of their fleets, using the equipment definitions in Section 2775. Then, except as provided in subdivisions (c), (d), (e), and (f), operators of medium and large forklift fleets and operators of non-forklift fleets with more than three pieces of equipment shall comply with the fleet average emission level standards in Table 2 by the specified compliance dates.

Table 2: Fleet Average Emission Level Standards in grams per kilowatt-hour (brake-horsepower-hour) of hydrocarbons plus oxides of nitrogen

	Initial Compliance Date		
Fleet Type	**1/1/2009**	**1/1/2011**	**1/1/2013**
Large Forklift Fleet	**3.2 (2.4)**	**2.3 (1.7)**	**1.5 (1.1)**
Medium Forklift Fleet	**3.5 (2.6)**	**2.7 (2.0)**	**1.9 (1.4)**
Non-forklift Fleet	**4.0 (3.0)**	**3.6 (2.7)**	**3.4 (2.5)**

(1) Fleet operators subject to the fleet average provisions shall include in their fleet average calculations any piece of equipment that the operator has rented or leased or reasonably expects to rent or lease for a period of one year or more.

(2) Fleet operators may exclude from the fleet average calculation uncontrolled 2003 and 2004 model year rental equipment (if the equipment is rented for a period of less than one year) until January 1, 2010.

(3) In addition to the provisions of (a)(2) above, fleet operators may exclude from the fleet average calculation rental or leased equipment if:

(A) the rental or lease is for a period of less than one year, and

(B) the rental or lease component comprises no more than 20 percent of the operator's equipment at any time, and

(C) the equipment rented or leased during the period from January 1, 2009 through December 31, 2010 is controlled to a 4.0 g/kW-hr (3.0 g/bhp-hr) standard or better and equipment rented or leased on or after January 1, 2011 is controlled to a 2.7 g/kW-hr (2.0 g/bhp-hr) standard or better.

(4) Fleet operators shall comply with the applicable fleet average standard in Table 2 with the following exceptions:

(A) if through business expansion, a fleet meets the definition of a larger size category, the fleet may continue to comply with the applicable fleet standard for the initial size category until the subsequent compliance date, at which

time the fleet must meet the applicable fleet standard for the new fleet size category, or

(B) if through retirement or other fleet size reduction mechanism the fleet would otherwise be required to comply with a less stringent fleet standard, then the less stringent fleet standard becomes effective immediately.

(b) Operators of mixed fleets comprised of forklifts and non-forklift equipment shall determine fleet size individually for forklift fleets and non-forklift fleets; a mixed fleet with three or fewer forklifts and three or fewer non-forklift pieces of equipment shall be considered to be a small fleet.

(c) Except as provided in subdivisions (d), (e) and (f), each operator of a forklift fleet used in agricultural crop preparation services shall address emissions from their owned uncontrolled forklifts engines as follows:

(1) by January 1, 2009, identify that portion of the 1990 and newer LSI forklift fleet for which retrofit emission control systems have been verified and control 20 percent of that portion as prescribed in ~~subdivision (d)(1)(D)(i)~~subsection (3) below; and

(2) by January 1, 2012, control 100 percent of the owned 1990 and newer LSI forklift fleet for which retrofit emission control systems have been verified as prescribed in ~~subdivision (d)(1)(D)(i)~~subsection (3) below.

(3) To comply with subsections (1) and (2) of this section, operators shall retrofit or repower the equipment to a Level 2 or Level 3 verification level as described in Title 13, California Code of Regulations, Section 2782 (f).

~~(3)~~(4) Operators of fleets used in agricultural crop preparation services may exclude from their LSI forklift fleet:

(A) leased forklifts provided the forklifts meet a 4.0 g/kW-hr (3.0 g/bhp-hr) standard or better. Forklifts under a lease agreement that was initiated prior to May 25, 2006 may also be excluded from the 4.0 g/kW-hr standard for the life of the lease, or until January 1, 2010, whichever is earlier, and

(B) rental forklifts rented on or after January 1, 2009, provided the forklifts meet a 4.0 g/kW-hr standard or better. Forklifts with an uncontrolled 2003 or 2004 model year engine may be excluded from the requirements of this subpart until January 1, 2010.

(d) Limited Hours of Use Provisions.

(1) Forklift and non-forklift equipment in medium and large fleets shall be exempted from the provisions of subdivision (a) of this section provided that:

(A) the equipment ~~is~~ was used~~, on average over any three year period, less~~ no more than ~~251~~200 hours ~~per year~~ in the prior year, and

(B) the equipment is equipped with an operational non-resettable hours of use meter, and

(C) the operator maintains hours of use records for the piece of equipment at a facility~~, and~~.

~~(D) the operator addresses the emissions by January 1, 2011, through option (i) or (ii) below:~~

~~(i) retrofit or repower the equipment to a Level 2 or Level 3 verification level as described in Title 13, California Code of Regulations, Section 2782 (f), or~~

~~(ii) retire the equipment or replace the equipment with a new or used piece of equipment certified to a 4.0 g/kW-hr (3.0 g/bhp-hr) hydrocarbon plus oxides of nitrogen standard.~~

(2) Forklifts used in agricultural crop preparation services fleets shall be exempted from the provisions of subdivision (c) of this section provided that they are used, on average over any three year period, less than 251 hours per year and meet the requirements of subdivisions (d)(1)~~(A)~~(B) ~~through~~and (d)(1)(C).

(e) Specialty Equipment Exemption.

(1) Forklift and non-forklift specialty equipment shall be exempt from the requirements of subdivisions (a) through (c) of this section provided that:

(A) the replacement cost exceeds the replacement cost of a "typical" piece of equipment from that category by 50 percent or the retrofit cost exceeds the "typical" retrofit cost of a piece of equipment from that category by 100 percent, and

(B) they are used, on average over any three year period, less than 251 hours per year and meet the requirements of subdivisions (d)(1)~~(A)~~(B) ~~through~~and (d)(1)(C), and

(C) the Executive Officer approves the listing of the piece of equipment as specialty equipment.

(f) Alternate Compliance Option for Operators of Fleets used in Agricultural Crop Preparation Services.

(1) Operators of forklift fleets used in agricultural crop preparation services shall be exempted from the provisions of subdivision (c) of this section provided that the forklift fleet complies with a 4.0 g/kW-hr (3.0 g/bhp-hr) fleet average emission level.

(g) Use of Experimental Emission Control Strategies.

(1) An operator may use an experimental emission control strategy provided by or operated by the manufacturer in no more than ten percent of his total fleet for testing and evaluation purposes. The operator shall keep documentation of this use in records as specified in Section 2775.2(b).

(i) Severability. If any provision of this section or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the section that can be given effect without the invalid provision or application, and to this end the provisions of this section are severable.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43018, Health and Safety Code. Reference: Sections 43013, 43017, and 43018, Health and Safety Code.

Section 2775.2. Compliance Requirements for Fleet Operators.

(a) Fleet operators subject to the fleet average emission level requirements contained in Table 2 of section 2775.1(a) shall conduct a baseline inventory of their fleet within six months of ~~[insert operative date of regulations after filing with Secretary of State]~~May 12, 2007 and shall maintain records at their facilities of their baseline inventory and subsequent inventories indicating accessions and retirements until June 30, 2016.

(b) At a minimum, fleet operators subject to the fleet average emission level requirements contained in Table 2 of section 2775.1(a) shall record and maintain on file for each LSI piece of equipment operated at their facilities, information on the equipment type, make, model, serial number, and emission certification standard or retrofit verification level. ~~Fleet operators shall also maintain on file, for a period of three years, information on the quality of propane fuel they purchased for their fleet that includes a written statement, product delivery ticket, or receipt from the fuel supplier, if obtainable, that the fuel supplied to the operator meets all applicable state and federal laws for use in their engines.~~ Operators that maintain multiple facilities may aggregate the records at a centralized facility or headquarters. Records for all equipment at all facilities shall be made available to the Air Resources Board within 30 calendar days upon

request. Compliance staff may then select a facility sample for inspection purposes.

(c) Medium and large fleets shall be required to demonstrate at any time between January 1, 2009 and December 31, 2015, based on actual inventory, and reconciled against inventory records, that they meet the applicable fleet average emission level standard in Section 2775.1(a).

(d) Agricultural crop preparation services fleets shall be required to demonstrate at any time on or after June 1, 2007, based on actual inventory and reconciled against inventory records, that they have addressed their 1990 and newer uncontrolled LSI engines as prescribed in Section 2775.1(c).

(e) Compliance Extensions. An operator may be granted an extension to a compliance deadline specified in Section 2775.1 for one of the following reasons:

(1) Compliance Extension based on No Verified Retrofit Emission Control System

(A) If the Executive Officer has not verified a retrofit emission control system, or if one is not commercially available for a particular engine and equipment combination, the Executive Officer may grant a twoone-year extension in compliance if prior to each compliance deadline specified in subsections 2775.1(a), (c), and (d), the Executive Officer finds that insufficient numbers of retrofit emission control systems are projected to be available. If the Executive Officer still finds that insufficient numbers of retrofit emission control systems are projected to be available near the end of the first two-year extension, the Executive Officer may grant a subsequent two-year extension in compliance. At the conclusion of the approved extension(s), the operator must include the LSI piece of equipment in their FAEL standards calculations.

(2) Compliance Extensions for GSE

(A) Compliance Extension based on no Verified or Commercially Available Retrofit Emission Control Systems for GSE. GSE of model year 1990 or newer with an uncontrolled LSI engine for which there is no verified retrofit as of January 1, 2007, or for which such verified retrofits are not commercially available by that date, shall be excluded from the GSE fleet average emission level standards contained in section 2775.1(a) until January 1, 2011. GSE of model year 1990 or newer with an uncontrolled LSI engine for which there is still no verified retrofit as of January 1, 2009, or for which such verified retrofits are not commercially available by that date, shall be excluded from the GSE fleet average emission level standards contained in section 2775.1(a) until January 1, 2013.

(B) Other Compliance Extensions for GSE. Operators may apply to the Executive Officer for an initial compliance extension of up to two years and one or more compliance extension renewals of up to one year in

circumstances other than those addressed in subsection 2(A) above. The Executive Officer shall grant such applications if the applicant has made a good faith effort to comply with the fleet average emission level standards contained in section 2775.1(a) in advance of the compliance dates contained in the same section and documents either that it meets one of the following criteria independently, or that, when considering any combination of the criteria, the documentation justifies granting the application:

(i) due to conditions beyond the reasonable control of the applicant, sufficient numbers of tested and reliable emission-controlled GSE are not projected to be available at a commercially reasonable cost;

(ii) due to conditions beyond the reasonable control of the applicant, use of available emission-controlled GSE would result in significant operational or safety issues;

(iii) any other criterion that reasonably relates to whether the application should be granted.

(C) Compliance extensions granted under subsections (e)(2)(A) and (e)(2)(B) shall not extend beyond January 1, 2013. After January 1, 2013, all uncontrolled GSE shall be included in calculations for determining compliance with the GSE fleet average emission level standards contained in section 2775.1(a).

(3) If an extension to the compliance deadline is granted by the Executive Officer, the operator shall be deemed to be in compliance as specified by the Executive Officer's authorization.

(f) Continuous Compliance. An operator is required to keep his equipment in compliance with this regulation, once it is in compliance, so long as the operator is operating the equipment in California.

(g) Severability. If any provision of this section or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the section that can be given effect without the invalid provision or application, and to this end the provisions of this section are severable.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43018, Health and Safety Code. Reference: Sections 43013, 43017, and 43018, Health and Safety Code.

APPENDIX C: SUMMARY OF SURVEY RESULTS

Staff conducted a survey of Off-Road fleets to garner feedback regarding different compliance options and suggested amendments to the Off-Road Rule. A total of 81 surveys were returned. Of the surveys returned, 23 were from large fleets, 7 were from medium sized fleets and 28 were from small fleets. There were an additional 23 surveys that did not indicate the size of their fleets. While the results varied quite a bit, several things stood out. First, nearly everyone had recommended changes, nearly everyone complained about the complexity of the regulation, and most said the current economic recession would make compliance difficult. While there were many suggested "rewards" for fleets that complied with the 2010 compliance date, they generally fell in two categories: either they wanted an exemption from compliance for one or two years (in one case, five years) or they wanted credits (in some cases double or triple) that would not expire. A more detailed breakdown of the responses to each question is below.

Question 1: *When looking at your fleet's future compliance requirements, what requirements are the toughest for your fleet to meet, a. or b.? a. Installing exhaust retrofits, b. Accelerating turnover to newer vehicles or engines.*

The results of this question were nearly evenly split with 43% of respondents (36 respondents) saying that (a) retrofit requirements were the toughest to meet and 48% (40 respondents) saying (b) turnover requirements were the toughest. Four respondents said that both (a) and (b) would be tough to meet while two respondents simply left the question blank. One interesting outcome from this question was that over 60% of small fleets answered that (b) was the toughest to meet. This possibly reflects a miscommunication since small fleets are not subject to the turnover requirements. Of medium and large fleets (i.e., those not identified as small fleets), 54% (29 respondents) said (a) retrofit requirements would be more difficult.

Question 2: *Which is more beneficial to your fleet, a. or b.? a. A 2 year delay in the compliance requirements, while maintaining the current regulatory requirements for turnover and retrofitting. b. Keep the current compliance timeline, but decrease the turnover and retrofit requirements and/or loosen the fleet average targets.*

The results of question 2 definitely show a clear favoring of option (b), keeping the timeline but decreasing annual requirements, with 60% (50 respondents) identifying this option as the most beneficial to their fleet. 29% (23 respondents) chose (a) a two-year delay as more beneficial, with the remainder stating that neither option was favorable. One additional comment was made when answering this question. A respondent who did not make a selection suggested that we only make new vehicles comply.

Question 3: *Low use vehicles are exempt from all requirements except reporting and labeling. If the low-use definition was increased to more than 100 hours per year, would that help your fleet comply? (If yes, put yes, then number).*

Virtually everyone (> 90%) felt that increasing the number of hours per year defined for low use vehicles would help their fleets comply. Less than 10% of respondents said that increasing the number of hours per year would not help. While the suggested increases ranged anywhere from 150 hours per year to 1500 hours per year, 23% of respondents (19) reported that an increase to 200 hours per year would help. The second most number of respondents (18% or 15 respondents) wanted an increase to 500 hours per year while 14% (12 respondents) requested 300 hours and 13% (11 respondents) requested 250. There were additional comments made by two respondents when answering this question. One respondent indicated that most times their vehicle may be under 100 hours per year but there are some years where they would reach 200 or even 300 hours. This respondent requested 500 hours. The other respondent, who identified 300 hours as their choice, said that this would help keep them in business as the cost of retrofits is "impractical."

Question 4: *If your fleet met the March 1, 2010 compliance requirements, which are not being enforced, what type of "reward" or credit would you like to receive in the future?*

Most respondents wanted a compliance exemption of at least one year with others suggesting two years and five years. Several other suggestions for exemptions were 4 years, six to eight years, 2013 or when Tier 4 engines were available (whichever was later) and even until such time that the economy has been stable for one full year (although that respondent did not make clear his/her definition of stable). Many other respondents suggested credits as a reward for compliance. These varied from requesting five years of double credit for retrofits, retirements, and repowers, freezing of credits until start date, credit for fleet updates, yearly hourly requirements, carryover of credits until they have been exhausted, and even triple credit.

Some respondents wanted compensation for their 2010 compliance efforts. These primarily involved vehicle purchases (including help purchasing Tier 4 vehicles) or financing. Other requests involved relaxing the rules, including 2014 PM targets and BACT requirements and targets, decreasing turnover and retrofit requirements, extended time for vehicle turnover and purchase, decreasing the percentage horsepower requirement, keeping the requirements from being "front loaded," and relaxed rules on future tractors. Several respondents also asked for an increase of horsepower limits to 3000 hp for the definition of small fleets or just a general increase.

Some miscellaneous requests included a couple requests for complete elimination of the program, and general requests for relief from the On-Road Rule.

Question 5: *What do you feel is the most complicated or hard to understand part(s) of the off-road regulation?*

A large number of respondents (approximately 15%) felt that the entire regulation was difficult to understand. Several responses indicated that the PM/NOx credits (including expiration timeline) were difficult to understand. Several also said they were frustrated that there are no Tier 4 vehicles available yet, which means vehicles bought now may need to be turned over again before the regulation is fully implemented. Lastly, meeting

requirements for PM and turnover/retrofit requirements were cited as complicated (including calculations for turnover requirements, horsepower and BACT).

Other portions of the regulation cited as difficult to understand included how the information was compiled, the moving fleet average targets, how to evaluate present and past fleets, record keeping, planning, the fleet calculator, paperwork, diesel particulate filters (DPF) verification, engines and retrofits not on the market, identifying the inventory, finding old vehicles in DOORS, finding the right DPF, hours in fleet average compliance, low use vehicle vs. small fleets vs. attainment counties, on road versus off-road regulation requirements, Surplus Off-road Opt-in for NOx (SOON) program, wording, exemptions, and deadlines. Finally, one respondent reported that it was hard to understand the reason for the regulation.

Question 6: *What part(s) of the off-road regulation are the most challenging to fleets?*

One of the common responses to this question was cost. Nearly 45% of respondents said that cost is the most challenging part of the off-road regulation – with the cost of installing retrofits being of the greatest concern (approximately 32% of cost respondents overall). Approximately 34% of respondents cited retrofits as the most challenging with about 43% of those respondents linking it to cost. Other challenges related to retrofitting identified were finding locations for the retrofits and the visibility of the retrofits. Many respondents seemed to believe that the technology for retrofits was either costly as mentioned above or non-existent. Also identified were challenges such as turning over vehicles, where respondents felt that they were eliminating vehicles that still had a useful life. Other respondents felt that the challenges were in meeting the requirements with a lack of available Tier 4 engines and vehicles. Several respondents also indicated the difficulties in keeping track of and complying with more than one different regulation (i.e., off-road, on-road, and PERP). Finally, respondents also felt that the costs for complying were not evenly distributed over the compliance timeline and that they would be spending the most money up front.

Question 7: *What part(s) of the off-road regulation are the least cost effective for your fleet?*

Almost half of the respondents (45%) reported that retrofits were the least cost effective part of the regulation. Another significant number of respondents, approximately 20%, cited the requirement to purchase new vehicles or replace existing vehicles. Also, a large number of respondents (12%) indicated that none of the regulation is cost effective (or everything about the regulation was least cost effective). Other items listed as the least cost effective were buying new machines, upgrading engines or vehicles to newer engines, the 2014 PM Target, replacing old vehicles (specifically Tier 0), retrofitting "low use" (200 – 300 hour) vehicles, inability to purchase Tier 4, lack of clear enforcement policy ensuring equality, time and effort obtaining grants, reporting and labeling, and the limit for low use being too low. One respondent wanted financial assistance for the regulation and another respondent suggested that Carl Moyer funding should go to buying up Tier 0 vehicles.

Question 8: *What part(s) of the off-road regulation fit in with normal business cycles, and what part(s) do not?*

Most respondents who felt that there were aspects of the regulation that fit within normal business cycles cited vehicle replacement and turnover as the best fitting cycle. However, these respondents expressed concern that the cycles proposed in the regulation were too short and preferred cycles more in line with vehicle life cycles. Others felt that registration and labeling of vehicles as well as planning, and maintaining vehicle logs fit with normal business cycles. One respondent believed that the time table fit into normal business cycles but suggested aligning the regulation timeline with the fiscal year (i.e. July 1 to June 30).

Of the respondents who identified aspects that do not fit within business cycles (33%), 44% of those respondents cited retrofits as the leading concern. A significant number of respondents (23%) also believed that none of the regulation was fitting to normal business cycles. These respondents mentioned that vehicle replacement and turnover did not fit due to the accelerated schedule of that requirement. Other aspects that were cited as not fitting into normal business cycles were planning, conflicts in standards among regional air quality control entities (such as air districts), and emission standards that do not parallel with an Original Equipment Manufacturer's (OEM's) ability to meet target dates.

Question 9: *Are there any other changes to the off-road regulation you would suggest?*

There were nearly as many ideas listed with this question as there were people surveyed. Some of the ideas mentioned here were ideas mentioned in previous questions. These include decreasing the turnover and retrofit requirements, loosening the annual targets and increasing the low use definition. Some other previously mentioned recommendations included delaying the regulation anywhere from two to five years. Other concepts that were mentioned by respondents were to provide incentives for compliant vehicles, provide credit to companies selling old vehicles and buying new vehicles, increase the fleet averages and BACT to a two year period and postpone the regulation until Tier 4 engines become available.

Question 10: *Have you installed exhaust retrofits on any of your off-road vehicles? If so, what has your experience been?*

Less than a quarter of those who did answer said that they had installed retrofits. Of those that had installed retrofits, most reported problems with clogging and frequent regeneration/service cycles leading to many instances of down time. Some respondents reported complaints by the operator (mostly due to visibility) and difficulty locating installations. One respondent reported that the majority of their retrofits worked well. Another respondent said they had one and didn't mention any problems. However, they said it was too early to tell if it would properly function and if it was practical. Of those who reported they had not installed retrofits (approximately 77% who answered the question), most cited cost as the reason for not installing retrofits.

Many also cited the issues that those who installed retrofits had as reasons for not installing retrofits. Some said that there were not any retrofits available for their vehicle.

Other concerns that were cited among respondents that did not install retrofits were limited engine installation, fines for unsafe location, lack of durability and that retrofits do not make sense in the rental industry (due to the difficulty of getting renters to perform regeneration).

APPENDIX D: OSM AND SUMMARY OF OFF-ROAD EMISSIONS INVENTORY UPDATE

I. EMISSIONS INVENTORY DEVELOPMENT FOR IN-USE OFF-ROAD EQUIPMENT

A. Overview

Since the emissions inventory was developed in support of the 2007 Rulemaking, conditions in the construction industry have changed dramatically. The economic recession that technically ended in June 2009 was the most severe since the Great Depression, and had a devastating impact on the construction industry in California. Staff estimates that between 2005 and 2010 construction emissions dropped by more than 50% because of reduced demand for construction services caused by the recession. Other emissions categories, like use of industrial off-road equipment, oil-drilling equipment, and aircraft ground support equipment saw similar if less severe declines in emissions over the same period that were caused by the recession. As a result of the recession, the Board directed staff to develop rule amendments to provide regulatory relief.

In 2009 industry stakeholders pointed out a 2009 study by Rob Harley at UC Berkeley which used a fuel-based method to assess construction equipment emissions and found our inventory was overestimated by more than a factor of three. Industry also pointed out that a similar study focused on all off-road equipment nationally was published in 2000 by Kean, Sawyer and Harley that found similar results.

In light of this new information, we conducted a comprehensive review of the inventory. We evaluated new sources of information that were not available when the Rule was developed, and updated the emissions inventory to reflect these new data as well as the impact of the recession. We made several updates:

- Population

We updated our estimates using the equipment population reported to ARB for Rule compliance. The total population in 2009 was 26% lower than had been anticipated in 2007 due to fleet downsizing during the recession.

- Hours of Use

The Rule allowed fleets to report 2007 and 2009 activity to obtain credits towards meeting regulatory obligations. About 10% of regulated vehicles reported this information. 2007 was a relatively average year for construction so we expected data to be consistent with previous estimates. Instead new data by equipment type were in most cases at least 30% lower than we expected. 2009 activity was lower than 2007 due to the recession.

- Load Factor

New data from 2009 academic studies and from engine manufacturers suggested our load factors should be reduced by 33%.

- Growth Forecasts

Between 2005 and today construction activity and emissions have dropped by more than 50% based on many different indicators. Future emissions are uncertain and depend on the pace of economic recovery. To forecast emissions we reviewed a variety of economic forecasts, developed bounding scenarios to estimate the range of potential future emissions, and assumed the average of those forecast scenarios. Our analysis suggests off-road activity and emissions will recover from the recession slowly.

The major data sources used to develop these updates include: ARB's Diesel Off-road On-line Reporting System (DOORS) vehicle database; Equipment Data Associates (EDA) UCC1 filings; Assembly Bill 8 2x (AB 8 2x) reporting database; Eastern Research Group (ERG); Bureau of Economic Analysis (BEA); Bureau of Labor Statistics (BLS); Bureau of Transportation Statistics (BTS); U.S Environmental Protection Agency; and additional input gathered from stakeholders.

Our revised emissions are substantially lower than previously estimated. About half of this reduction can be attributed to the recession, and about half to updated assumptions independent of the recession. Table 1 compares the 2007 and updated inventories. Table 2 compares estimated fuel use in the 2007 inventory to the current inventory and industry estimates.

Table D-1: Comparison of 2007 Rule and Current Emission Estimates

Calendar Year	2007 Inventory (tons/day)		Current Inventory (tons/day)	
	PM2.5	NOx	PM2.5	NOx
2009	18.5	358	3.7	79
2014	13.1	272	3.6	76
2023	5.1	136	2.2	52

Table D-2: 2009 Estimated Fuel Use (Million Gallons of Diesel Fuel): ARB vs. Industry

2007 Inventory	Current Inventory	Industry Estimates
990	219	160 to 186

In this document, ARB staff describes the methodology used to estimate emissions from equipment subject to the proposed off-road diesel regulation. These include mobile (self-propelled) vehicles with engines greater than or equal to 25 horsepower. They are found in four categories within ARB's off-road diesel inventory: airport ground support equipment (GSE), construction and mining, industrial, and oil drilling. Table 3 shows the specific equipment covered by the proposed rule in each of these four categories.

Despite the major economic recession and revisions to the off-road Rule inventory, the in-use diesel off-road equipment category remains a substantial source of emissions. Staff estimates the off-road equipment subject to the Rule is the 6th largest source of diesel PM in California (7% of total) and the 8th largest source of NOx from all sources (4% of total). Emissions levels from in-use construction equipment are comparable to

many other previously regulated sources including commercial harborcraft, locomotives, and cargo handling equipment.

Table D-3: Categories and Equipment Types Included in the Emissions Inventory

Category	Equipment
Airport Ground Support Equipment (GSE)	A/C Tug Narrow Body
	A/C Tug Wide Body
	Baggage Tug
	Belt Loader
	Bobtail
	Cargo Loader
	Cargo Tractor
	Forklift (GSE)
	Lift
	Other GSE
	Passenger Stand
Construction and Mining	Bore/Drill Rigs
	Cranes
	Crawler Tractors
	Excavators
	Graders
	Off-Highway Tractors
	Off-Highway Trucks
	Other Construction Equipment
	Pavers
	Paving Equipment
	Rollers
	Rough Terrain Forklifts
	Rubber Tired Dozers
	Rubber Tired Loaders
	Scrapers
	Skid Steer Loaders
	Surfacing Equipment
	Tractors/Loaders/Backhoes
	Trenchers
Industrial	Aerial Lifts
	Forklifts
	Other General Industrial Equipment
	Other Material Handling Equipment
	Sweepers/Scrubbers
Oil Drilling	Drill Rig (Mobile)
	Workover Rig (Mobile)

B. Methodology for Estimating Emissions

The PM and NOx emissions from each type of off-road rule equipment are calculated using the following equation:

$$\textit{Emissions in tons/day} = Pop * HP_{ave} * LF * Activity * EF$$

Where:

Pop	= Population
HP_{ave}	= Maximum rated average horsepower (hp)
LF	= load factor, unitless
Activity	= Activity or annual operation (hr/yr)
EF	= Emission factor (g/hp-hr)

The above equation is applied to a diverse population of vehicles and is extrapolated into the future. Two models were developed to accomplish this task: the Off-road Simulation Model (OSM) used current population characteristics and assumptions about vehicle turnover and purchasing age to estimate what those characteristics will be like in future years for a 'baseline' scenario (business-as-usual) and a 'with-rule' scenario (proposed rule effects on population); the Off-road Emissions Inventory model applies the above equation to the population generated by OSM using appropriate factors (EF, LF, Activity) for individual types of equipment. A more detailed description of these models and their coding are available in Attachment A. The data inputs are described in more detail below.

C. Emissions Inventory Inputs

1. Population

The off-road rule requires all owners of regulated equipment (Table 3) to report fleet information in ARB's Diesel Off-road On-line Reporting System (DOORS). The total population of equipment subject to the off-road rule was based on DOORS data and an estimate for the number of vehicles that have not reported (see non-compliance section below).

a. DOORS

The DOORS database is an on-line tool designed to help fleet owners report their vehicle inventories for compliance with the off-road diesel regulation. It is also used by ARB to track compliance of individual fleets with the requirements of the regulation. Fleet owners were required to report all relevant fleet information including total number of vehicles, vehicle types, and vehicle model years. These data served as the basis for developing a statewide population inventory by vehicle type and model year/age. The final reporting date for fleet owners depended on the size of the fleet:

- Large fleets (fleets over 5,000 hp and State or government fleets): January 1, 2010
- Medium fleets (fleets between 2,501 and 5,000 hp): January 1, 2010
- Small fleets (fleets under 2,500 and other specific categories): March 1, 2010

For the purposes of emission inventory development, staff used a snapshot of the DOORS database from April 2010 as a base estimate of the 2009 population. Although all fleets should have reported to DOORS by that point in time, a fraction had not. As a result, it was necessary to determine the rate of non-compliance and make an adjustment to the DOORS population.

b. Non-Compliance Estimate

Staff conducted a survey of 1,000 potential fleet owners in March 2010 to estimate the number of vehicles subject to the off-road rule that had not reported to DOORS. This sample was developed from a list of 21,800 buyers who had financed construction equipment in 2005 to 2009 based on a collection of UCC1 forms filed with the California Secretary of State and subsequently assembled by Equipment Data Associates (EDA, 2010). UCC1 forms are financing statements supplied by lenders to the California Secretary of State to indicate a security interest in financed property. In order to avoid contacting fleet owners that had already reported to DOORS, staff filtered the sampling list to remove fleets in the DOORS database by matching company names and addresses. The final list of 1,000 fleet owners was created using a random number generator and stratified among different air basins to achieve a representative sample of the entire California population. Large, medium and small fleets were identified by the total value of equipment financed in the UCC1 database. Specifically, large fleets were those fleets with the highest total equipment values, followed by medium and small fleets. The final sample fleet characteristics are shown in Table 4. The air basin abbreviations are defined in Table 9.

Table D-4: Sample Fleet Characteristics (number of fleets)

		Air Basin						
		OTHER	SCAB	SDAB	SFBAB	SJVAB	SVAB	Total
Fleet Size	Large	110	128	31	63	107	61	500
	Medium	60	55	13	29	63	30	250
	Small	64	66	17	36	39	28	250
	Total	234	249	61	128	209	119	1,000

Of the 1,000 fleets contacted, 73 (about 7%) owned vehicles subject to reporting requirements that were not yet reported in DOORS. The other 927 fleets either could not be reached and therefore were assumed to no longer operate in California or were reached and confirmed that their off-road vehicles were not subject to the off-road rule (e.g. agricultural vehicles). Attachment B provides a summary of the survey results.

Staff applied this non-compliance rate to the 21,800 unique buyer fleets. Based on assumptions about fleet size (i.e. number of vehicles/fleet) for small, medium, and large fleets, staff estimated there were about 13,000 unreported vehicles statewide. The fleet size assumptions were based on an examination of the average fleet sizes reported to DOORS during the months of February through June 2010:

- Large fleet size: 25 vehicles per fleet
- Medium fleet size: 16 vehicles per fleet
- Small fleet size: 6 vehicles per fleet

The total estimated number of unreported vehicles equaled about 10% of the total DOORS population in April 2010 (about 130,000). As a result, staff applied a 10% adjustment factor to each of the equipment-specific populations to increase the total estimated DOORS population to about 144,000 vehicles. The original DOORS and final adjusted populations for each equipment type are shown in Table 5.

Table D-5: Original DOORS and Adjusted Equipment Populations

Category	Equipment	DOORS Population	Adjusted Population
Airport Ground Support Equipment (GSE)	A/C Tug Narrow Body	277	305
	A/C Tug Wide Body	131	144
	Baggage Tug	197	217
	Belt Loader	170	187
	Bobtail	35	39
	Cargo Loader	374	411
	Cargo Tractor	248	273
	Forklift (GSE)	271	298
	Lift	162	178
	Other GSE	879	967
	Passenger Stand	55	61
Construction and Mining	Bore/Drill Rigs	1,030	1,133
	Cranes	3,102	3,412
	Crawler Tractors	5,714	6,285
	Excavators	11,112	12,223
	Graders	3,593	3,952
	Off-Highway Tractors	2,528	2,781
	Off-Highway Trucks	2,646	2,911
	Other Construction Equipment	3,827	4,210
	Pavers	1,359	1,495
	Paving Equipment	770	847
	Rollers	7,078	7,786
	Rough Terrain Forklifts	7,137	7,851
	Rubber Tired Dozers	631	694
	Rubber Tired Loaders	9,250	10,175
	Scrapers	5,195	5,715
	Skid Steer Loaders	9,255	10,181
	Surfacing Equipment	425	468
	Tractors/Loaders/Backhoes	27,913	30,704
	Trenchers	1,677	1,845
Industrial	Aerial Lifts	6,286	6,915
	Forklifts	11,790	12,969
	Other General Industrial Equipment	3,002	3,302
	Other Material Handling Equipment	903	993
	Sweepers/Scrubbers	1,147	1,262
Oil Drilling	Drill Rig (Mobile)	167	184
	Workover Rig (Mobile)	580	638
Total		130,916	144,011

2. Engine Load Factor

The load factor is the average operational level of an engine in a given application as a fraction or percentage of the engine manufacturer's maximum rated horsepower. Since emissions are directly proportional to engine horsepower, load factors are used in the emissions inventory calculations to adjust the maximum rated horsepower to normal operating levels.

Load factors are difficult to characterize since they are highly dependent on equipment use and operation. The load factors in the original 2007 rulemaking were obtained from the Power Systems Research (1996) database. However, data collected in 2009 and 2010 suggest these original load factors were too high. The new data sources included an Eastern Research Group (ERG) study (ARB, 2008), ARB Mobile Source Control Division (MSCD) testing data (ARB, 2010), and data provided by manufacturers and the U.S. EPA (EPA, 2004a). The ARB data are discussed in Attachment C.

Some newer off-road diesel engines are equipped with an electronic control unit (ECU), which provides real-time load information. Additionally, other surrogates are used to estimate the engine load when direct load data is not available. These surrogates include manifold absolute pressure (MAP), exhaust temperature (Temp), and engine RPM (RPM). To use these surrogates to derive load, it is assumed that the engine is fully loaded when the surrogate reaches its maximum value during a duty cycle and the engine is unloaded when the surrogate is at its minimum value. The general formula to calculate load based on these surrogates is:

$$LF_t = \frac{X_t - X_{\min}}{X_{\max} - X_{\min}}$$

Where:

LF_t = Load factor at time t
X_t = Surrogate variable at time t, such as MAP, Temp, and RPM
X_{max} = Maximum surrogate value during a given duty cycle
X_{min} = Minimum surrogate value during a given duty cycle

After evaluating data from a variety of surrogates, staff concluded that electronic control unit (ECU) data provides better estimates of engine load than the other surrogates (ARB, 2010). Table 6 summarizes the load factor results from ECU data for tractors, forklifts, dozers and excavators. Also shown in Table 6 are the load factors from ARB's OFFROAD model, which was used to calculate the emissions inventory for the original rulemaking.

Table D-6: Electronic Control Unit (ECU) Load Factor Data

Equipment	HP Range	Model Year	OFFROAD Load Factor	Load Factor Estimation Method	Load Factor		Data Source
					Mean	Median	
Tractor	125-140	2006-2007	0.55	ECU	0.42	0.41	MSCD
Forklift	174	2005	0.3	ECU	0.15	0.1	MSCD
Dozer	75-450		0.59	ECU	0.39		Manufacturer
Excavator	95-500		0.57	ECU	0.43		Manufacturer

Based on electronic control unit (ECU) data, a correction factor was derived using the following formula:

$$CF = 1 - \frac{1}{n}\sum_{i=1}^{n}\left(\frac{X_{off} - X_i}{X_{off}}\right)$$

Where:

CF = Correction factor, unitless
X_{off} = Load factor in OFFROAD model
X_i = Load factor provided by ECU

A correction factor of 0.67 was estimated and applied to the original OFFROAD load factors for airport ground support equipment (GSE), construction and mining, industrial, and oil drilling equipment. Other studies that evaluated the load factors used in OFFROAD came to similar conclusions (San Pedro Bay Ports, 2009). Table 7 lists the original OFFROAD and proposed load factors for each type of off-road rule equipment.

Table D-7: Original OFFROAD and New Load Factors (LF) by Equipment Type

Category	Equipment	OFFROAD Load Factor	Proposed Load Factor
Airport Ground Support Equipment (GSE)	A/C Tug Narrow Body	0.8	0.54
	A/C Tug Wide Body	0.8	0.54
	Baggage Tug	0.55	0.37
	Belt Loader	0.5	0.34
	Bobtail	0.55	0.37
	Cargo Loader	0.5	0.34
	Cargo Tractor	0.54	0.36
	Forklift (GSE)	0.3	0.20
	Lift	0.5	0.34
	Other GSE	0.5	0.34
	Passenger Stand	0.59	0.40
Construction and Mining	Bore/Drill Rigs	0.75	0.50
	Cranes	0.43	0.29
	Crawler Tractors	0.64	0.43
	Excavators	0.57	0.38
	Graders	0.61	0.41
	Off-Highway Tractors	0.65	0.44
	Off-Highway Trucks	0.57	0.38
	Other Construction Equipment	0.62	0.42
	Pavers	0.62	0.42
	Paving Equipment	0.53	0.36
	Rollers	0.56	0.38
	Rough Terrain Forklifts	0.6	0.40
	Rubber Tired Dozers	0.59	0.40
	Rubber Tired Loaders	0.54	0.36
	Scrapers	0.72	0.48
	Skid Steer Loaders	0.55	0.37
	Surfacing Equipment	0.45	0.30
	Tractors/Loaders/Backhoes	0.55	0.37
	Trenchers	0.75	0.50
Industrial	Aerial Lifts	0.46	0.31
	Forklifts	0.3	0.20
	Other General Industrial Equipment	0.51	0.34
	Other Material Handling Equipment	0.59	0.40
	Sweepers/Scrubbers	0.68	0.46
Oil Drilling	Drill Rig (Mobile)	0.75	0.50
	Workover Rig (Mobile)	0.75	0.50

3. Activity

The activity or annual operation of off-road equipment is measured in annual average hours of use and varies by equipment type and age. Staff derived activity values from the OFFROAD model and further adjusted the values based on Assembly Bill 8 2x reporting data.

a. OFFROAD Activity Data

The activity values in the OFFROAD model were derived from various survey data (ARB, 2007). Since these survey data were collected between 2003 and 2005, the effects of the recent economic recession (2007 – 2009) on activity are not included. In addition, much of the OFFROAD data are not specific to California fleets. To update the activity values and incorporate the effects of the economic recession, staff utilized new activity data (required by Assembly Bill 8 2x) to adjust the OFFROAD activity values.

b. Assembly Bill 8 2x Reporting Data

In 2009, the California legislature approved Assembly Bill 8 2x, which required ARB to amend certain sections of the off-road diesel regulation (AB 8 2x, 2009). As part of the amendments, ARB gave credit to fleet owners toward early requirements if they provided documentation that indicated reduced operation (i.e. hour meter readings, fuel purchase records, etc.) and/or reduced population of their off-road equipment since 2007. In order to receive credit for reduced usage, fleet owners had to provide equipment-specific activity values (hours/year) for the baseline year (2007) and reduced activity values for the same equipment in 2009. Fleet owners provided such data from late 2009 through April 2010 in accordance with requirements in the reduced activity reporting guide (ARB, 2009a). These data (ARB, 2009b) were used to adjust OFFROAD activity values to new baseline levels and to derive depressed activity values to reflect the recent economic recession.

To ensure that the activity data from AB 8 2x fleets were representative of the general California population, staff compared the fleet size (i.e. number of vehicles/fleet) of fleets with 2009 reduced activity data (96 fleets) to all 828 large fleets in DOORS. Figure 1 compares the two data sources by fleet size. Although the fleet sizes were not identical for the sample and DOORS fleets, the average fleet size and distribution in the two data sources were not significantly different (95% confidence level). In addition, the sample fleets were similar in terms of total horsepower for specific equipment types when compared to all DOORS large fleets. As a result, staff determined that data from the AB 8 2x fleets were a suitable surrogate for all California fleets.

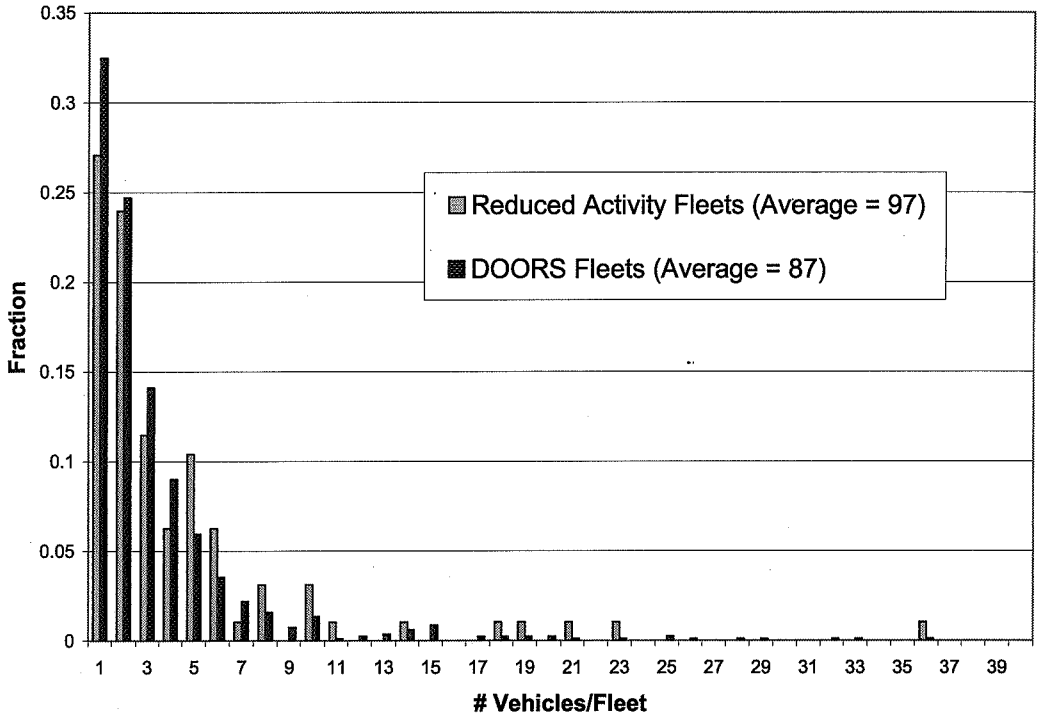


Figure D-1: Fleet Population Comparisons

c. Calculation of New Activity Values

Staff calculated new activity values assuming that the AB8 2x reporting data for 2007 activity represented baseline activity under normal economic conditions. This assumption was based on the fact that 2007 represents an approximate midpoint between peak economic activity in 2005/2006 and the recessed economy of 2009.

For each equipment type where activity data were available, staff calculated an age-specific ratio of the 2007 activity to the OFFROAD activity. Staff then calculated an overall weighted ratio to use as an adjustment factor to OFFROAD activity values. This weighted ratio was applied to age-specific activity values in OFFROAD for each equipment type to derive new baseline activity values. Staff also performed an identical analysis using the AB8 2x 2009 reduced activity data whereby a weighted ratio of the 2009 activity relative to the OFFROAD activity was calculated and used to derive the depressed activity values for 2009/2010. For equipment types with insufficient activity data, the average value of the ratios in the general equipment category to which the equipment belonged was used as the adjustment factor. For example, since sufficient activity data for bore/drill rigs were unavailable, the average of the adjustment factors for those pieces of equipment in the construction and mining sector with sufficient data were used to derive activity values for bore/drill rigs. Table 8 provides the adjustment factors used to derive new baseline and reduced activity values from OFFROAD values.

Table D-8: Activity Adjustment Factors Applied to OFFROAD Values

Equipment	2007 Baseline Activity Weighted Average Correction Factor	2009 Reduced Activity Weighted Average Correction Factor
Scrapers	0.52	0.22
Tractors/Loaders/Backhoes	0.62	0.40
Rubber Tired Loaders	1.03	0.69
Excavators	0.44	0.27
Crawler Tractors	0.45	0.29
Rollers	0.48	0.34
Forklifts	0.45	0.26
Graders	0.71	0.50
Other Construction Equipment	0.70	0.46
Off-Highway Trucks	0.74	0.46
Rough Terrain Forklifts	0.21	0.22
Aerial Lifts	0.72	0.65
Workover Rig (Mobile)	0.40	0.24
Skid Steer Loaders	0.35	0.33
Cranes	0.40	0.25
Pavers	0.42	0.34
All Other Airport GSE	0.54	0.37
All Other Construction Equipment	0.54	0.37
All Other Industrial Equipment	0.58	0.45
All Other Oil Drilling Equipment	0.40	0.24

After calculating the age-specific activity values, staff determined the fraction of vehicles in California experiencing reduced activity. Specifically, staff determined what proportion of the overall reductions in horsepower hours in 2009 were met solely by reduced activity since there was a portion of fleets that had experienced reduced activity due to reduced population (i.e. horsepower) rather than usage (i.e. hours/year). Based on an analysis of AB 8 2x reporting data (ARB, 2009b), staff determined that approximately 34% of the reductions in horsepower hours could be attributed to reduced activity. The other reductions in horsepower hours were met by reductions in vehicle population. As a result, the remaining 66% of the vehicles were assumed to operate at the 2007 baseline activity values. Staff used these two values as weighting factors to derive the new adjusted activity values to be used in the emissions inventory. Table 9 provides a comparison of the average activity by equipment type in the original OFFROAD model and the modified values in the new emissions inventory model.

Table D-9: OFFROAD and Modified Average Activity Values (hours/year)

Category	Equipment	OFFROAD Activity	Modified Activity
Airport Ground Support Equipment (GSE)	A/C Tug Narrow Body	625	301
	A/C Tug Wide Body	759	365
	Baggage Tug	1,392	669
	Belt Loader	974	468
	Bobtail	683	328
	Cargo Loader	906	436
	Cargo Tractor	1,309	630
	Forklift (GSE)	743	357
	Lift	791	380
	Other GSE	922	443
	Passenger Stand	70	34
Construction and Mining	Bore/Drill Rigs	811	392
	Cranes	1,252	444
	Crawler Tractors	1,013	409
	Excavators	1,396	546
	Graders	929	610
	Off-Highway Tractors	1,091	534
	Off-Highway Trucks	1,958	1,293
	Other Construction Equipment	690	429
	Pavers	821	324
	Paving Equipment	829	400
	Rollers	695	299
	Rough Terrain Forklifts	1,123	237
	Rubber Tired Dozers	1,589	767
	Rubber Tired Loaders	957	893
	Scrapers	1,092	453
	Skid Steer Loaders	834	297
	Surfacing Equipment	446	215
	Tractors/Loaders/Backhoes	942	512
	Trenchers	618	298
Industrial	Aerial Lifts	384	266
	Forklifts	1,800	690
	Other General Industrial Equipment	1,425	766
	Other Material Handling Equipment	1,318	709
	Sweepers/Scrubbers	1,220	656
Oil Drilling	Drill Rig (Mobile)	3,000	1,025
	Workover Rig (Mobile)	3,000	1,025

Figures 2 – 5 provide examples of the various age-specific activity values used in the OFFROAD model and the proposed values for scrapers, tractors/loaders/backhoes, excavators, and crawler tractors. These equipment types account for over 40 percent of the total horsepower in the California off-road diesel equipment population. As seen from the figures, the original OFFROAD activity values are much higher than the proposed baseline activity values in 2007. Also shown is the effect of the economic recession on 2009 activity values. For designated low-use vehicles of all equipment types, staff assigned a value of 150 hours/year, which is the threshold for receiving a low-use designation. Staff also examined activity data from a 2003 TIAX report (TIAX, 2003) a 2007 Eastern Research Group (ERG) study (ARB,2008). These data agreed reasonably well with the baseline activity values derived for 2007.

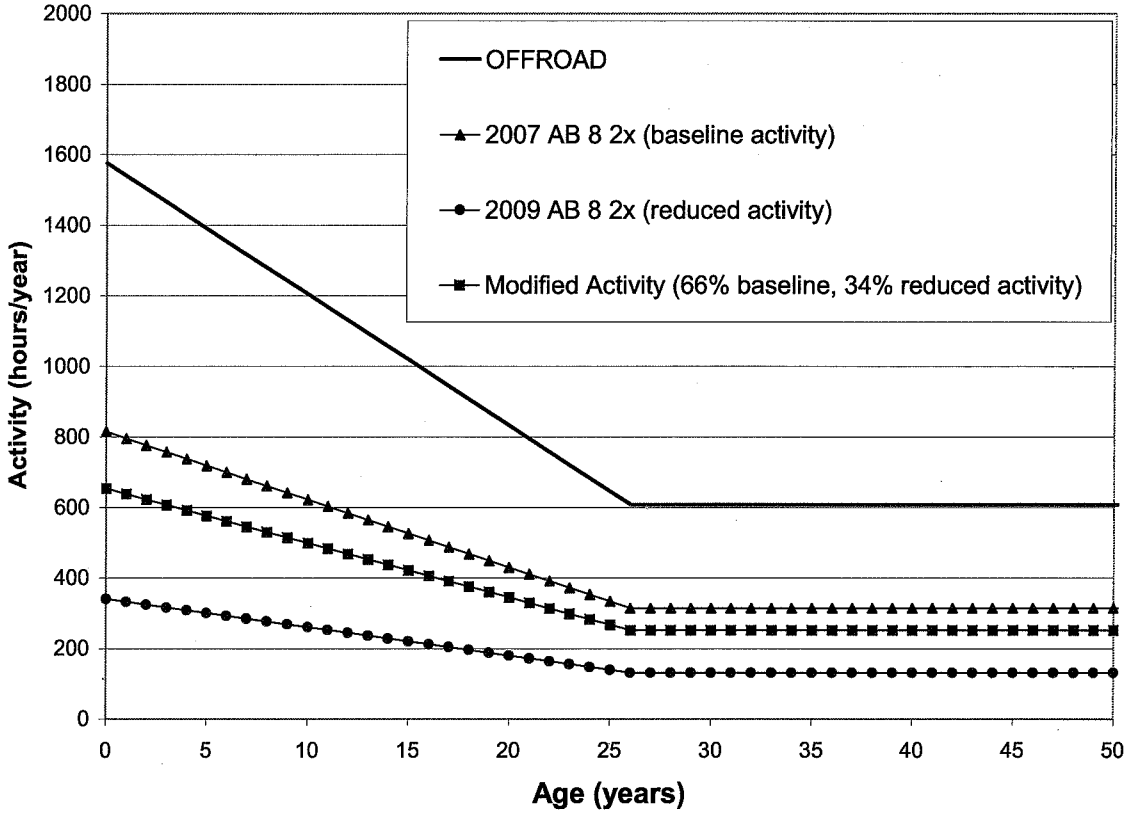


Figure D-2: Scrapers Activity Values

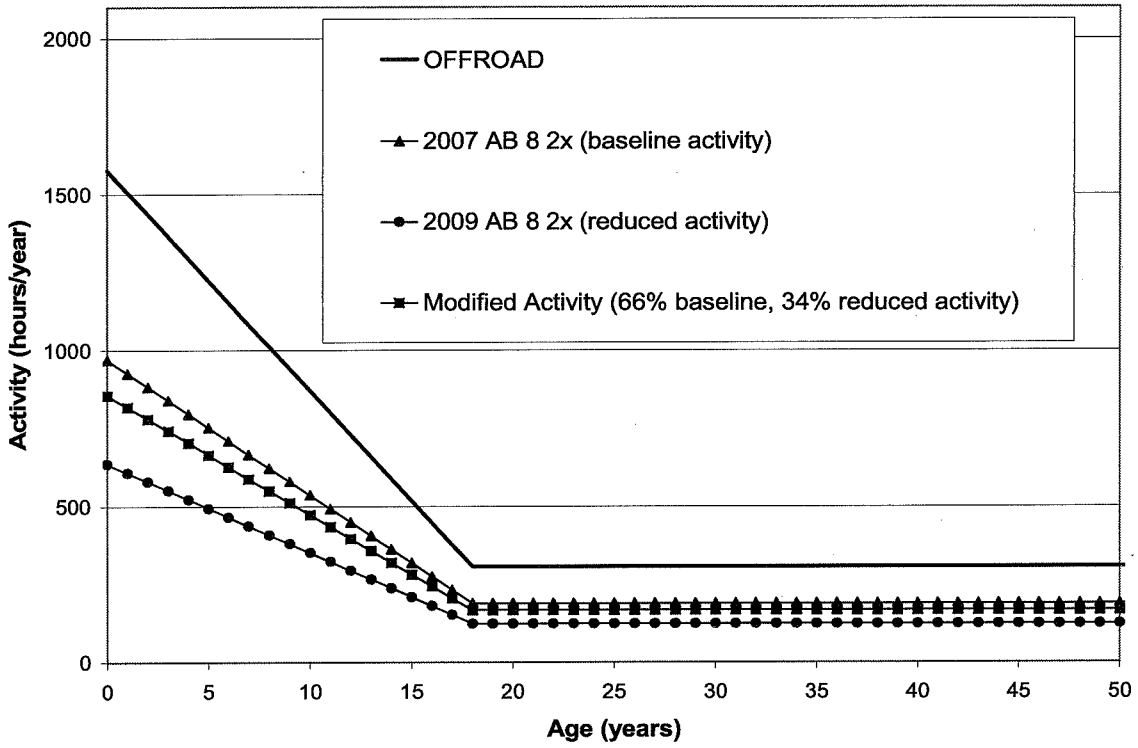


Figure D-3: Tractors/Loaders/Backhoes Activity Values

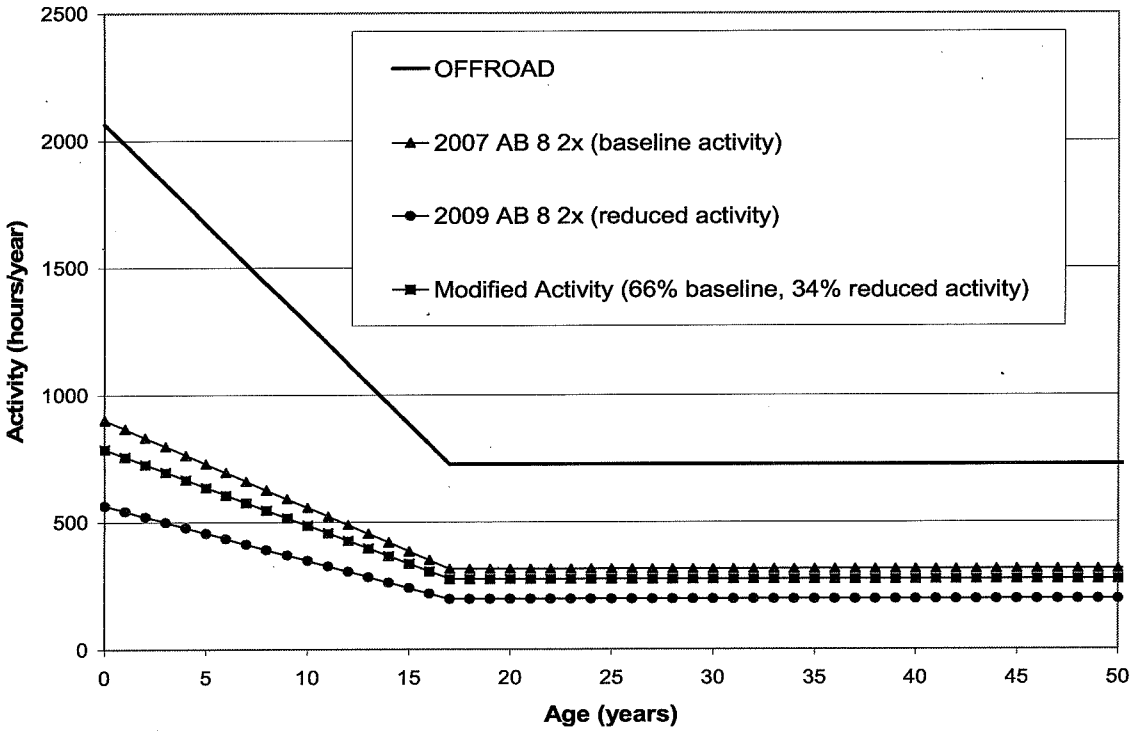


Figure D-4: Excavators Activity Values

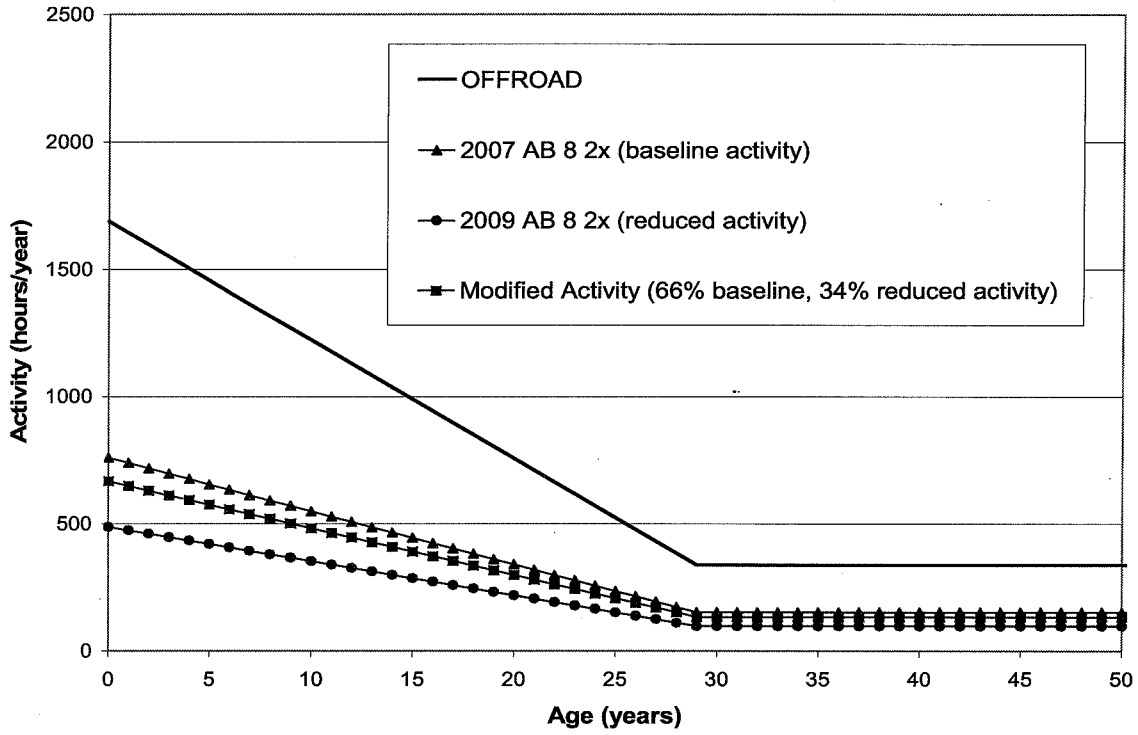


Figure D-5: Crawler Tractors Activity Values

4. Age Distributions and Economic Recovery Factors

a. Background

The age distribution of off-road diesel equipment has important implications for the emissions inventory. In general, an older vehicle will produce more emissions than a newer vehicle operating under the same conditions. In light of the economic recession, it is important to assess the impacts of the economy on sales of new off-road diesel equipment. Depending on the state of the economy in a given calendar year, one of several scenarios will occur regarding the sales of the new equipment. These scenarios will impact the relative proportion of the new model year equipment in the age distribution. These scenarios include:

- **New equipment sales are higher than expected equipment sales**. The proportion of the new model year equipment pieces in the age distribution will therefore be *higher* than the proportion in a baseline (no impact) age distribution.
- **New equipment sales are lower than expected equipment sales**. The proportion of the new model year equipment pieces in the age distribution will therefore be *lower* than the proportion in a baseline (no impact) age distribution.
- **New equipment sales are equal to expected equipment sales**. The proportion of the new model year equipment pieces will therefore be *equal* to the proportion in a baseline (no impact) age distribution age distribution.

The original OFFROAD emissions inventory did not consider these effects on the age distribution. Instead, staff derived a base year age distribution and the equipment was assumed to follow a specific attrition rate, which was used to derive future age distributions. To account for the impacts of the California economy on future age distributions, staff estimated the impact of new off-road diesel equipment sales on the age distributions. The 2009 age distributions and average ages of off-road diesel equipment were based on data from the Diesel Off-road On-line Reporting System (DOORS) database (DOORS, 2010). Once future age distributions were derived, they were used to calculate average ages by calendar year, which in turn were used to derive economic recovery factors as used in the Off-road Simulation Model (OSM) to model fleet turnover (described in Attachment A).

b. Methodology and Assumptions

Staff estimated future age distributions based on the assumption that trends in sector-specific gross domestic product (GDP) directly impact the relative proportion of a given model year equipment in a baseline age distribution. The baseline age distribution is the age distribution that is expected without the impacts of GDP on sales patterns. So, during a calendar year with high economic growth (i.e. high GDP), the proportion of the corresponding model year equipment within the age distribution is increased relative to the baseline age distribution. Conversely, during times of economic recession, less new equipment is purchased and the proportion of the corresponding model year equipment within the age distribution is decreased relative to the baseline age distribution. Staff considered the effects of sales patterns within the following individual sectors of off-road equipment: construction and mining, industrial, airport ground support equipment (GSE), and oil drilling. Each of these sectors is described below.

c. Construction and Mining Equipment

Correlation between new equipment sales and California GDP

Prior to estimating future age distributions, it was first necessary to validate the assumption that new off-road diesel equipment sales were correlated to California specific GDP sectors. In order to do this, staff examined in detail the relationship between financed sales of new off-road diesel construction equipment in California and California construction GDP. California equipment sales for new construction equipment were obtained from Equipment Data Associates' database of Uniform Commercial Code 1 (UCC1) filings (EDA, 2010). UCC1 forms are financing statements supplied by lenders to the California Secretary of State to indicate a security interest in financed property. For this analysis, staff analyzed UCC1 forms concerning financed new sales of construction equipment in California from 1990 to 2009. Although the UCC1 filings did not capture all data regarding the off-road diesel equipment sales in California, staff assumed the relative amount of financed new equipment sales (i.e. ratio of sales from one year to the next) would be sufficient to model the trend in sales of new equipment. GDP data were obtained from the United States Bureau of Economic

Analysis (BEA, 2010). Using multiple linear regression with time and construction GDP as predictor variables, staff found a strong correlation (R^2 = 0.93) between financed new construction equipment sales in Year *y* and the GDP from Year *y*+1, the time lag indicating that the construction industry purchasing behavior was impacted before a decline in economic activity. Figure 6 provides a comparison of the actual sales of new construction equipment and the predicted sales for calendar years 1990-2009. The average difference between the actual sales number and the predicted sales number was 3.6%. Based on these results, staff determined that construction GDP is a useful predictor of new construction equipment sales.

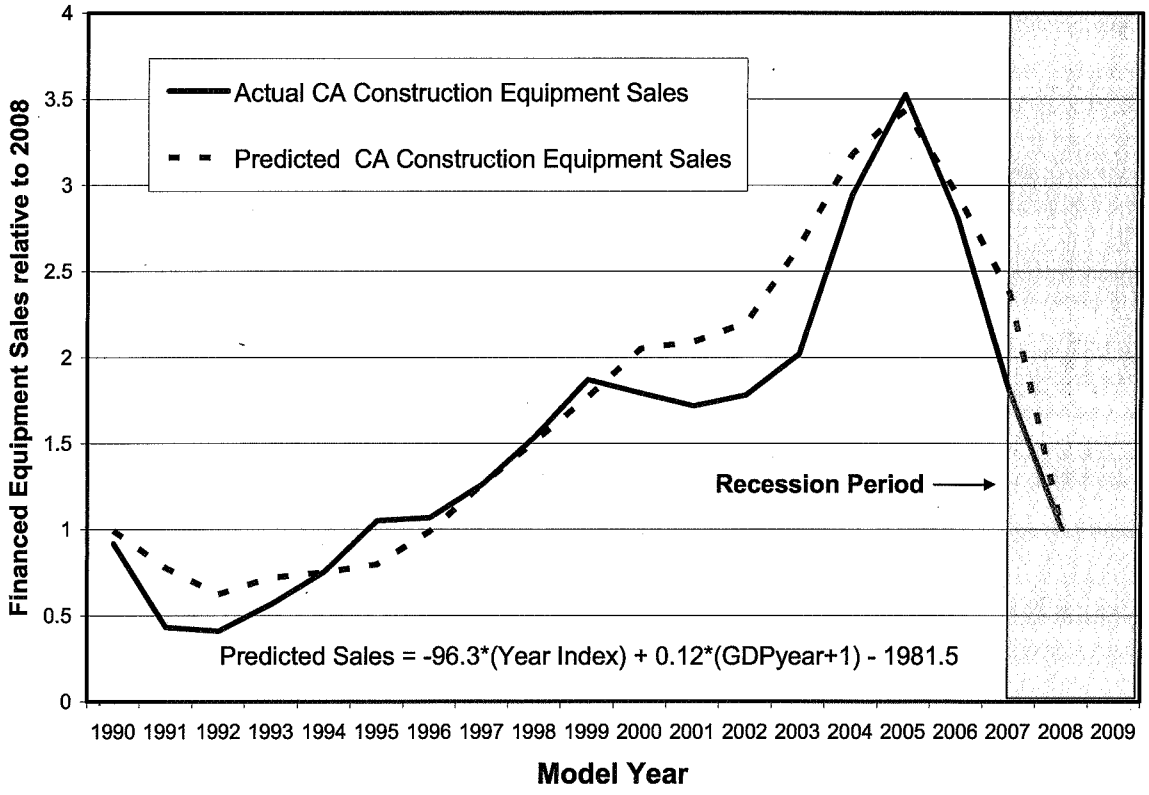


Figure D-6: Actual and Predicted New Construction Equipment Sales

Derivation of Model Year Adjustment Factors

The correlation between construction GDP and construction sales enabled staff to predict historical construction equipment sales prior to 1990 for which no sales data was available. Historical GDP values (< 1990) were provided by the U.S. Bureau of Economic Analysis (BEA, 2010). To incorporate the impact of construction equipment sales on the age distribution, staff first calculated the ratio between sales of construction equipment and the expected number of sales if no factor (i.e. construction GDP) had caused variation for each particular model year. These ratios served as model year

adjustment factors for future calendar years. The actual/predicted sales as well as the best-fit line (i.e. expected equipment sales) associated with "no GDP impact" are shown in Figure 7 below.

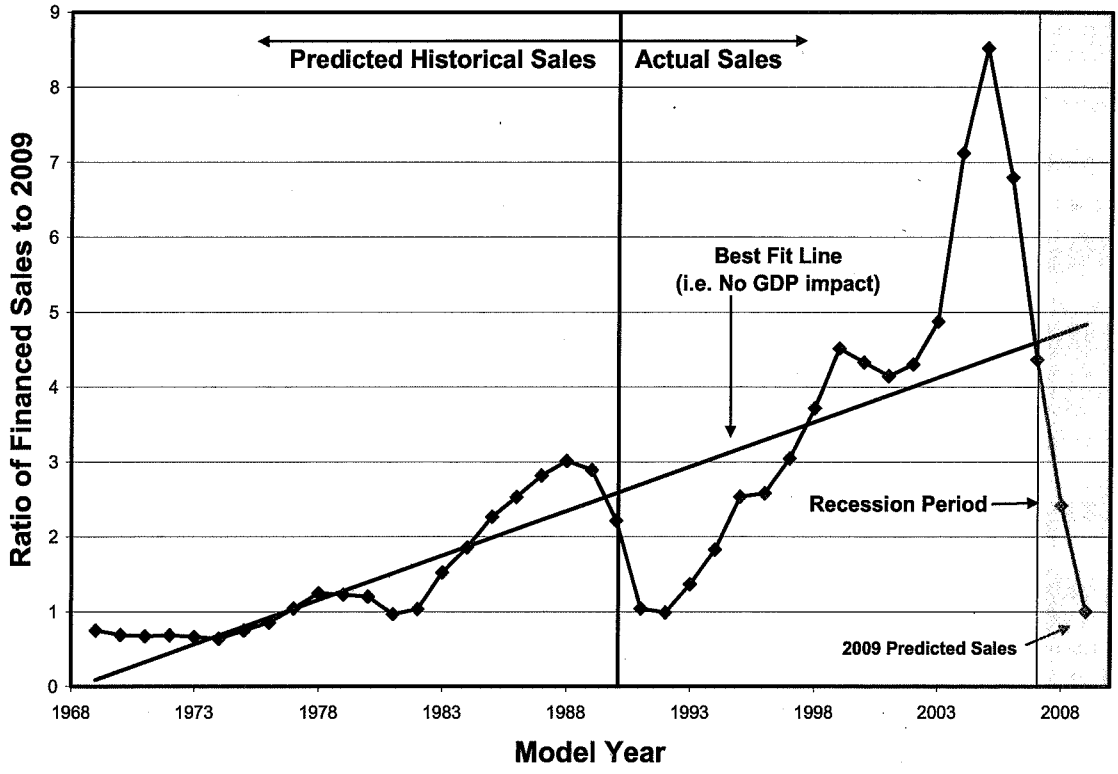


Figure D-7: California New Construction Equipment Sales with Best Fit Line

Application of Model Year Adjustment Factors and Derivation of Future Calendar Year Age Distributions

The construction and mining equipment age distribution for 2009 was derived from DOORS. Staff derived the baseline age distribution (i.e. no GDP impact) by dividing the 2009 DOORS age distribution by the appropriate model year adjustment factors to remove the effects of the economy. An example of the 2009 age distribution with the adjusted baseline age distribution is shown in Figure 8 for the construction and mining category. Although the 2009 age distribution from DOORS was used only for the calendar year 2009 age distribution, the derived baseline age distribution was used as a starting point to predict future age distributions.

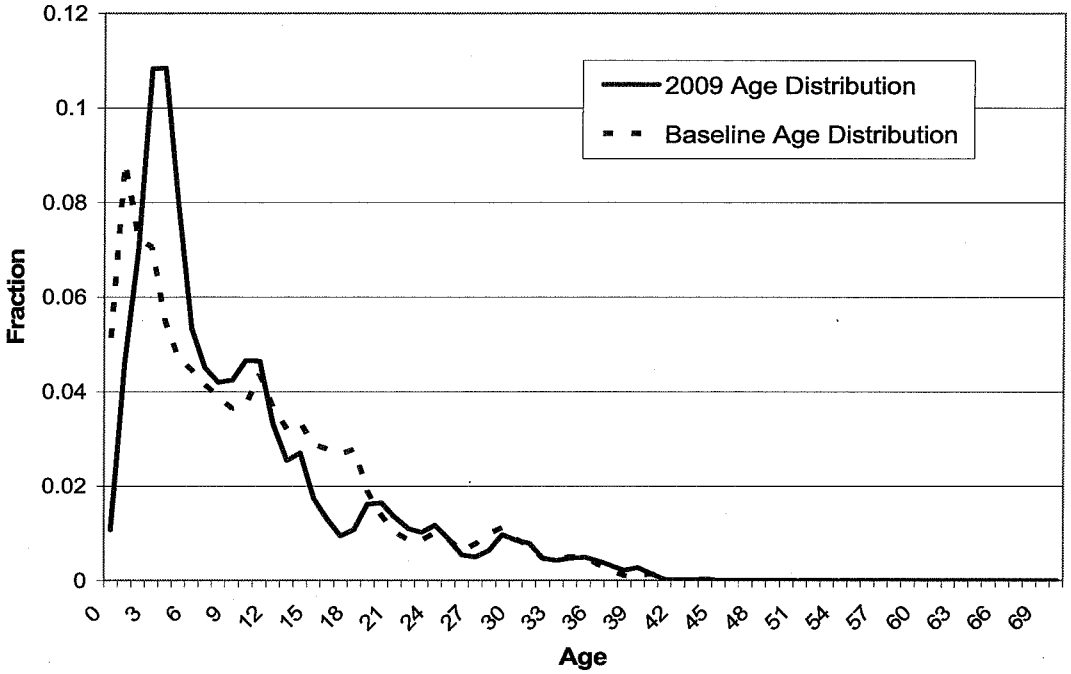


Figure D-8: 2009 and Baseline Age Distributions for Construction and Mining Equipment

Staff derived the model year proportions in future age distributions (2010 – 2030) by multiplying the fraction of each model year in the baseline age distribution by the appropriate model year adjustment factor. By doing this, the effects of the economy were implicitly incorporated into the age distribution. The model year adjustment factors for model years 2010 and greater had to be derived based on assumptions about the recovery in new equipment sales. In order to derive these adjustment factors, staff looked at a few economic recovery scenarios for sales. The fast scenario assumed construction equipment sales return to the average historical trend in 2017. The slow growth scenario assumed growth at the previous historical rate but never returns to baseline conditions. The average growth scenario represented an average of the fast and slow growth scenarios. For the purposes of the emissions inventory, the age distributions derived under the average growth scenario were used up until 2017. After 2017, new equipment sales were assumed to continue at the same rate as the average scenario until they reached the expected sales ratio in 2025. This recovery scenario for the construction sector is shown in Figure 9. Similar to the pre-2010 model year adjustment factors, the ratio of new equipment sales to the expected equipment sales (best fit line) was used to calculate a model year adjustment factor. An example of the age distribution for construction and mining equipment in 2009, 2017 and 2030 is shown in Figure 10. As expected, the age distribution begins to resemble the baseline age distribution (Figure 8) as time goes on and the economy recovers. It should be noted that these age distributions were not directly used to predict age distributions in the future, which is done by the Off-road Simulation Model (OSM). Instead they were used as the basis for calculating economic recovery factors as described below.

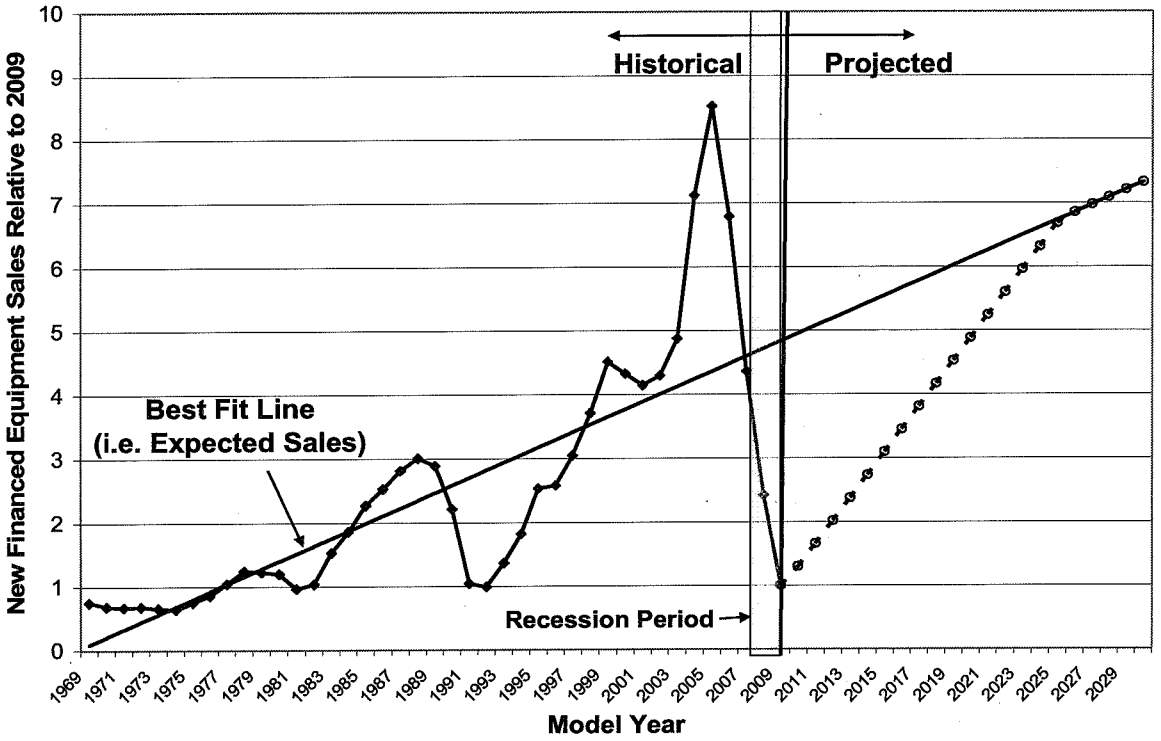


Figure D-9: Recovery Scenario Projections for New Construction Equipment Sales

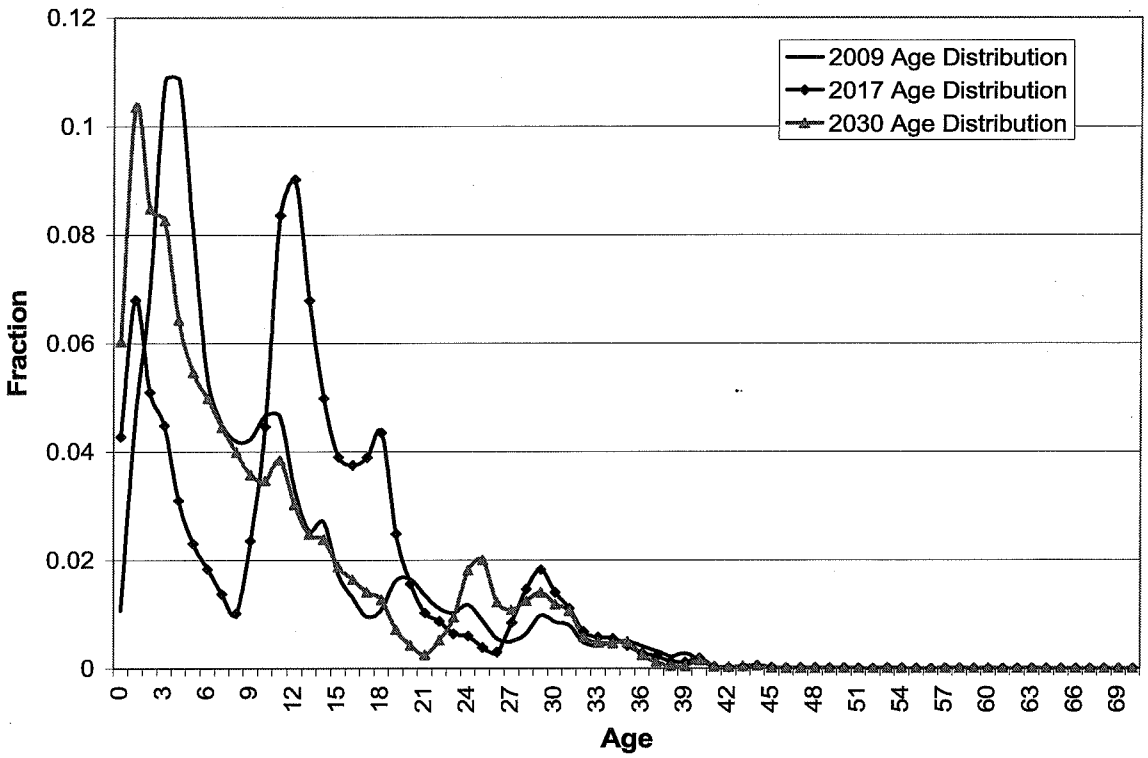


Figure D-10: Age Distribution of Construction and Mining Equipment in Average Recovery Scenario

Calculation of Average Ages and Economic Recovery Factors

Staff calculated the weighted average age value for the construction and mining sector age distributions for 2009 to 2030 (Figure 11). As seen from the figure, the average age increases during the initial years after 2009. The ratios in the figure were used as economic recovery factors in the Off-road Simulation Model (described in Attachment A). The initial increase in the average age is a result of much fewer new vehicles entering the fleet relative to the historical average. As the economy recovers, the average age begins to decrease as older equipment is turned over and newer equipment, at rates close to the historical average, enters the fleet.

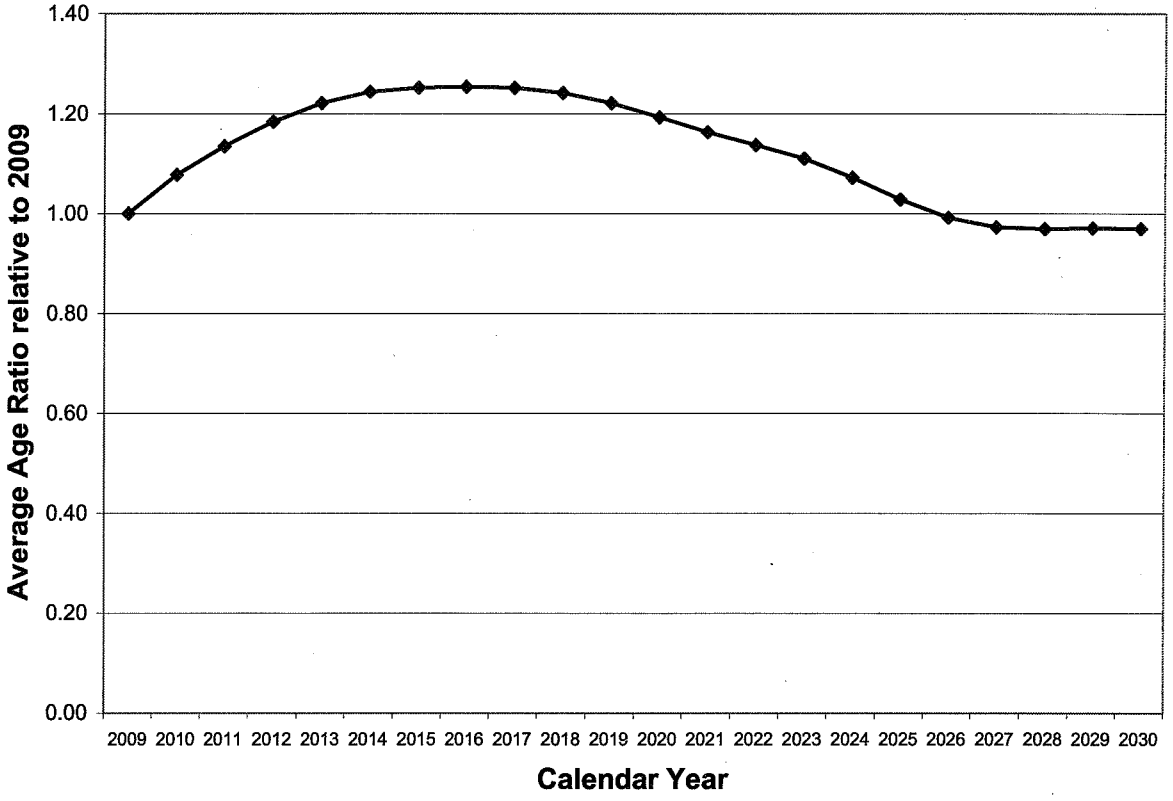


Figure D-11: Average Ages of Construction Equipment (2009 – 2030)

d. Industrial Equipment

Since most of the industrial companies in the DOORS were suppliers of construction equipment and construction building materials, staff assumed that sales patterns of new industrial equipment followed the same pattern in sales of new construction equipment. As a result, the same model year adjustment factors were applied to industrial equipment as were applied to construction equipment. The approach for deriving future age distributions was the same as construction equipment. The average ages of industrial equipment are shown in Figure 12.

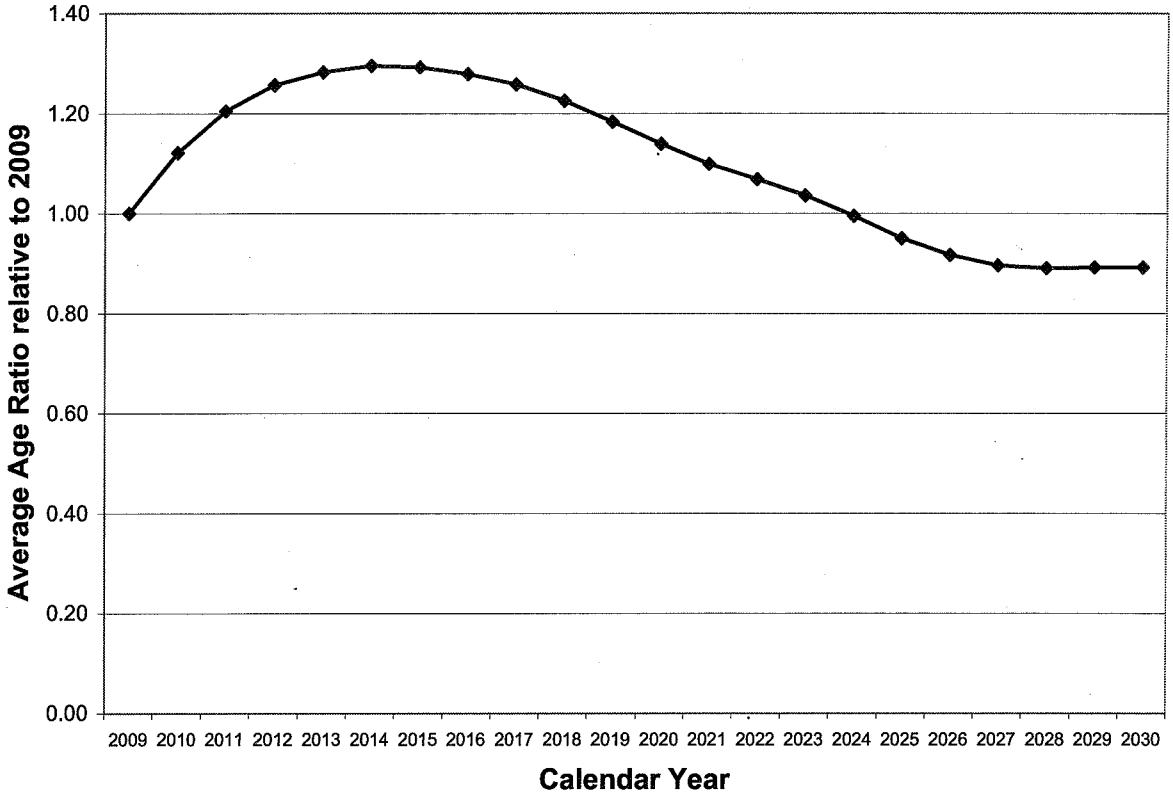


Figure D-12: Average Ages of Industrial Equipment (2009 – 2030)

e. Airport Ground Support Equipment (GSE)

Based on the strong correlation between financed new construction equipment sales and construction GDP, staff made the assumption that sales of new GSE equipment were also strongly correlated to GDP. As a result, a similar approach was taken for these equipment types using California air transport GDP as a surrogate for sales of GSE. The determination of model year adjustment factors, future age distributions and average ages was determined in the same manner as the construction and industrial equipment categories. The age distribution derived under the average recovery scenario was used for calculations in the emissions inventory. The average recovery scenario for GSE is shown in Figure 13. The average ages of GSE under the average recovery scenario are shown in Figure 14.

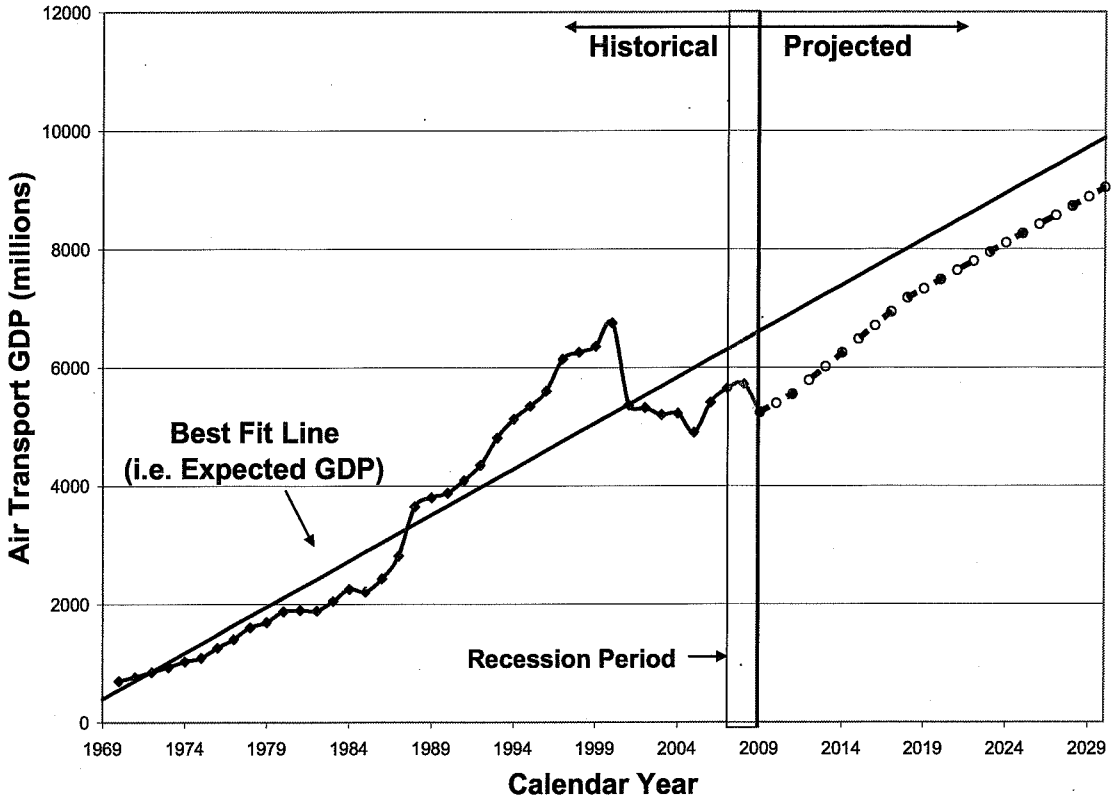


Figure D-13: Recovery Scenario Projections for Air Transport GDP

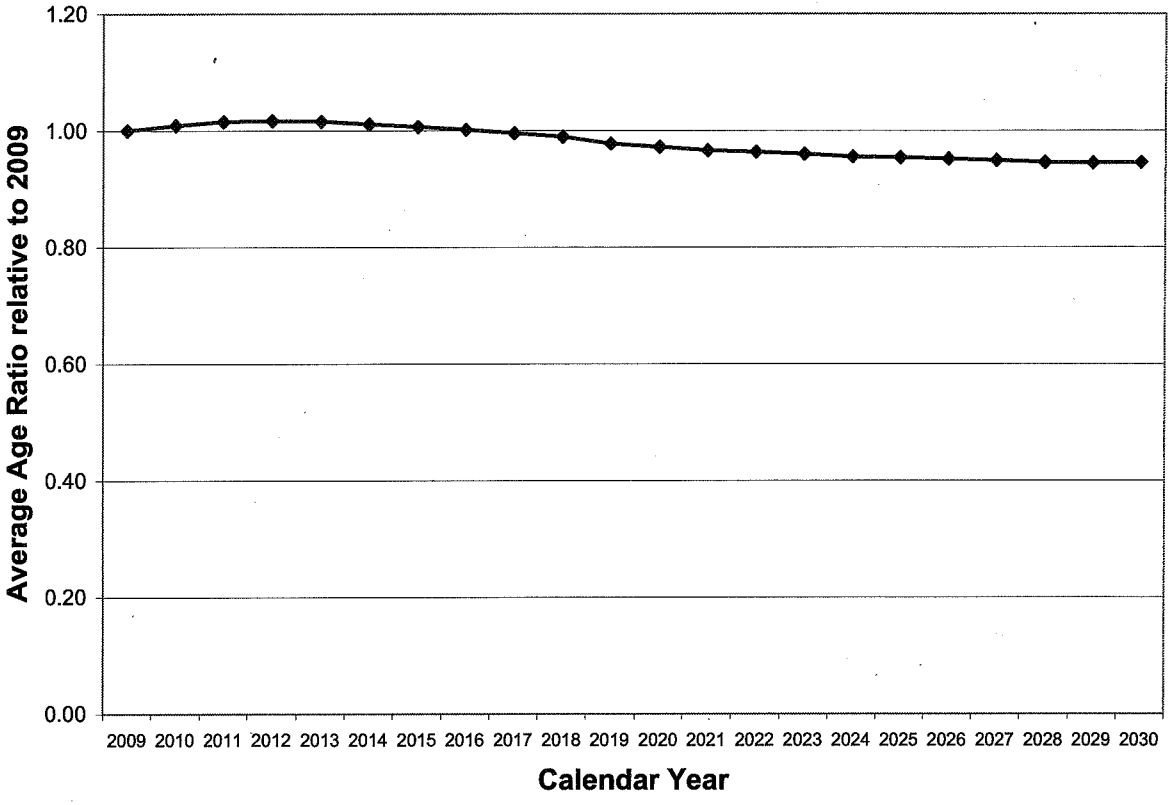


Figure D-14: Average Ages of Airport Ground Support Equipment (2009 – 2030)

f. Oil Drilling Equipment

Due to the strong historical variability in oil drilling GDP, it was difficult to establish a strong correlation between sales of oil drilling and oil drilling GDP. As a result, the age distributions and average ages for all future years were assumed to be equivalent to the 2009 DOORS age distribution.

5. Emission Factors

Emission factors are composed of zero-hour emission rates[1] and deterioration rates. The emission factors can be expressed by the following equations.

For cumulative hours (CHrs) less than or equal to 12,000 hours:

[1] Section I-G of ARB's Mail-Out#: MSC 99-32 contains a more detailed discussion of how each emission rate is derived for Tier 0 or uncontrolled, through Tier 3. The Tier 4 emission rates were adopted December 7, 2005, as detailed in "Amendments to the California Exhaust Emission Standards and Test Procedures for New 2008 and Later Tier 4 Off-Road Compression-Ignition Engines and Equipment, Part 1-C" (http://www.arb.ca.gov/regact/offrdcie/offrdcie.htm)

$$EF = Zh + dr * CHrs$$

For cumulative hours (CHrs) greater than 12,000 hours:

$$EF = Zh + dr * 12{,}000$$

Where:

EF = Emission factor (g/bhp-hr)
Zh = Zero-hour emission rate when the equipment is new (g/bhp-hr)
Dr = Deterioration rate or the increase in zero-hour emissions as the equipment is used (g/bhp-hr^2)
CHrs = Cumulative hours or total number of hours accumulated on the equipment; maximum value is equal to 12,000 hours

The diesel emission factors in the model are in grams per brake horsepower-hour and vary by fuel type, horsepower, and model year as shown in Attachment D. To estimate fuel consumption, an emission factor is replaced with a brake-specific fuel consumption (BSFC) value (lb/hp-hr). BSFC values are used from the U.S. EPA NONROAD model (EPA, 2004b). These BSFC values are lower than the values used in the original rulemaking and are more consistent with input ARB staff received from stakeholders.

6. Emission Factor Deterioration

Deterioration rates[2] are in units of grams per brake horsepower-hour[2] and are defined as the change in emissions as a function of usage. These are based on the deterioration rates of on-highway diesel-powered engines with similar horsepower ratings. The rate of emissions changes over time as a result of wear on various parts of an engine due to use. Originally, the deterioration rate continued to increase throughout the entire useful life of the equipment. Based on discussions with stakeholders and industry, staff concluded that the deterioration for off-road diesel equipment was over-estimated because diesel engines are rebuilt after approximately 12,000 hours of use (ARB, 2007). It is assumed that an engine would be rebuilt back to the standard of that particular emissions tier (varies by model year of the engine). Taking engine rebuilds into account, staff has updated the diesel emission factor deterioration to cap at 12,000 hours. As a result, once an engine's cumulative hours equals 12,000 hours, the deteriorated emission factor is assumed to be constant at that rate for the rest of the life of the equipment.

[2] Section I-I of ARB's Mail-Out#: MSC 99-32 contains a more detailed discussion of how each deterioration rate is derived for uncontrolled, and Tier 1 to Tier 3. The Tier 4 deterioration rates were derived using the ratio to the standard of Tier 3.

7. Fuel Correction Factors

The fuel correction factors (FCF) used in the emissions inventory model are dimensionless multipliers applied to the basic exhaust emission rates that account for differences in the properties of certification fuels compared to those of commercially dispensed fuels. In instances where engines or vehicles are not required to certify, the FCFs reflect the impact in changes of dispensed fuel over time as refiners respond to changes in fuel specific regulations compared to the fuel used to obtain the test data. The FCFs used in the model were specific to horsepower group and model year and were based on data described in a 2005 OFFROAD Modeling Change Technical Memo (ARB, 2005).

D. Spatial Allocation and Emissions Projections

1. Spatial Allocation

The spatial allocation distributes the entire population of off-road rule equipment to separate geographic regions within the State. Since the precise location of every piece of mobile off-road equipment is unknown, staff allocated equipment to the 15 air basins within California based on equipment population surrogates. These surrogates are indicators of the population of equipment operating within each air basin. Below, the spatial allocations for the four categories of off-road rule equipment are described.

a. Airport Ground Support Equipment

The allocation of airport ground support equipment (GSE) is based on airport-specific data obtained from the Department of Transportation's (DOT) 1997 Flight Ops data (ARB, 2007). The allocation was reviewed by the GSE's industry representative/consultant as part of the original rulemaking process in 2005. This data was also utilized as the basis of allocating equipment used in GSE applications in the OFFROAD model. Table 10 contains the statewide allocation for airport ground support equipment.

Table D-10: Airport Ground Support Equipment Statewide Allocation by Air Basin

Air Basin	Abbreviation	Statewide Allocation
Great Basin Valleys	GBV	0.0%
Lake County	LC	0.0%
Lake Tahoe	LT	0.0%
Mountain Counties	MC	0.0%
Mojave Desert	MD	0.1%
North Coast	NC	0.2%
North Central Coast	NCC	0.4%
Northeast Plateau	NEP	0.0%
South Coast	SC	50.2%
South Central Coast	SCC	0.6%
San Diego	SD	7.7%
San Francisco	SF	36.0%
San Joaquin Valley	SJV	1.0%
Salton Sea	SS	0.5%
Sacramento Valley	SV	3.2%
Total		**100%**

b. Construction and Mining Equipment

For construction fleets, staff assumed that the regional allocation is proportional to the regional rate of population growth. The Demographic Research Unit of California Department of Finance (DOF, 2009) provides population estimates and projections by county. The populations within counties were then distributed into air basins based on census data. Staff calculated the year-to-year increase in population within each air basin and used the fraction of the population growth in air basin versus statewide growth as a surrogate for construction fleet regional allocation. The resulting allocations are shown in Table 11 for 2009, 2014 and 2020. For years between DOF projections, staff interpolated regional allocation factors linearly.

Table D-11: Construction and Mining Equipment Statewide Allocation by Air Basin

Air Basin	OFFROAD Allocation	Updated 2009 Allocation	Updated 2014 Allocation	Updated 2020 Allocation
GBV	0.3%	0.01%	0.1%	0.1%
LC	0.5%	0.1%	0.2%	0.2%
LT	0.6%	0.2%	0.2%	0.2%
MC	3.4%	0.4%	0.9%	1.5%
MD	2.5%	2.5%	2.9%	3.4%
NC	2.0%	0.4%	0.5%	0.7%
NCC	3.0%	1.7%	1.6%	1.6%
NEP	0.3%	0.0%	0.1%	0.3%
SC	36.0%	35.6%	36.6%	37.7%
SCC	6.8%	3.0%	3.0%	3.0%
SD	9.1%	10.3%	8.6%	6.5%
SF	14.7%	21.0%	16.0%	10.1%
SJV	9.8%	13.8%	17.4%	21.7%
SS	2.1%	3.1%	3.4%	3.8%
SV	9.1%	7.8%	8.5%	9.3%
Total	**100%**	**100%**	**100%**	**100%**

c. Industrial Equipment

Since industrial operations are primarily situated in non-residential and less populated areas typically zoned for commercial or industrial use, human population is not the best surrogate on which to base the allocation of industrial equipment. County-level employment data was obtained from the Employment Development Department (EDD) for 2000 to 2008 based on the annual compilation of the Quarterly Census of

Employment & Wages (ES202) for the following Divisions: (01) Goods- Producing and (31) Manufacturing (EDD, 2010).

The county-specific data was distributed into air basins using data obtained from the 2000 U.S. Census overlaid with available air basin/county geographic information system (GIS) map layers. Actual EDD employment data were used from 2000 to 2008 to determine the county fraction for allocation of industrial equipment. Since the EDD does not provide any future forecasts for 2009 and beyond, the allocation of industrial equipment is based on data for 2008.

Table 12 below compares the updated allocation of industrial equipment by air basin with the original values from OFFROAD.

Table D-12: Industrial Equipment Statewide Allocation by Air Basin

Air Basin	OFFROAD Allocation	Updated Allocation
GBV	0.0%	0.0%
LC	0.0%	0.0%
LT	0.1%	0.1%
MC	0.4%	0.5%
MD	0.6%	2.2%
NC	0.6%	0.6%
NCC	1.1%	1.5%
NEP	0.1%	0.1%
SC	55.7%	46.6%
SCC	2.9%	3.9%
SD	6.2%	6.9%
SF	23.9%	23.9%
SJV	5.0%	9.2%
SS	0.4%	1.0%
SV	2.9%	3.5%
Total	**100%**	**100%**

d. Oil Drilling Equipment

County-level registration data of off-road equipment, used specifically for oil drilling applications, was obtained from the ARB's Portable Equipment Registration Program (PERP) Database in 2004 (ARB,2007), and was used to allocate oil drilling equipment in the OFFROAD model. This allocation was reviewed by industry and key stakeholders as part of the original rulemaking process in 2005. Table 13 contains the statewide allocation for oil drilling equipment. The allocation of oil drilling equipment in Table 13 is in good agreement with the number and location of rotary rigs operating within California (Baker Hughes, 2010).

Table D-13: Oil Drilling Equipment Statewide Allocation by Air Basin

Air Basin	Statewide Allocation
GBV	0.0%
LC	0.0%
LT	0.0%
MC	0.0%
MD	0.0%
NC	0.0%
NCC	0.0%
NEP	0.0%
SC	13.0%
SCC	8.5%
SD	0.0%
SF	2.7%
SJV	61.1%
SS	0.0%
SV	14.5%
Total	**100%**

2. Emissions Projections

The emissions inventory for off-road equipment is a function of engine emission factors and total equipment activity. Total equipment activity describes both the population of vehicles and much how the vehicles are operated. In order to project future off-road vehicle emissions, staff must estimate how these variables change over time. Emission factors change as a result of new engine technologies that are adopted to meet State or Federal regulations. Vehicle activity changes in response to population growth, national and regional economic conditions, changes in demand for off-road engines and the products they are used to produce, and other factors. In this section, total vehicle activity growth rates are derived for the four categories of equipment covered by the off-road rule: airport ground support equipment, construction and mining, industrial, and oil drilling.

The DOORS database and other data cited above provided a baseline 2009 population and annual equipment activity estimates for off-road rule equipment operating in California, but very little pre-2009 data is available. Therefore, historical economic indicators were used as "growth surrogates" to model how total equipment activity changes over time. The most reliable surrogates had many continuous years of historical data and correspond well with other industry trends.

a. Historical Growth Rates

Growth rates for the OFFROAD model were originally derived by Energy & Environmental Analysis (EEA) in 1995 from a study of off-road vehicle activity by CSU Fullerton (Puri and Kleinhenz, 1994). Growth rates were based on category-specific economic indicators such as employment, expenditures, and fuel use. The growth rate for the construction and mining equipment category was later derived from U.S. construction employment data from Regional Economic Models, Inc. (ARB, 2007).

For the current inventory, staff considered GDP, fuel use, employment and other economic indicators as growth surrogates for off-road equipment activity. For each data set, annual historical data were divided by 2009 values to "standardize" the data to a baseline reference point. These standardized data were termed growth factors, with a baseline value of 1.00 in 2009:

$$\text{Growth Factor} = \frac{\text{Value from Year of Interest}}{\text{Value from 2009}}$$

The slope of a linear best-fit line through the growth factor data is the historical average annual growth rate. The growth factor for a particular year is also a scaling factor by which 2009 total activity is multiplied to estimate that year's activity. Table 14 summarizes the annual growth rates used by the OFFROAD model and the values derived using the above method in this analysis. The growth rates presented here are linear and not compound. The growth rates and data sources for each equipment category are further described in the sections below.

Table D-14: Annual Historical Growth Rates

Category	OFFROAD[1]	Proposed
Airport Ground Support	2.02%	1.78%
Construction and Mining	1.96%	1.84%
Industrial	0.63%	1.84%
Oil Drilling	0.00%	0.00%

[1]Annual growth rates estimated from best-fit line fitted to growth factors from 2000 to 2030.

i. Airport Ground Support Equipment Historical Growth

For airport ground support equipment (GSE), staff considered: California air transportation GDP from the BEA (BEA, 2010); air transportation employment from the Bureau of Labor Statistics (BLS, 2010a); jet fuel use from the California Board of Equalization (BOE, 2010); airline revenue passenger miles from the Bureau of Transportation Statistics (BTS, 2010a); and U.S. airline fuel consumption from the BTS

(BTS, 2010b). GDP data is only available through 2007, which yields an overly optimistic growth rate since it does not include the recent recession. California air transportation employment data is only available since 1990 and a larger data set is necessary to derive historical average growth. Additionally, air transportation employment may not be an appropriate surrogate since contracting employment as a result of airline mergers or other factors may not directly relate to airport GSE activity. BOE California jet fuel data is only available since 2003. Annual airline passenger miles have increased steadily since the 1960s, but these data show very little variation in response to economic conditions. Therefore, airline fuel consumption, with an annual growth rate of 1.78% from 1977 to 2009, was selected as the best surrogate for airport GSE activity. Figure 15 shows the U.S. airline fuel consumption growth factors and best fit line, which is the historical growth trend.

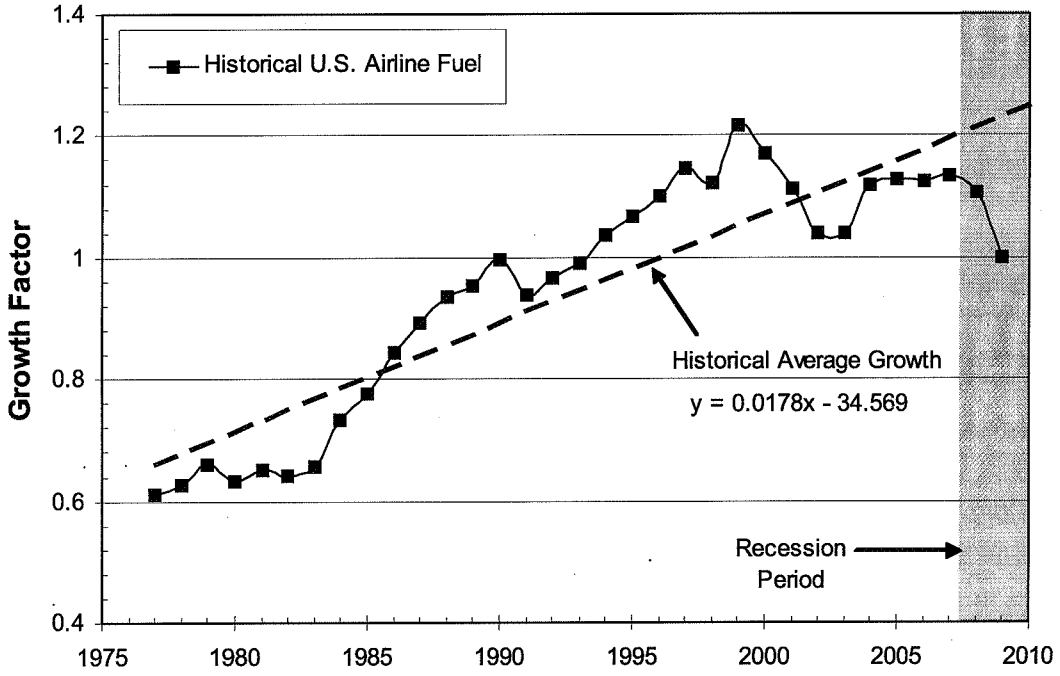


Figure D-15: Growth Factors and Best Fit Line for U.S. Airline Fuel Consumption from 1977 to 2009

ii. Construction and Mining Equipment Historical Growth

For the construction and mining sector, staff considered: U.S. Census Bureau data on the annual value of construction put in place (Census Bureau, 2010); California construction GDP from the BEA (BEA, 2010); construction sector diesel fuel sales published by the Energy Information Administration (EIA, 2010); and construction employment data from the BLS (BLS, 2010a). Data for U.S. construction value put in place were not California-specific and were only available since the early 1990's.

Historical data for California construction GDP was only available through 2008, thus its growth rate does not fully capture the effects of the recent recession. Construction sector fuel sales showed significant annual variation that is not seen in any of the other construction surrogates.

Due to the limitations described above, California construction sector employment was chosen as the best surrogate for construction and mining equipment growth. Construction employment in California had an annual growth rate of 1.84% between 1970 and 2009. California employment figures were only available since 1990, so employment from 1970 to 1989 was predicted using U.S. construction employment data and the average percentage of U.S. construction employment within California during 1990 to 2009 (10.9 ± 1.1%). Figure 16 shows the construction employment growth factors and best fit line.

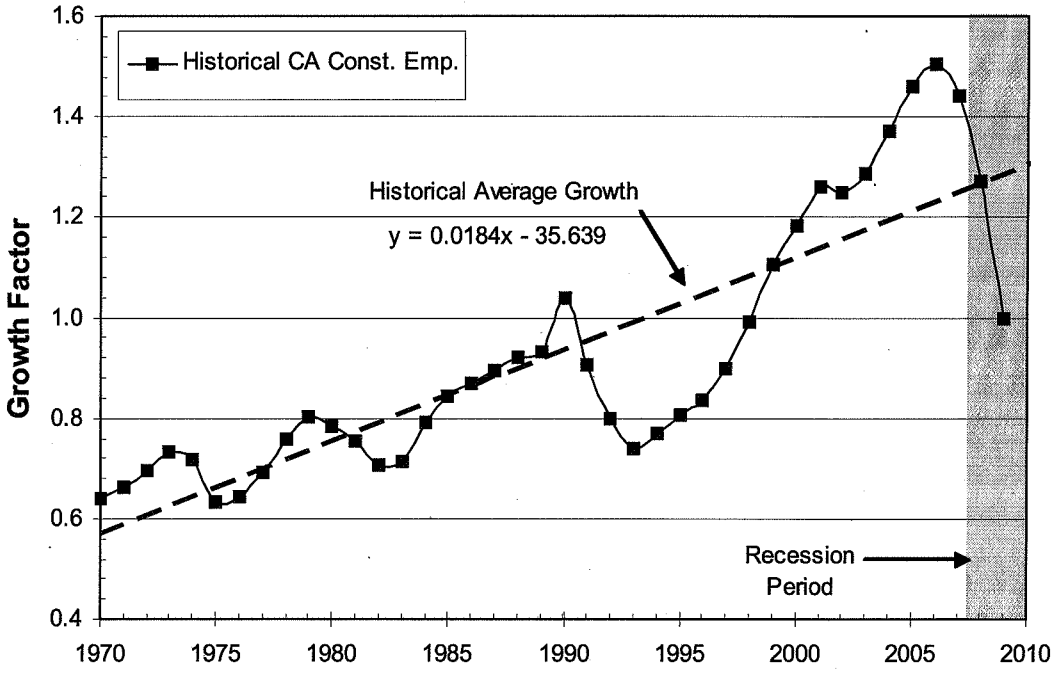


Figure D-16: Growth Factor Data and Best Fit Line for California Construction Employment from 1970 to 2009

Staff also considered California employment in the following construction occupations from the BLS: paving, surfacing, and tamping equipment operators; pile-driver operators; and operating engineers and other construction equipment operators. These occupations are more commonly associated with the use of diesel construction equipment than other construction professions (e.g. carpenters, etc.). However, unlike the other economic and employment indicators considered above, occupation-specific data were only available for one month during each year since 1999, which was

insufficient to determine a historical annual growth rate. Furthermore, the month for which data was reported varied from year to year.

BLS employment projections suggested total employment in the three occupations above wiould increase 1.8% per year between 2008 and 2018 (BLS, 2010b). This value was in good agreement with the historical growth rate derived from total California construction employment.

iii. Industrial Equipment Historical Growth

Staff looked at the top industrial sector fleets reported in the DOORS database and determined that many of the fleets were closely tied to the construction industry. For this reason, and limited economic data for the industrial sector as a whole, the growth rate derived for the construction and mining category (1.84%) was also used for industrial equipment. Since industrial processes often support the construction sector, it is reasonable to assume the industrial sector mirrors construction activity.

iv. Oil Drilling Equipment Historical Growth

For the oil drilling equipment category, staff considered: California oil and gas extraction GDP from the BEA (BEA, 2010); oil company diesel fuel use published by the EIA (EIA, 2010); California rotary rig counts from Baker Hughes (Baker Hughes, 2010); and California oil and gas extraction employment from the BLS (BLS, 2010a). Oil and gas extraction GDP values were only available through 2007 and show slightly positive growth. Oil company fuel use was only available through 2008 and had a slightly negative growth rate. Oil and gas extraction employment was only available since 1990 and yielded virtually no growth over the past two decades. Rotary rig counts in California have declined since 1970, but these data did not include the horsepower or size of the equipment. All of these datasets showed major peaks and valleys over the past two decades. Considering the limitations of all the data and since no clear trend in either the positive or negative direction is exhibited, the average annual growth rate for oil drilling equipment in California was assumed to be zero.

b. Forecasting

Many of the economic indicators considered in this analysis peaked in 2006 and dropped each year through 2009 as a result of the recent recession. Preliminary data and economic forecasts suggested 2010 values will be lower than 2009. To forecast total equipment activity following the recession, staff developed three recovery scenarios to encompass the possible rate of growth ("fast", "slow", and "average"). In all three recovery scenarios, growth does not begin until 2011.

The fast recovery scenario assumed that total activity would return to historically average levels in 2017 and then grow at the historical average rate. A return to anticipated activity by 2017 was based on historical recovery rates and accounts for the idea that California is likely to recover more slowly from this recession than the country

as a whole. Additionally, the Congressional Budget Office forecast suggested that real gross domestic product at a nationwide level will converge with potential gross domestic product trends no later than 2015. Coupling this forecast with the assumption that California's recovery will lag the nation by several years yielded the 2017 recovery date assumed for the fast recovery scenario.

For the slow recovery scenario, staff assumed that activity would be permanently depressed relative to historical levels, but continue to grow at the average historical growth rate beginning in 2011. The average scenario is the average of the fast and slow scenarios. Figure 17 illustrates the fast, slow, and average recovery scenarios through 2014 for a generic equipment type.

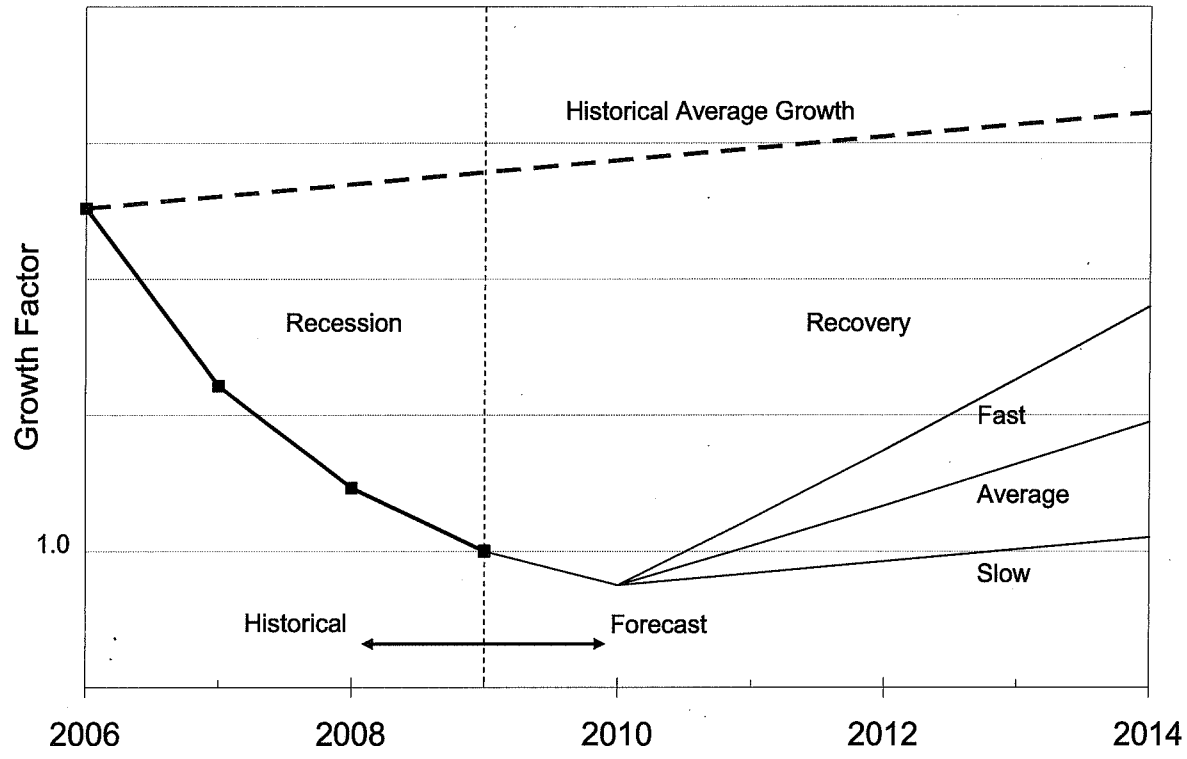


Figure D-17: Historical Average Growth (Best Fit Line to Historical Data) and ARB Fast, Slow, and Average Recovery Scenarios

Separate recovery scenarios were made for the short-term through 2014 and for the long-term from 2015 to 2030. On the short-term, staff determined that the average recovery scenario was most appropriate. Given the uncertainty with economic forecasts, the average recovery scenario represented the "middle-of-the-road" path to recovery. Staff modeled the average recovery scenario from the historical average growth rates derived for each equipment category except oil drilling equipment, which has a growth rate of zero. For the long-term growth projections, staff compared the fast,

slow, and average recovery scenarios with published economic forecasts. Based on these comparisons, different long-term recovery scenarios were derived for each equipment type.

i. Airport Ground Support Equipment Forecast

To forecast short-term growth in the airport GSE sector, staff modeled the average recovery scenario from the U.S. airline fuel data used to derive the historical growth rate. The U.S. airline fuel forecast from the Federal Aviation Administration (FAA) predicted fuel consumption in 2010 will be 3% lower than 2009 (FAA, 2010). Therefore, the 2010 growth factor is assigned a value of 0.97. Figure 18 shows historical U.S. airline fuel growth factor data from 2006 to 2009, the historical average growth rate, and the short-term recovery scenario through 2014.

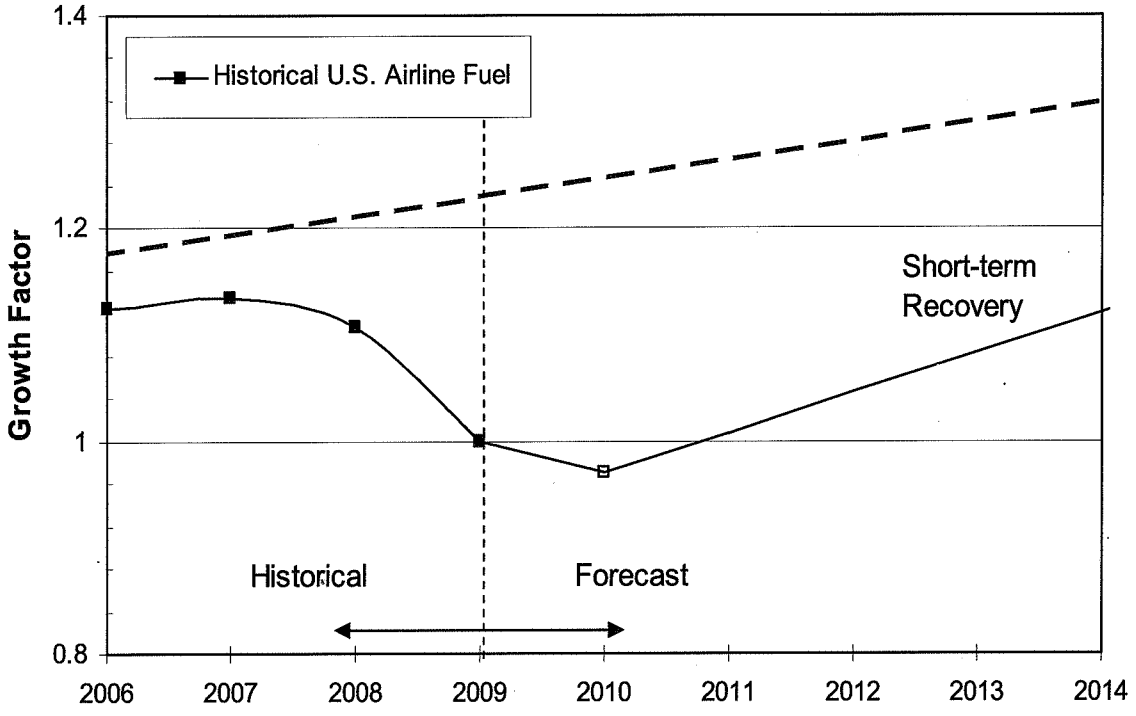


Figure D-18: Historical U.S. Airline Fuel Consumption Growth Factors, Historical Average Growth Rate, and ARB Short-term Recovery Scenario

Staff then compared the fast, slow, and average recovery scenarios to the FAA U.S. airline fuel forecast to generate a long-term recovery scenario. Based on this comparison, the average recovery scenario was selected through the year 2030. Figure 19 shows historical U.S. airline fuel consumption growth factor data from the years 1977 through 2009 and the ARB long-term recovery scenario. As shown in Fig. 19, the long-

term scenario recovers more rapidly through 2017 and then grows at the historical average growth rate through 2030.

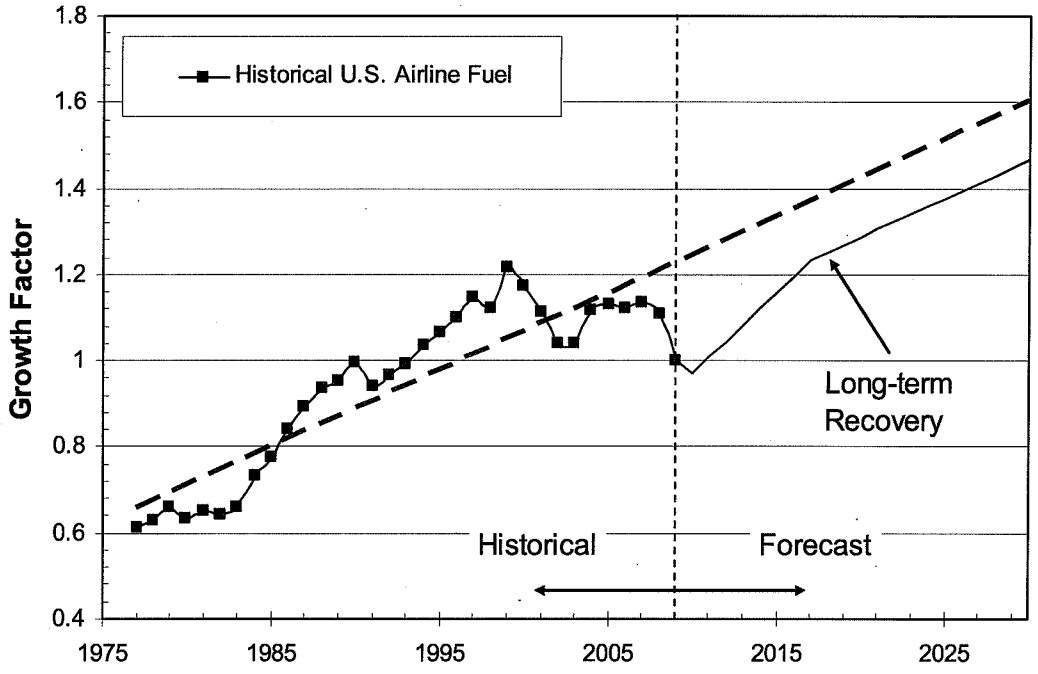


Figure D-19: Historical U.S. Airline Fuel Consumption, Historical Average Growth Rate, and ARB Long-term Recovery Scenario

ii. Construction and Mining Equipment Forecast

To forecast growth in the construction and mining sector, staff modeled the average recovery scenario from the California construction employment data used to develop the historical growth rate. Forecasts of California construction employment from the UCLA Anderson School of Management (UCLA, 2010), Beacon Economics (Beacon, 2010), and University of the Pacific Eberhardt School of Business (UOP, 2010) predicted construction employment in 2010 is about 10% lower than 2009. For this reason, the 2010 growth factor was assigned a value of 0.90. Figure 20 shows historical CA construction employment from 2006 to 2009, the historical average growth rate, and the short-term recovery scenario through 2014.

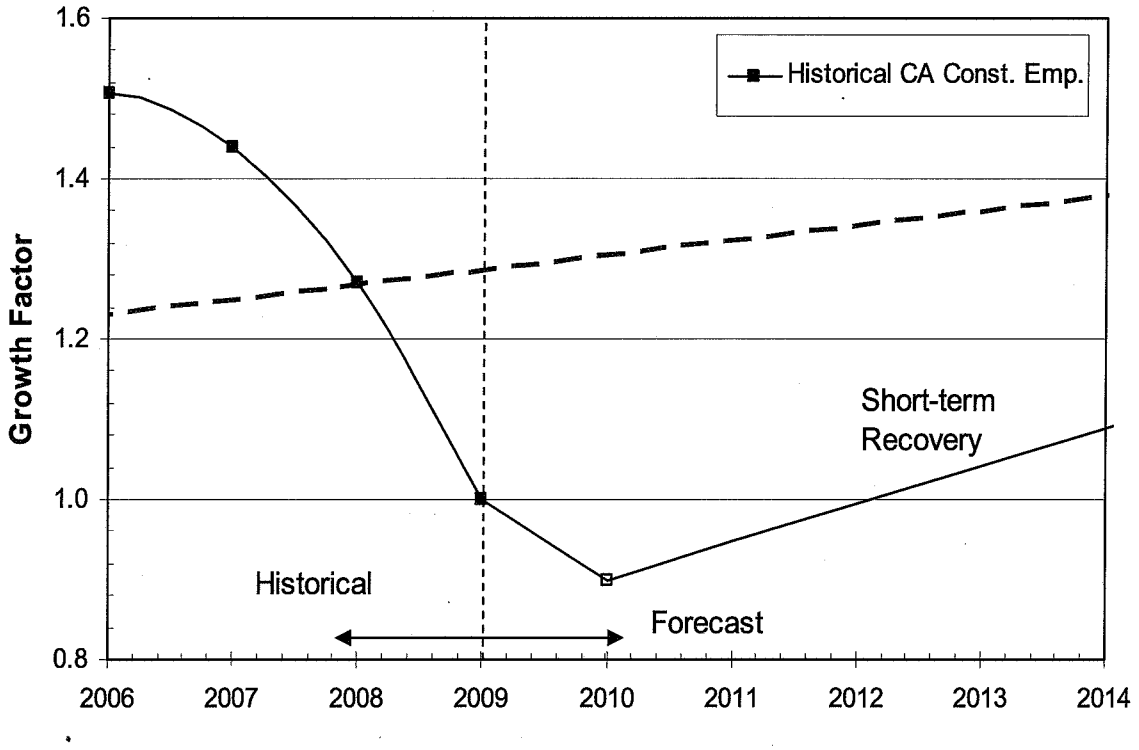


Figure D-20: Historical CA Construction Employment Growth Factors, Historical Average Growth Rate, and ARB Short-term Recovery Scenario

Staff then compared the fast, slow, and average recovery scenarios to the published construction employment forecasts referenced above. Based on this comparison, the long-term recovery scenario was modeled by extending the short-term recovery scenario trend line past 2014 until it reached the historical average growth trend. The long-term recovery scenario intersects the historical average growth trend in 2024 and then follows the same growth rate as the historical average. Figure 21 shows the historical construction employment data from 1970 to 2009, construction employment forecast data, and the long-term recovery scenario through 2030.

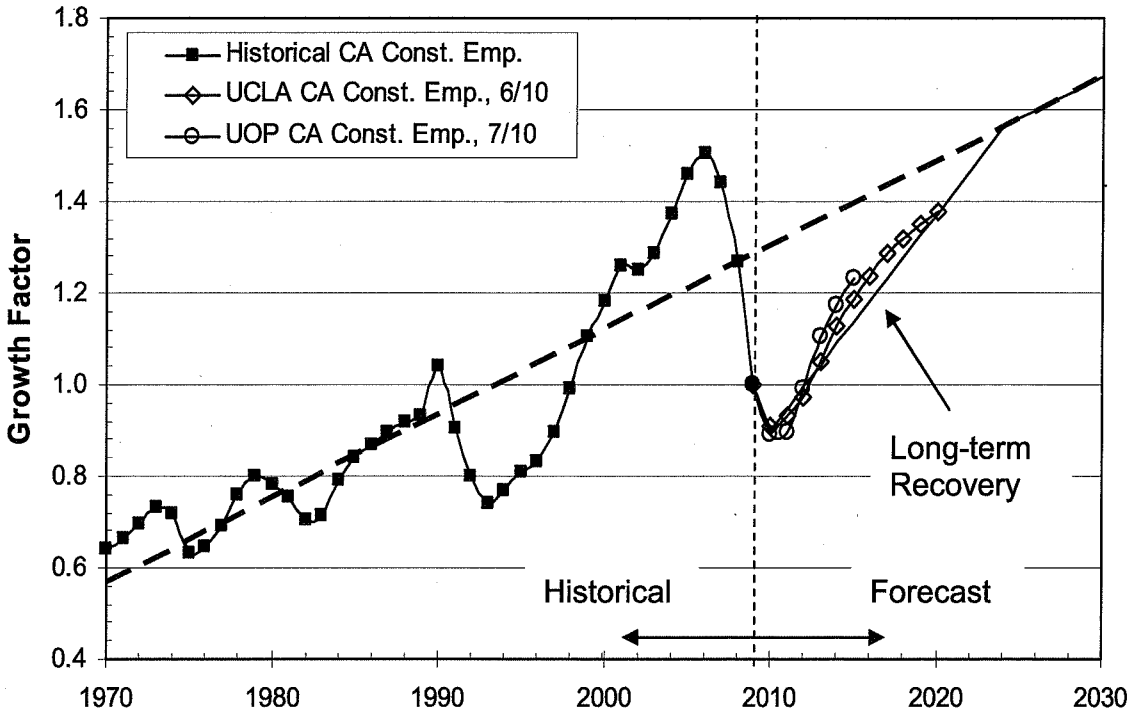


Figure D-21: Historical CA Construction Employment, Historical Average Growth Rate, Forecasts, and ARB Long-term Recovery Scenario

iii. Industrial Equipment Forecast

As described above, industrial equipment was assigned the same annual growth rate as construction and mining equipment. Forecasted growth in industrial equipment was also assumed to be the same as the construction and mining category.

iv. Oil Drilling Equipment Forecast

With an annual growth rate of 0.00%, the oil drilling category was assigned a growth factor of 1.00 for all future years.

c. Growth Factors

For each equipment category, staff derived growth factors to represent future activity. A growth factor is a scaling factor by which the baseline total activity is multiplied to arrive at a future equipment activity. The year 2009 was assigned a baseline growth factor of 1.00 for all equipment types and 2010 values were derived from economic forecasts. As described above, airport ground support equipment had a growth factor of 0.97 in 2010 and the construction and mining and industrial categories had growth factors of

0.90 in 2010. Table 15 lists the growth factors by equipment category for future years 2010 through 2030.

Table D-15: Future Growth Factors by Equipment Category for 2010 to 2030

Year	Airport Ground Support	Construction and Mining	Industrial	Oil Drilling
2009	1.00	1.00	1.00	1.00
2010	0.97	0.90	0.90	1.00
2011	1.01	0.95	0.95	1.00
2012	1.05	0.99	0.99	1.00
2013	1.08	1.04	1.04	1.00
2014	1.12	1.09	1.09	1.00
2015	1.16	1.14	1.14	1.00
2016	1.20	1.18	1.18	1.00
2017	1.23	1.23	1.23	1.00
2018	1.25	1.28	1.28	1.00
2019	1.27	1.33	1.33	1.00
2020	1.29	1.37	1.37	1.00
2021	1.31	1.42	1.42	1.00
2022	1.32	1.47	1.47	1.00
2023	1.34	1.51	1.51	1.00
2024	1.36	1.56	1.56	1.00
2025	1.38	1.58	1.58	1.00
2026	1.39	1.60	1.60	1.00
2027	1.41	1.62	1.62	1.00
2028	1.43	1.64	1.64	1.00
2029	1.45	1.65	1.65	1.00
2030	1.47	1.67	1.67	1.00

II. EMISSIONS INVENTORY RESULTS

A. Statewide

Overall, the updated NOx emissions, PM emissions and fuel consumption estimates are lower statewide and for the South Coast and San Joaquin Valley Air Basins. Most of the reductions can be attributed to changes in the data sources used as inputs for the model as described below:

- **Population**: Statewide population estimates in the updated inventory were derived from the DOORS database (DOORS, 2010). The DOORS population estimates were lower than the nationwide survey data used to develop population estimates for the original OFFROAD inventory.
- **Activity**: Annual activity data in the updated inventory were derived from Assembly Bill 8 2x reporting data (AB 8 2x, 2009), which were specific to California fleet activity. These activity values were lower than the activity values used for the original model.
- **Load Factor**: Updated load factor data for the new inventory were derived from ARB and manufacturer provided data. These load factor data were lower than the values derived from Power Systems Research data (Power Systems Research, 1996) used in the original inventory.

Table 13 shows statewide NOx emissions estimates for the unregulated 'baseline' inventory and remaining emissions estimates for the proposed regulation. The estimated benefits of the regulation project a decrease in emissions by 2% in 2014, 13% in 2020, and 17% in 2023. Figure 22 shows a year-by-year comparison of NOx emissions for baseline and proposed-regulation scenarios.

Table 1: Statewide NOx Emissions – Baseline and With-Regulation (tons per day)

	2009	2014	2020	2023
NOx Baseline	79	76	65	52
NOx With Proposed Regulation	79	75	57	44
Benefits of Regulation	0	1	8	9
Percent Reduction	0%	2%	13%	17%

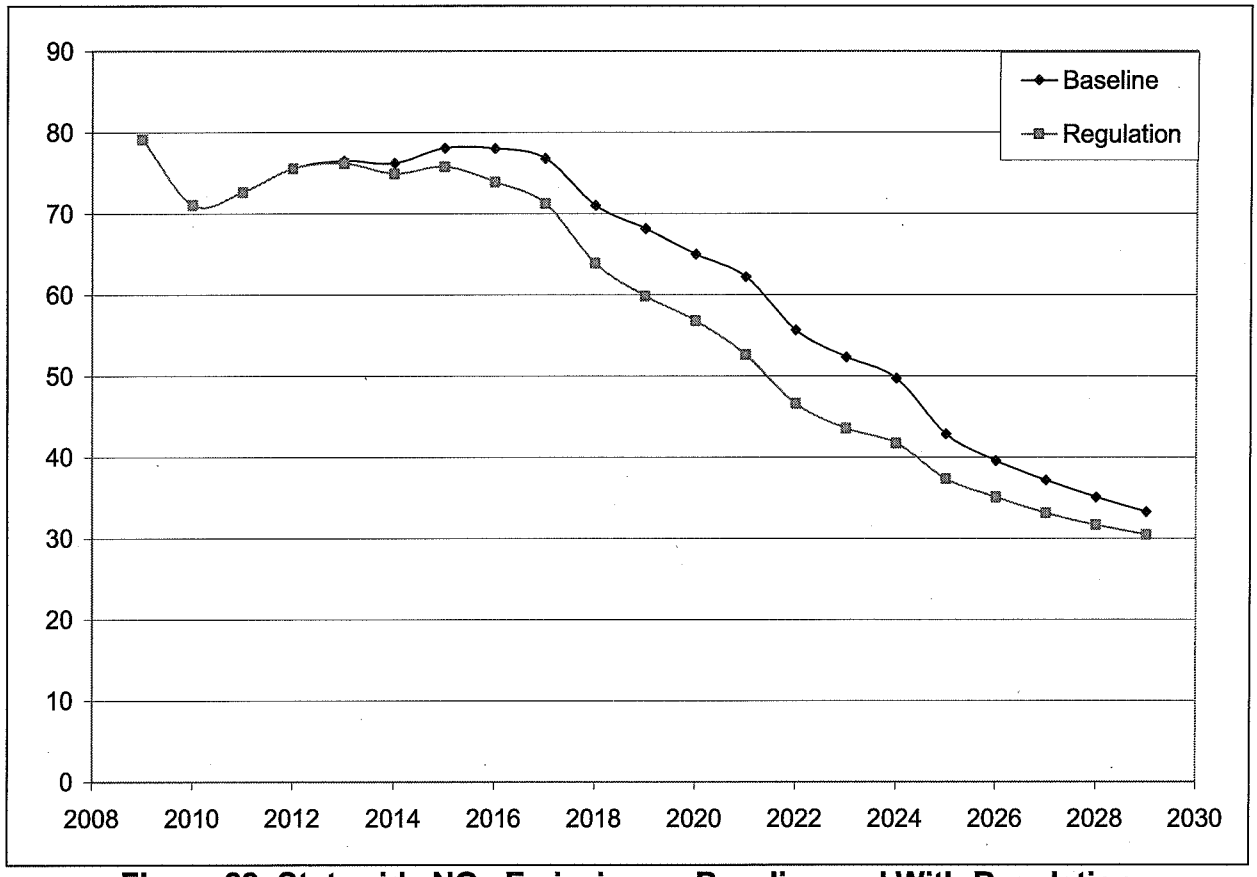


Figure 22: Statewide NOx Emissions – Baseline and With-Regulation (tons per day)

Table 15 shows statewide PM 2.5 emissions estimates for the unregulated 'baseline' inventory and remaining emissions estimates for the proposed regulation. The estimated benefits of the regulation project a decrease in emissions by 2% in 2014, 16% in 2020, and 21% in 2023. Figure 23 shows a year-by-year comparison of PM 2.5 emissions for baseline and proposed-regulation scenarios.

Table 2: Statewide PM 2.5 Emissions – Baseline and With-Regulation (tons per day)

	2009	2014	2020	2023
PM 2.5 Baseline	3.7	3.6	2.9	2.2
PM 2.5 With Proposed Regulation	3.7	3.5	2.4	1.7
Benefits of Regulation	0.0	0.1	0.5	0.5
Percent Reduction	0%	2%	16%	21%

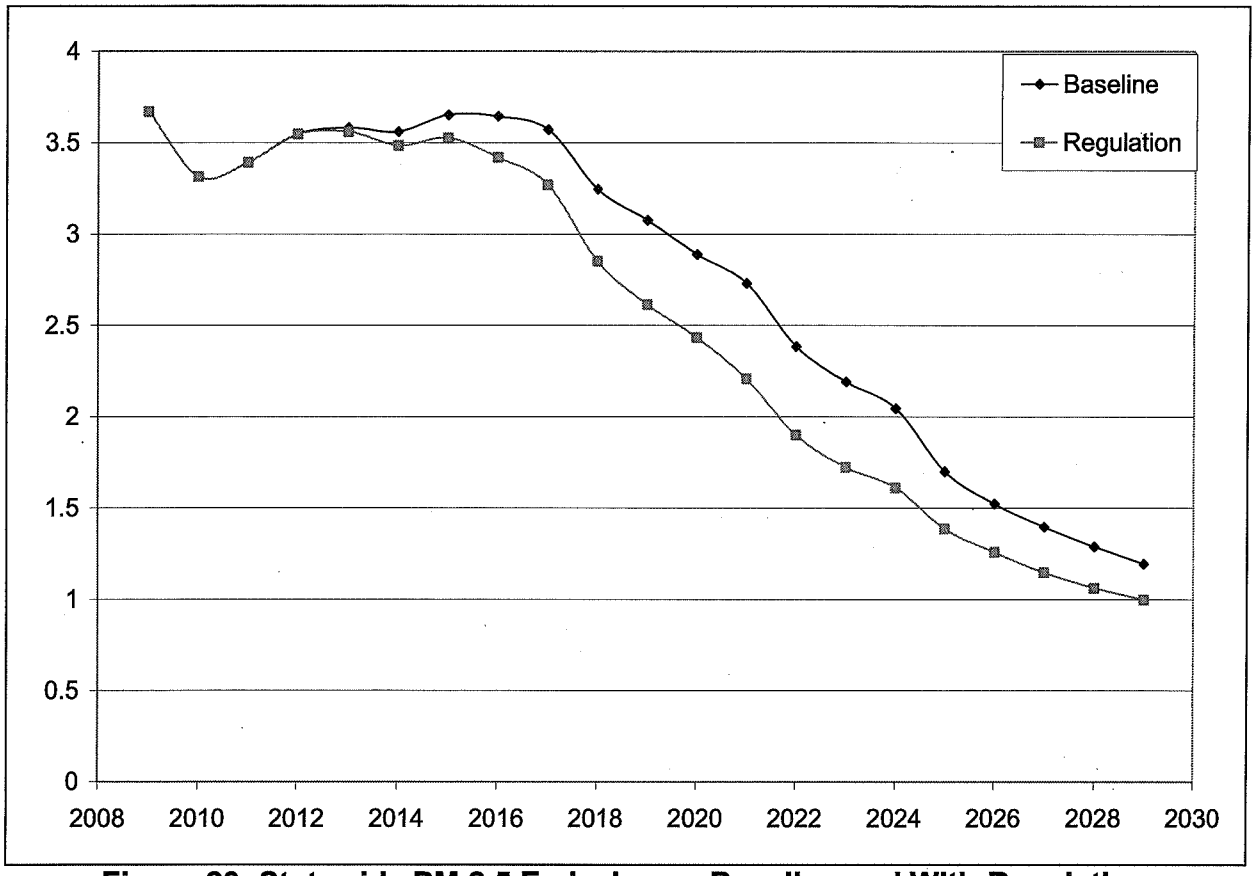


Figure 23: Statewide PM 2.5 Emissions – Baseline and With-Regulation (tons per day)

Table 16 shows original fuel consumption estimates from the OFFROAD model compared to new estimates. OFFROAD estimates 990 million gallons per year in 2009 and increases to 1,170 million gallons per year by 2023. Updated estimates are 220 million gallons per year in 2009 and increases to 330 million gallons per year by 2023. Overall updated fuel estimates are about one fourth original values.

Table 3: Statewide Fuel Consumption - OFFROAD and Update (million gallons per year)

OFFROAD	2009	2014	2020	2023
Fuel Consumption	990	1,020	1,130	1,170
UPDATE	**2009**	**2014**	**2020**	**2023**
Fuel Consumption	220	240	300	330

While there is some information available for off-road fuel sales there is no single source that breaks out sales for In-Use Off-Road Rule categories. Sources that do report fuel sales for subsets of off-road equipment have uncertainty as trends in the

data do not match industry activity. The updated emissions inventory presented here reflects the best available data provided directly by California fleets that wasn't available at the time of the original rulemaking. Fuel consumption now agrees more closely to other fuel based estimates.

Figure 23 below shows the 2007 fuel consumption estimates from the OFFROAD model and the updated estimate for calendar year 2009. Also presented are the range of estimates provided by the Associated General Contractors (AGC) and the American Rental Association (ARA).

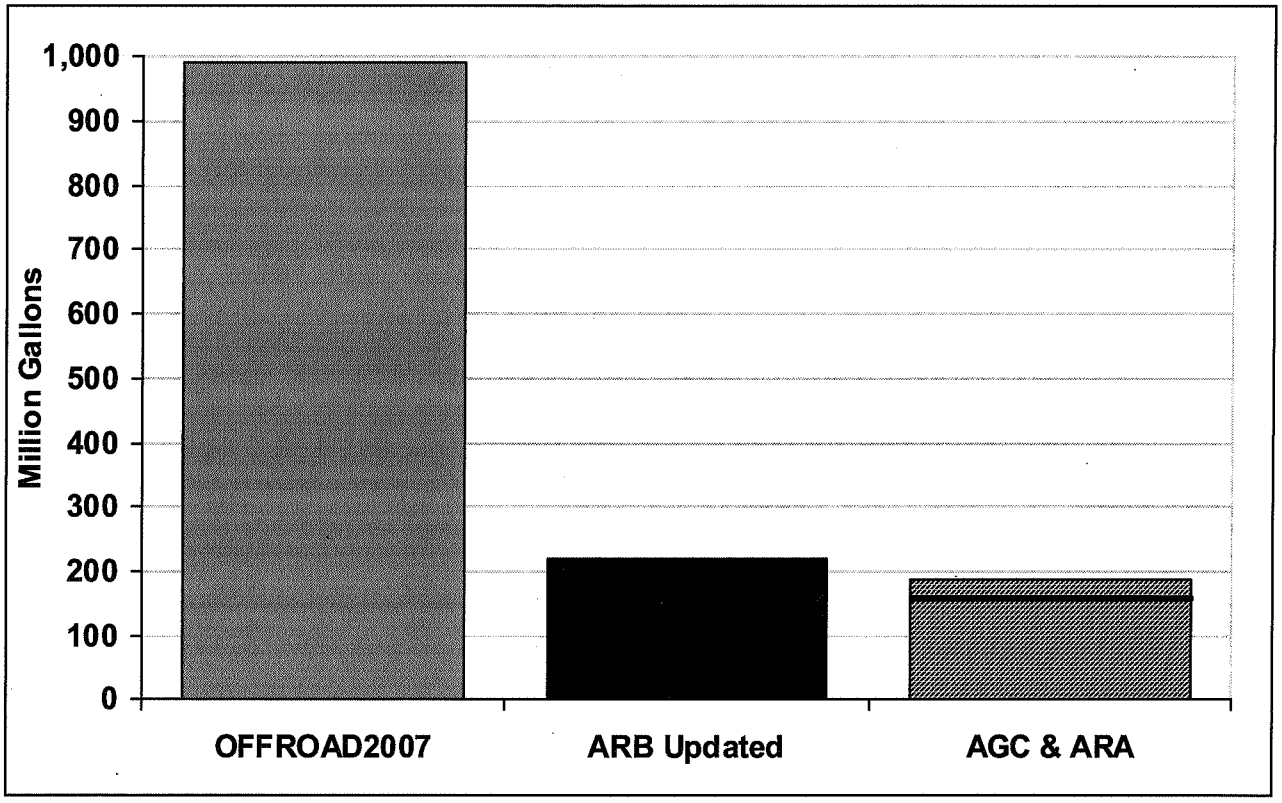


Figure 23: 2009 Statewide Fuel Consumption Comparison – OFFROAD, Update and Industry

B. Air Basins – Updated South Coast and San Joaquin Valley

In order to estimate regional emissions, staff allocated statewide estimates to the various air basins in the state. Allocation factors in the updated inventory have been changed since the original rulemaking inventory (see I-D-1). Construction and mining equipment allocations were updated with county-specific population growth projections; industrial equipment allocations were updated with employment data from the 'Goods-Producing' and 'Manufacturing' divisions; airport ground support equipment and oil drilling remained the same as they were in OFFROAD. These changes resulted in different air basin emissions relative to statewide estimates (see Tables 10 and 12).

Tables 17 and 18 show updated emissions estimates for the South Coast and San Joaquin Valley Air Basins, respectively. A comparison between baseline and with-regulation scenarios is shown for PM 2.5, NOx, and ROG.

Table 4: Emissions Inventory for South Coast (tons per day)

South Coast						
Calendar Year	PM2.5		NOx		ROG	
	Baseline	Regulation	Baseline	Regulation	Baseline	Regulation
2009	1.3	1.3	28	28	2.5	2.5
2014	1.3	1.3	28	28	2.6	2.5
2020	1.1	0.9	25	22	2.4	2.1
2023	0.8	0.6	19	16	2.0	1.7

Table 5: Emissions Inventory for San Joaquin Valley (tons per day)

San Joaquin Valley						
Calendar Year	PM2.5		NOx		ROG	
	Baseline	Regulation	Baseline	Regulation	Baseline	Regulation
2009	0.5	0.5	12	12	1.0	1.0
2014	0.6	0.6	14	13	1.2	1.2
2020	0.6	0.5	14	12	1.3	1.2
2023	0.5	0.4	11	9	1.2	1.0

C. State Implementation Plan (SIP) and Preserving Benefits

As discussed in the staff report the combined impact of the recession with amended regulations on both on-road and off-road inventories will provide essentially the same cumulative remaining emissions levels between 2011 and 2023 to what the adopted Rules would have achieved without the recession. In addition, the combined margin for trucks/buses and off-road equipment is minimized, providing maximum relief while still meeting SIP legal obligations. For a more detailed discussion of these issues please refer to Section H of Appendix D in the "Proposed Amendments to the Truck and Bus Regulation, the Drayage Truck Regulation and the Tractor-Trailer Greenhouse Gas Regulation" staff report.

Attachment A

III. Off-Road Simulation Model (OSM)

A. Introduction and Overview

ARB staff have developed the Off-road Simulation Model (OSM) to provide future-year statewide vehicle populations for use in the off-road emissions inventory and to evaluate various alternative amendments to the current off-road regulation. OSM utilizes the California off-road fleet data submitted to DOORS; from these fleet data, future year fleet composition is projected by OSM on a fleet-by-fleet basis. OSM consists of PHP code (pages) that manipulate DOORS fleet data in a separate OSM database (both DOORS and OSM database are in MySQL). The OSM vehicle population projections used in the Offroad Inventory and the analyses within this document are based upon vehicles registered in DOORS as of September 23, 2010.

This section provides a brief description of the user interface and operation, OSM logic, followed by a more detailed description of OSM and how the vehicle populations were derived.

[Note: Both the Offroad Inventory and OSM use 2009 as a beginning year, however OSM designates actions taken by fleets from April 1, 2009 through March 31, 2010 as "2010". Similarly, for succeeding years, the designation of a "regulatory year" represents the actions taken in the twelve months leading up to March 1st of the year.]

i. OSM User Interface and Operation

A user can run OSM from the user interface shown in Figure 1. As can be seen, the user has only a single button to click to run either the proposed regulation amendments or any of three alternatives. Clicking a button will cause OSM to populate tables within the OSM database with projected future year vehicle populations. When this operation is complete a cost table will be displayed as shown in Figure 2. The raw vehicle and fleet data that are used as inputs to the inventory are contained within several tables within the OSM database as shown in Figure 3.

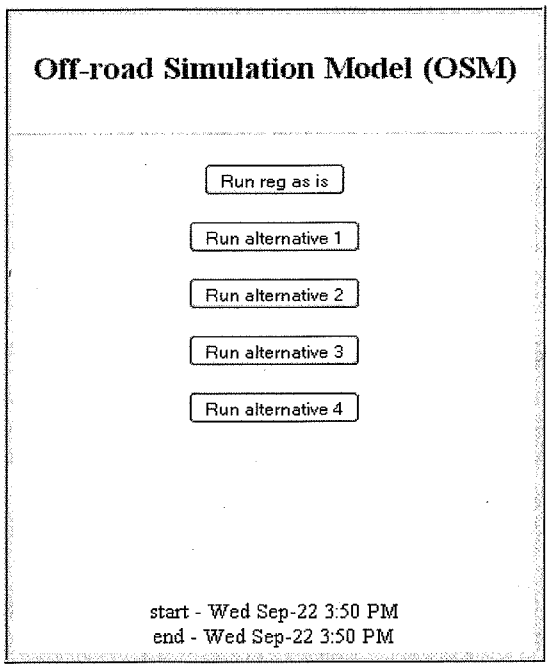


Figure 1: OSM User Interface

Run	Calendar Year	Turnover	Full Turnover	Retrofit	Annual	PV Annual	Full Annual	PV Full Annual
Base	2010	0	0	0	0	0	0	0
Base	2011	0	0	0	0	0	0	0
Run	Calendar Year	Turnover	Full Turnover	Retrofit	Annual	PV Annual	Full Annual	PV Full Annual
Scenario	2010	0	0	0	0	0	0	0
Scenario	2011	15,592	456,316	158,060	173,652	165,382	614,376	585,120

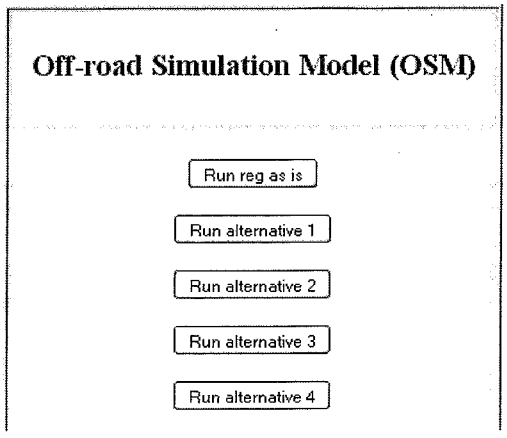


Figure 2: OSM Cost Table

```
mysql> use osm1085
Database changed
mysql> show tables;
+-------------------------------------+
| Tables_in_osm1085                   |
+-------------------------------------+
| osm_fleet_base_costs                |
| osm_fleet_base_costs_cumulative     |
| osm_fleet_scenario_costs            |
| osm_fleet_scenario_costs_cumulative |
| osm_vehicle                         |
| osm_vehicle_base                    |
| osm_vehicle_base_costs              |
| osm_vehicle_scenario                |
| osm_vehicle_scenario_costs          |
| zeconomic_recovery_factor           |
| zengine_index                       |
| zengine_target                      |
| zequipment_class                    |
| zretrofit_cost                      |
| ztarget_1delay                      |
| ztarget_2delay                      |
| ztarget_2delay_noshift              |
| ztarget_3delay                      |
| ztarget_4delay                      |
| ztarget_5delay                      |
| ztier4_premium_cost                 |
| zvehicle_average_age                |
| zvehicle_cost                       |
+-------------------------------------+
23 rows in set (0.01 sec)

mysql>
```

Figure 3: OSM Database Tables

ii. OSM Logic

As mentioned the user may run an OSM simulation of the existing off-road regulation or an amended off-road regulation by clicking a button in the user interface. Each button will load the specific parameters for that simulation.

Each simulation will consist of a "base" run and a "scenario" run. The base run models fleet behavior without any regulatory constraints, but only with actions that are consistent with usual business practices. On the other hand, the scenario run includes both actions taken to meet usual business practices but also additional actions required by the regulation or amended regulation. Both the scenario and base runs are needed for each fleet to see the change in fleet composition and calculate the associated costs of compliance.

Under either the scenario or base run, OSM starts with the fleet information from fleets reported in DOORS as of September 23, 2010 and then copies the fleet information for an individual fleet into the next regulatory year. Then, OSM starts modifying this fleet with turnover and retrofits. As mentioned, depending on an input parameter OSM may follow the constraints given in the regulation while turning over and retrofitting vehicles or not, but in either case, OSM will modify the fleet over time. OSM then projects the fleet into the next regulatory year and repeats the process for the fleet through regulatory year 2030. That process is then repeated for each fleet until all fleets have

been modified. At the conclusion of an OSM run, database tables will contain data that reflects the changes to the fleet composition.

To summarize the programming logic of the preceding paragraph, in the most general terms, OSM consists of processing each fleet in DOORS in turn containing a nested loop processing each year in turn which contains another nested loop processing turnover and retrofit actions taken on each individual vehicle in turn. The process is illustrated in Figure 4.

Figure 5 is a flowchart showing OSM logic in more detail. As shown, OSM includes pages that initialize variables, gets fleet information, creates new regulatory years, gets the fleet targets, gets the fleet averages, sets compliance flags, sets the pool of eligible vehicles, modifies the fleet table with turnover and retrofits, writes the results to the database, and performs other actions as needed. More details are given in the following section, OSM Formulas.

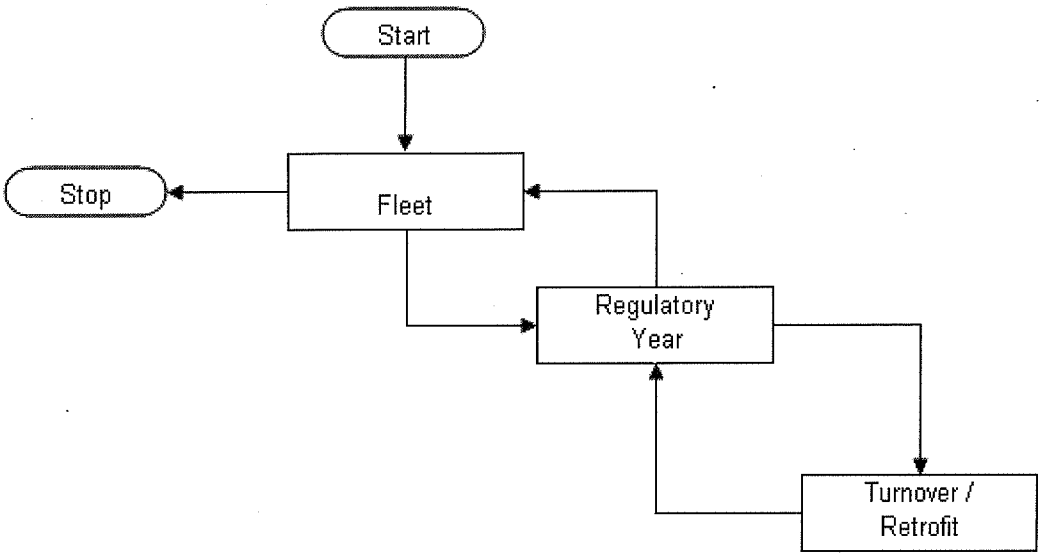


Figure 4: Summary OSM Flowchart

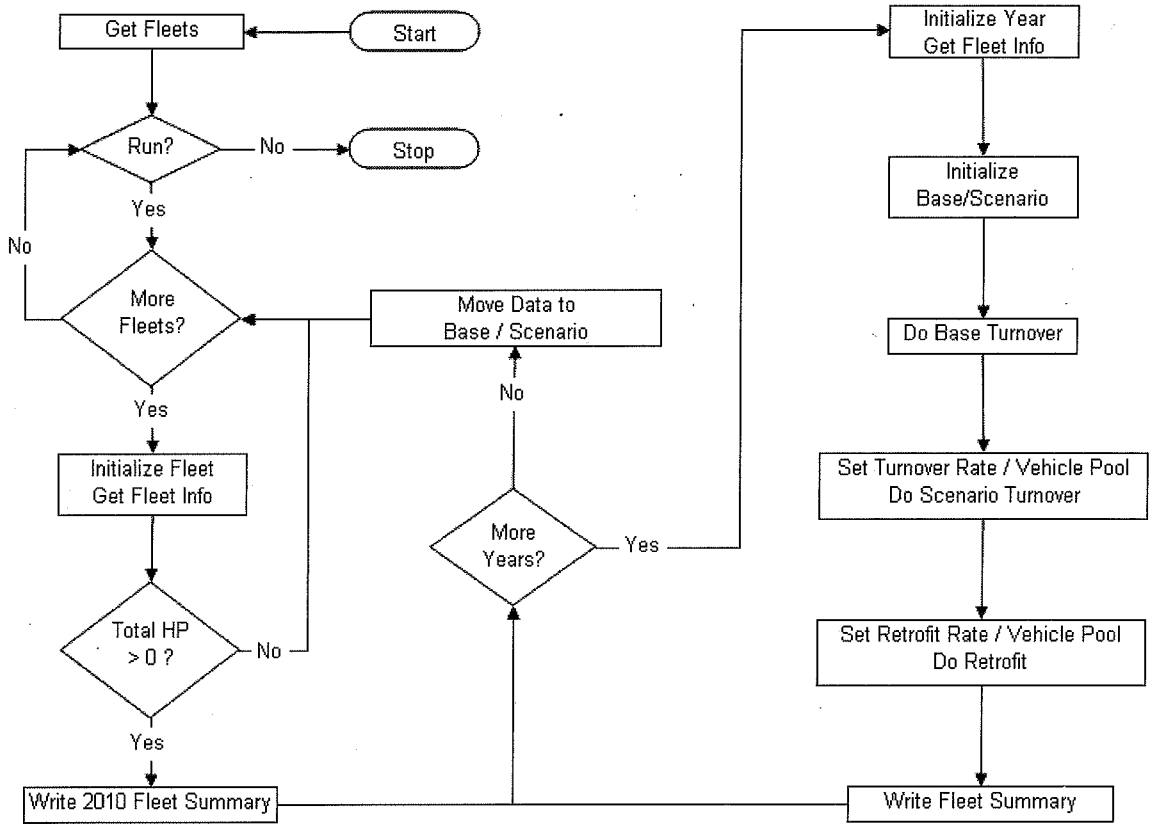


Figure 5: OSM Flowchart

iii. OSM Formulas

OSM first initializes the fleet variables (those variables that must be reset for each fleet but shouldn't be initialized each year, such as beginning turnover credit, retrofit credit, etc.), then initializes the variables that will change from year to year, such as the turnover needed and the retrofit needed for a given year. After all the variables are initialized, the fleet information is retrieved from a September 23, 2010 copy of DOORS as well as any early credit and then the fleet is stored in the osm_vehicle table for the regulatory year 2010. Then the osm_vehicle table is supplemented with additional information from lookup tables such as vehicle average age.

Low-use vehicles are included in the information retrieved from DOORS but are excluded from turnover and retrofit. Low-use vehicles are included in the emissions estimates and should reasonably model actual emissions since low-use vehicles that remain unchanged in the fleet really represent replacement with newer, but still relatively old, vehicles that become low-use. This would be the case for vehicles that have more than 12,000 hours since deterioration in the emissions rate is truncated beyond that point and hence emissions remain the same. [However, the age

distribution will be distorted by low-use vehicles in later years since they will not reflect replacement with newer model vehicles.]

a. get_fleet_info.php

The get_fleet_info.php page calculates total horsepower and fleet age for the current fleet excluding low-use vehicles. The fleet total horsepower is simply the sum of the horsepower of all vehicles in the fleet excluding low use vehicles.

The calculation of the total horsepower is shown in Equation 1.

Equation 1: $$TotalHorsepower = \sum_{i=1}^{n} Horsepower_i$$

Where n = Number of vehicles in the fleet excluding low use vehicles.

Fleets with missing engine information will have an indeterminate total horsepower and therefore total horsepower is set equal to zero and the fleet will not be included in the OSM calculations.

The fleet age is a measure of the horsepower weighted average age of the fleet as a whole. The fleet age is calculated in Equation 2.

Equation 2: $$FleetAge = \frac{\sum_{i=1}^{n} EngineHorsepower * (CalendarYear - EngineModelYear_i)}{TotalHorsepower}$$

The fleet age in regulatory year 2010 is fixed as a measure against which turnover is controlled as explained below.

Equation 3: $$FleetAverageAge2010 = FleetAge(2010)$$

b. do_turnover_base.php

OSM will do a "base turnover" in both the base and scenario runs in the do_turnover_base.php page (additional turnover will occur under the scenario run in response to the regulatory requirements in the do_turnover.php page as discussed below). It is assumed that under normal conditions without a regulation forcing accelerated turnover, a fleet will turnover at a rate such that the fleet average age is maintained, on average, constant over time.

An adjusted 2010 fleet age incorporates the impact of an assumed economic recovery on the 2010 fleet age measure by utilizing an economic recovery factor as shown in Equation 4. In the economic recovery it is assumed that vehicles are held longer by the fleet owner than in normal economic times and therefore the fleet age would naturally become older.

Equation 4:

$$FleetAgeAdjusted2010 = \frac{\sum_{i=1}^{n} EngineHorsepower * (CalendarYear - EngineModelYear_i) * Economic\,Recovery Factor}{TotalHorsepower}$$

An excerpt from the Economic Recovery by Year is shown in Table 1.

Table 1: Excerpt from Economic Recovery Factor Table

Equipment Class	2010	2011	2012	2013	2014	2015
Airport Ground Support	1.00	1.01	1.02	1.03	1.03	1.03
Construction and Mining	1.00	1.08	1.13	1.18	1.22	1.24
Industrial	1.00	1.12	1.20	1.26	1.28	1.29
Oil Drilling	1.00	1.00	1.00	1.00	1.00	1.00

As discussed, the fleet age is maintained at the original 2010 fleet age with adjustments to account for economic recovery. Each year, if no vehicles were turned over, the fleet would age by one year in each succeeding year; thus, to maintain a constant fleet age in each successive year, vehicles are turned over one at a time and after each vehicle is turned over the fleet age is recalculated. Once the fleet age is no longer greater than the original adjusted 2010 fleet age (plus a delta discussed below), turnover stops. This is illustrated in the Base Turnover Flowchart shown in Figure 6.

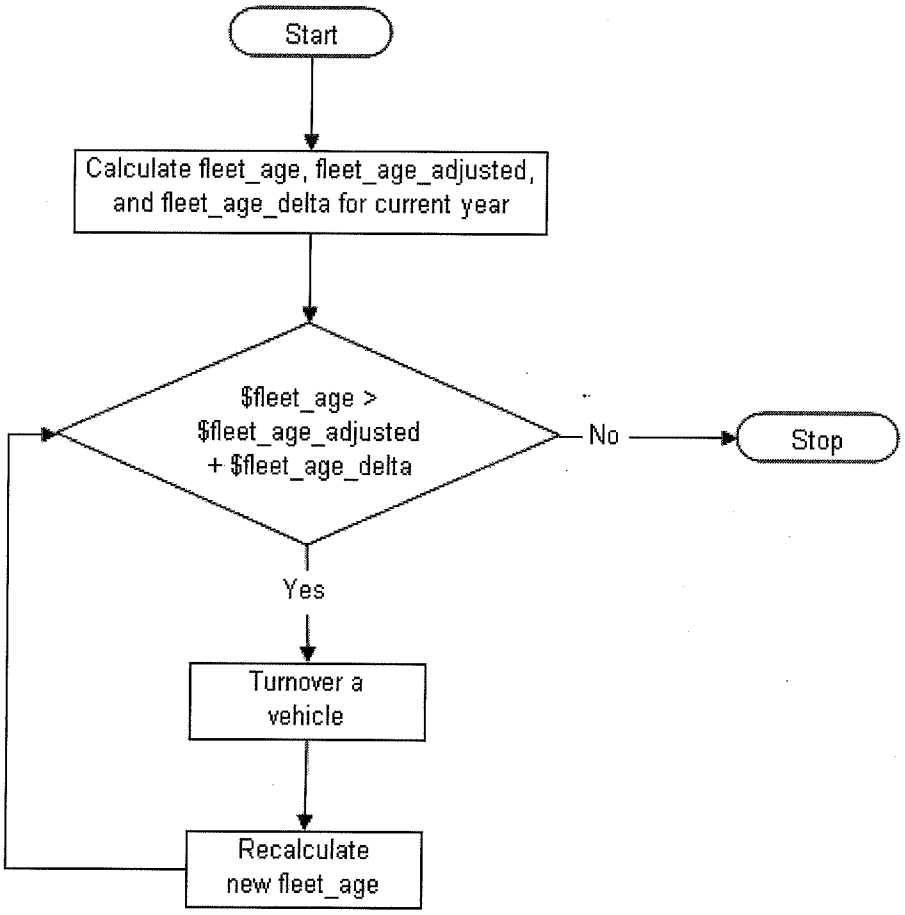


Figure 6: Base Turnover Flowchart

Since discrete vehicles will be turned over, the fleet age will virtually always overshoot the targeted fleet adjusted age resulting in a slightly younger fleet than required. Therefore a fleet age delta is calculated according to Equation 5 which is then added to the target fleet age when determining when to stop turnover as shown in equation 6. Over a period of time, the average fleet age over all years will asymptotically approach the original 2010 fleet age.

Equation 5:

$$FleetAgeDelta_{CurrentYear} = FleetAgeDelta_{PriorYear} + FleetAge2010Adjusted - FleetAge_{CurrentYear}$$

Equation 6: $FleetAge_{CurrentYear} > FleetAgeAdjusted_{2010} + FleetAgeDelta_{PriorYear}$

For example, a fleet with a horsepower weighted, average age of 13.2 years will continue as a 13.2 year old fleet over time, with some variation due to the discrete nature of individual vehicle replacements. The turnover which keeps the fleet less than or equal to the original fleet age is called the "base turnover".

Base turnover is illustrated in Figure 7; in this example in 2016, the fleet happens to have an average age equal to its 2010 fleet average age of 13.2 years. In 2017 if no vehicles were turned over the fleet average age would be 14.2 years; however a vehicle is turned over which reduces the average fleet age to 13.9, then another vehicle is turnover to reduce the age to 13.5, then another to reduce the age to 13.0. At this point, the average age is less than the 2010 average fleet age and therefore base turnover had been achieved.

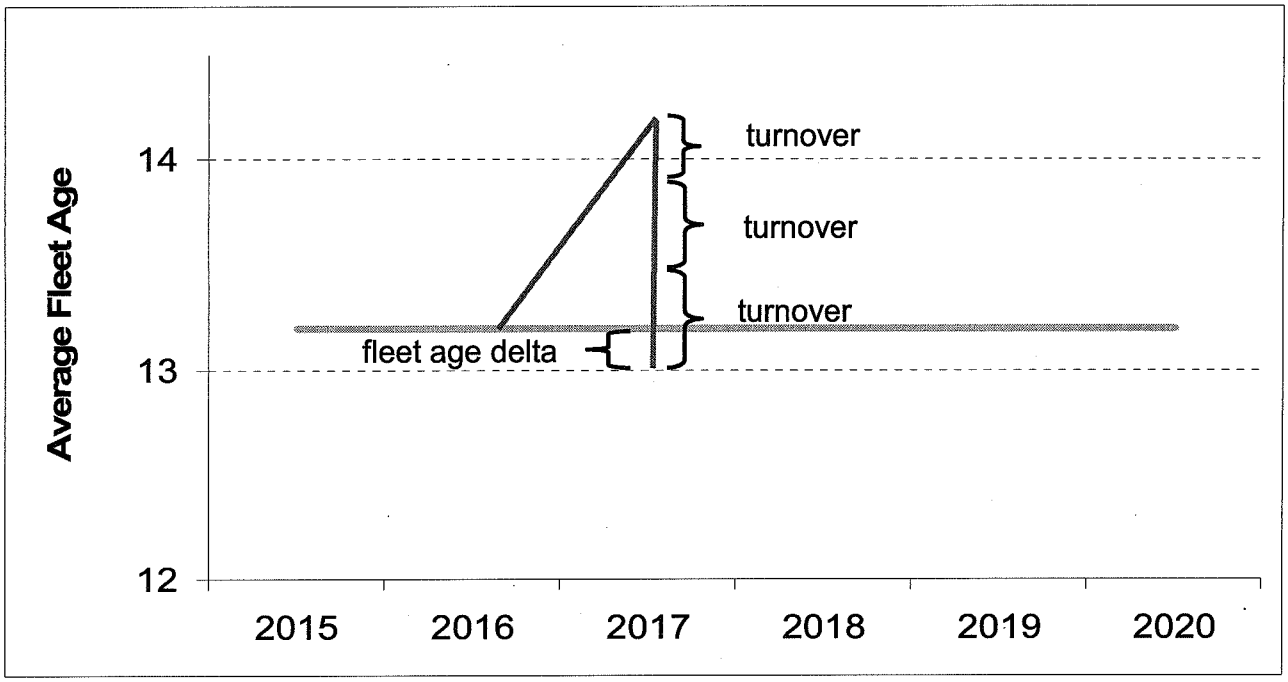


Figure 7: Base Turnover

Due to the discrete nature of vehicle turnover, the age after turnover in 2016 is less than the 2010 fleet age, the running total of that amount is call the fleet age delta. As shown in Equation 5, the fleet age delta in a given year would be the fleet age delta from the prior year plus the difference between the 2010 fleet age and the current year fleet age. So in the prior example the fleet age delta would be 13.2 – 13.0 = 0.2 years.

Since in 2017 the fleet average age was less than the 2010 fleet average age by the amount of the fleet age delta, in the next year the fleet average age is allowed to exceed the 2010 fleet average age by that amount. As shown in Figure 8, if there were no turnover in 2018 the fleet age would increase from 13.0 to 14.0; however, a vehicle is turned over which reduces the fleet average age to 13.7, and then another vehicle is turned over reducing the average age to 13.3 years old. Since the 2010 fleet average age of 13.2 plus the fleet age delta of the prior year of 0.2 years is 13.4 years, base turnover has been achieved. Note that the fleet age delta going forward is now 13.4-13.3 = 0.1 years.

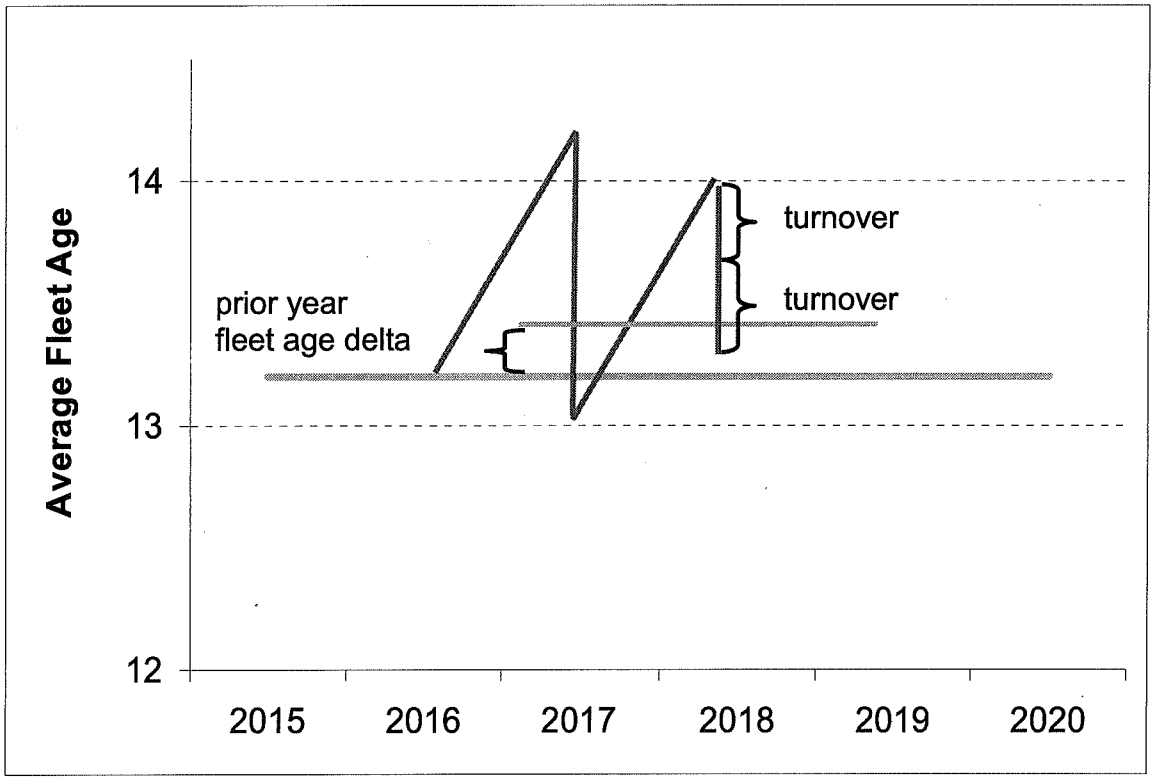


Figure 8: Fleet Age Delta

By incorporating the fleet age delta, fleet age will sometimes be less than the 2010 average fleet age and sometime more than the 2010 fleet average age, however over time the fleet average age will asymptotically approach the 2010 fleet average age. Fleets with a large number of vehicles will in general have a smaller fleet age delta than fleets with fewer vehicles. Small fleets will have a "lumpy" fleet average age over time exhibiting a periodic decrease and increase in fleet age. With a large number of fleets included in a simulation, the fluctuations of individual fleet ages will average out. Additional coding is required to shift the periodic behavior of fleets in 2010 to minimize cumulative impacts of all fleets that would otherwise all start the periodic decrease and increase in fleet average age at the same time.

It should also be noted that a vehicle is always replaced with a vehicle of the same vehicle type and same horsepower but a newer vehicle and engine model year. Fleets neither grow nor shrink in the OSM simulations since there is no basis for such in any given fleet. However, emissions are grown at a later step in the inventory process.

OSM excludes vehicles that have been recently retrofitted from the pool of vehicles subject to turnover; i.e., vehicles retrofit within the last six years. From the pool of

eligible vehicles, OSM will rank them by relative age, where relative age is calculated using Equation 7. (For reproducibility between OSM runs, vehicles are also ranked by EIN as this provides a unique ordering of all vehicles.)

Equation 7: $\text{Re}\,lativeAge = \dfrac{CalendarYear - ModelYear}{AverageAge}$

Where: Average age by vehicle type as shown in Table 2.

From the vehicle ranking, OSM will select the relative oldest vehicle for turnover. For example, a fleet may have a 10 year old skid steer and a 15 year old scraper. The skid steer has a relative age of 10/7.3 = 1.4 and the scraper has a relative age of 15/17.6 = 0.9 so the 10 year old skid steer will be turned over before the 15 year old scaper. No vehicles were modeled as repowers, which is a cost conservative estimate since repowers would be less costly than replacement.

OSM assumes that an older fleet would typically purchase newer but used vehicles to replace an older vehicle that they are selling or retiring and a younger fleet would purchase newer vehicles to replace a vehicle that they are selling or retiring. The fleet age is used to determine the typical age of a replacement vehicle. Also, OSM assumes that fleet owner business practices would change under the regulation, with fleet owners buying slightly newer vehicles than without the regulation.

Since different vehicle types have different average ages, a replacement vehicle age factor is used where:

Equation 8: $\text{Re}\,placementVehicleAge = \text{Re}\,placementVehicleAgeFactor * VehicleAverageAge$

Both the vehicle model year and the engine model year for the new, possibly used vehicle will be as shown in Equation 9.

Equation 9: $\text{Re}\,placementEngineModelYear = \text{Re}\,gulatoryYear - \text{Re}\,placementVehicleAge$

The average age of the various vehicle types is shown in Table 2.

Table 2: Average Age by Vehicle Type

Vehicle Type	Average Age (Years)
A/C Tug Narrow Body	14.7
A/C Tug Wide Body	13.8
Aerial Lifts	5.9
Baggage Tug	20.5
Belt Loader	17.5
Bobtail	10.5
Bore/Drill Rigs	9.8
Cargo Loader	9.6
Cargo Tractor	15.3
Cranes	18.1
Crawler Tractors	16.4
Drill Rig (Mobile)	13.1
Excavators	9.2
Forklift (GSE)	17.2
Forklifts	11.5
Graders	17.9
Lift (GSE)	10.2
Off-Highway Tractors	12.0
Off-Highway Trucks	13.0
Other Construction Equipment	13.6
Other General Industrial Equipment	9.8
Other GSE	9.9
Other Material Handling Equipment	11.0
Passenger Stand	8.8
Pavers	11.1
Paving Equipment	11.4
Rollers	11.4
Rough Terrain Forklifts	8.1
Rubber Tired Dozers	21.6
Rubber Tired Loaders	13.6
Scrapers	17.6
Skid Steer Loaders	7.3
Surfacing Equipment	12.1
Sweepers/Scrubbers	11.1
Tractors/Loaders/Backhoes	10.9
Trenchers	12.1
Workover Rig (Mobile)	12.3

The default replacement factors are shown in Table 3.

Table 3: Replacement Factor By Fleet Age

Fleet age	Replacement Factor Baseline	Replacement Factor Scenario
< 8	0	0
8 to < 12	0.17	0.08
12 to < 16	0.33	0.17
16 to < 20	0.50	0.25
20 plus	0.75	0.50

In the base run OSM stops after doing the base turnover but in the scenario run OSM continues turnover. Since the base turnover occurs in the scenario run, the total horsepower actually turned over in the base turnover has to be included in the turnover carryover. Turnover carryover accounts for any incremental horsepower above that required by the regulation in a given year. Again, this occurs because discrete vehicles are turned over and the required turnover horsepower is often exceeded by some portion of the last engine horsepower turned over.

c. get_fleet_target.php, get_fleet_average.php, set_nox_pm_compliance_flags.php

To run the do_turnover.php page, several other pages need to be run first to set values used by the do_turnover.php page.

Using the vehicle model year and horsepower, OSM will look up the emissions targets as outlined in the rule and the associated emissions factors for the respective engines. OSM includes a retrofit factor which equals one unless the vehicle is retrofit, and then the retrofit factor is set to the percent of emissions that would result after retrofitting; e.g., a vehicle retrofit with a Level 3 device which reduces PM emissions by 85 percent would have a retrofit factor of 0.15. OSM will calculate the Fleet Targets and Fleet Average using Equation 8 and Equation 9 respectively.

Equation 10:
$$FleetTarget = \frac{\sum Horsepower * EmissionTarget}{TotalHorsepower}$$

Equation 11:
$$FleetAverage = \frac{\sum Horsepower * EmissionFactor * RetrofitFactor}{TotalHorsepower}$$

After OSM has calculated the fleet NOx and PM averages and targets, OSM will compare them and set compliance flags, i.e., it will set certain variables that will

determine whether the turnover and retrofit pages are executed. If the NOx compliance flag is set to false, then OSM will attempt to turnover vehicles until the fleet does meet the NOx fleet target. If the PM compliance flag is set to false, then OSM will attempt to retrofit vehicles until the fleet does meet the PM fleet target.

OSM will do all turnover before it begins retrofitting, this is because turnover will reduce both NOx and PM, whereas retrofits (assuming retrofits do not control NOx) will only reduce PM thereby reducing the total retrofits and the associated costs to the fleet owner.

d. set_turnover_rate_and veh_pool, do_turnover.php

OSM assumes that a fleet will turn over vehicles under both the baseline and scenario runs, however unlike the base run which turns over to keep the fleet age constant, the additional turnover under the scenario run is in response to the regulatory requirements. Under the regulation a fleet must either meet the fleet average or meet a BACT requirement of turning over a certain percent of the total horsepower; this turnover is referred to as forced turnover. (A fleet may also run out of eligible vehicles before meeting the fleet average or BACT in which case it is compliant without further action for that regulatory year.) The forced turnover is calculated using Equation 12.

Equation 12 $ForcedTurnover = TotalHP * ForcedTurnoverRate$

Where ForcedTurnoverRate is the NOx BACT rate.

OSM excludes vehicles that are exempt under the regulation from the pool of vehicles subject to turnover; e.g., vehicles less than 10 years old, Tier 4 vehicles and before 2013, Tier 1 or newer vehicles. From the pool of eligible vehicles, whereas in the base run OSM will rank vehicles by relative age, in the scenario run OSM will rank them by Tier and then by relative age, where relative age is calculated, as in the base turnover, Equation 7.

Since the regulation provides exemptions and credits based on modifying the fleet's Tier composition, it is assumed that the fleets will preferentially replace older Tiered vehicles and then within that tier, the oldest by relative age. From the vehicle ranking, OSM will select the lowest tier and relative oldest vehicle for turnover. No vehicles were modeled as repowers, this is a cost conservative estimate since repowers would be less costly that a replacement.

The do_turnover.php page records into the osm_vehicle_scenario table the regulatory year the vehicle is turned over. Also, the do_turnover.php page inserts new tier, PM and NOx indexes into the osm_vehicle_scenario table looked up from zengine_index table, then recalculates the fleet NOx average and resets the compliance flags after each engine is turned over. If the fleet still does not meet the fleet NOx targets and there are still vehicles eligible for turnover, then the page repeats the turnover process until the fleet either meet the fleet NOx target or the fleet hits the maximum required turnover under BACT, or there are no more vehicles eligible for turnover or repower.

In instances where a fleet turns over more horsepower than is required, OSM will accumulate and track turnover carryover for the fleet. Carryover will accrue when the last vehicle required to be turned over does not match exactly the maximum horsepower required to be turned over, i.e., the 8 or 10 percent or when a fleet for other business purposes turns over more than required. The turnover carryover can be used in subsequent years to meet the maximum horsepower required to be turned over.

Any credit accrued due to early replacement, repowers, turnover, double NOx retrofit, and permanent low use, or reduced activity provisions are added to the turnover carryover in 2010. The reduced activity credits expire in 2012, the other credits continue until exhausted.

e. set_retrofit_rate_and veh_pool, do_retrofit.php

OSM assumes that fleets will not retrofit any vehicles under the baseline run nor when a fleet meets the PM target. Retrofits are assumed to be driven solely by the regulation; i.e., OSM assumes the fleet owner has no motivation to retrofit in the absence of the regulation. Hence, unlike the turnover rate, the retrofit rate is fixed at the PM BACT rate. OSM will retrofit eligible vehicles as long as a fleet does not meet the PM target or if it has not yet retrofit at least the percent of its fleet horsepower required under PM BACT.

OSM excludes from retrofit vehicles that are exempt under the regulation from the pool of vehicles subject to retrofit; i.e., vehicles less than five years old, tier 4s, and vehicles that have already been retrofit in the last ten years. After ten years OSM assumes that retrofitted vehicles will have the existing retrofit replaced with a similar device. This does not change the emissions associated with that vehicle but does add the cost of the new retrofit device in that regulatory year.

OSM utilizes the emissions controls associated with specific retrofit models for the data retrieved from DOORS. For example, if a vehicle has installed a Cleaire Longview DPF which is a Level 3 device with 25 percent NOx control, OSM will use a 0.75 NOx retrofit factor and a 0.15 PM retrofit factor when calculating the emissions associated with the vehicle. For all new retrofits installed under the scenario run the devices are assumed to be Level 3s that achieve at least 85% PM control and no NOx control.

Installing retrofits will change the fleet composition over time compared to no retrofits by essentially blocking retrofitted vehicles from turning over; i.e., vehicles have a six year exemption from turnover from the time a vehicle is first retrofit.

The do_retrofit.php page inserts into the osm_vehicle_scenario table a PM factor in a field in the osm_vehicle_scenario table which reduces the PM attributed to the vehicle and records the regulatory year the vehicle is retrofit. The do_retrofit.php page then recalculates the fleet PM average and resets the compliance flags after each engine is retrofit. If the fleet still does not meet the fleet PM targets and there are still vehicles

eligible for retrofit, then the page repeats the retrofit process until the fleet either meet the fleet PM target, hits the maximum required retrofits, or there are no more vehicles eligible for retrofit.

Retrofit carryover, similar to turnover carryover, accumulates as the last vehicle to be retrofit exceeds the maximum required or due to business practices that retrofit more horsepower than is required. The retrofit carryover for medium and large fleets is typically negligible. On the other hand, retrofit carryover may be significant for small fleets, and indeed, the carryover provisions were developed to accommodate the needs of the small fleets.

For example, if a small fleet with just three older vehicles, all at 333 horsepower, did not meet the PM target, then in 2015 the fleet would be required to retrofit one vehicle representing approximately 33% of the fleet horsepower accruing 13% retrofit carryover in excess of the 20% required. If the fleet does not meet the PM fleet target in 2016 it will have to once again retrofit since the retrofit carryover not meet the required 20% maximum retrofit. After retrofitting a second engine in 2016, the fleet would have accrued 26% retrofit carryover credit which could be used in 2017 in lieu of meeting the PM fleet target. Although this example is not likely, it is provided to illustrate how OSM would utilize retrofit carryover.

f. write_fleet_summary.php, move_fleet_to_base_scenario.php

All of the preceding turnover and retrofit would be modeled for a given regulatory year on multiple vehicles for a specific fleet. All of the vehicle data would be recorded in the osm_vehicle table.

After OSM repeats the page for turnover until the fleet meets the NOx fleet average, or the fleet hits its maximum NOx BACT required, or there are no eligible engines OSM transfers control to the retrofit page. After OSM repeats the page for retrofit until the fleet meets the PM fleet average, or the fleet hits its maximum required PM BACT, or there are no eligible engines OSM transfer control to the write_fleet_summary.php page at the end of each year simulated.

The write_fleet_summary.php page records a snapshot of the entire fleet for a given regulatory year. OSM records for the regulatory year the final NOx and PM fleet averages, the percent turn over and retrofit, and any carryover. OSM will iterate through all of the regulatory years for a selected fleet through the selected end year up to 2030. Then, the move_fleet_to_base_scenario.php page will move all of the fleet data stored in osm_vehicle into either the osm_vehicle_base or osm_vehicle_scenario tables depending on whether it is a base or scenario run (the run value).

B. PHP Code

Note: The osm.php file is the calling file for all other osm1085 files and is therefore listed as the first in this document; all other php files are listed in alphabetical order; each file is separated from the next file by a line as shown here:

```
<?php  #osm

require_once ('connect.php');

include("doors_functions_1085.php");
include("fleet_stats_2010_1085.php");

$start_time = date("D M-d g:i A");
include ("initialize_run.php");

if (isset($_POST['run_sim'])
  or isset($_POST['run_sim1']))
{
   mysqli_query ($dbc4, "TRUNCATE TABLE osm_vehicle_base");
   mysqli_query ($dbc4, "TRUNCATE TABLE osm_vehicle_scenario");
   include ("run_sim.php");

   $query = 'TRUNCATE TABLE osm_fleet_base_costs_cumulative';
   $result = mysqli_query($dbc4, $query);

   $query = 'TRUNCATE TABLE osm_fleet_scenario_costs_cumulative';
   $result = mysqli_query($dbc4, $query);

   include ("costs.php");
   $message = "Costs Calculated.";
}

?>

<form action="<?php echo $_SERVER['PHP_SELF']; ?>" method="post">

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   <TR><TD><center><BR>

<?php
if (isset($_POST['run_sim'])
  or isset($_POST['run_sim1']))
{
 //  include ("show_costs_totals.php");
```

```
}
?>

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      <TR><TD>

   <TABLE BORDER="0" cellpadding="2" CELLSPACING="1" bgcolor="#D0D0D0">
      <TR><TD colspan="4" bgcolor="#FFE7C6">
      <fieldset><CENTER><H2>Off-road Simulation Model (OSM)</H2>
      </TD></TR>
      <TR><TD colspan="2">

      <TABLE BORDER="0" cellpadding="2" CELLSPACING="1"  width="100%"
bgcolor="#FFFFC6">
      <TR><TD colspan="3"><BR><CENTER>
            <INPUT TYPE="SUBMIT" NAME="run_sim" VALUE="Run regulation
simulation"> <BR><BR>
            <INPUT TYPE="SUBMIT" NAME="run_sim1" VALUE="Run proposed
alternative"> <BR><BR>
<?php

   $color = "BLUE";
   if(isset($_SESSION['color']) and $_SESSION['color']=="RED") $color="BLUE";
   if(isset($_SESSION['color']) and $_SESSION['color']=="BLUE") $color="RED";
   $_SESSION['color']=$color;

   echo '<FONT COLOR="' . $color . '"><B>';
   echo $message;
   echo '</B></FONT><BR><BR><BR>';

   echo 'start - ' . $start_time . '<BR>'
        . 'end - ' . date("D M-d g:i A") . '<BR>';

?>
       </TD></TR></TABLE>
      </TD></TABLE></TABLE>
  <BR><BR> </TD></TR></TABLE>

</form>
```

```
<?php  # calculate_early_credit


$expiring_nox_credit_begin =  $reduced_activity_credit;
```

```
$turnover_carryover_begin = $retirement_2006_2010_credit
                          + $early_replacement_credit
                          + $repower_hp
                          + $turnover09_10
                          + $double_nox_retrofit_credit
                          + $permanent_low_use_nox_credit;
$free_2014 = false;

if(isset($_POST['run_sim1']))
{
   $turnover_carryover_begin = $repower_hp
                             + $double_nox_retrofit_credit
                             + $permanent_low_use_nox_credit;

   if($early_replacement_credit
      + $retirement_2006_2010_credit
       + $repower_hp
       + $turnover09_10
       > $nox_bact_hp)
   {
      $free_2014=true;
   }
}

$expiring_pm_credit_begin = $reduced_activity_credit
                          + $tier0_retirement_vdecs_credit;

$retrofit_carryover_begin = $retirement_2006_2010_credit
                          + $double_retrofit_credit
                          + $single_retrofit_credit;

$turnover_carryover = $turnover_carryover_begin;
$retrofit_carryover = $retrofit_carryover_begin;

$expiring_nox_credit = $expiring_nox_credit_begin;
$expiring_pm_credit  = $expiring_pm_credit_begin;

?>
```

```
<?php #connect

date_default_timezone_set('America/Los_Angeles');

DEFINE ('DB_HOST', 'localhost');
```

```
DEFINE ('DB_USER', 'puser');
DEFINE ('DB_PASSWORD', 'password');
DEFINE ('DB_NAME', 'doors1085');

$dbc = mysqli_connect (DB_HOST, DB_USER, DB_PASSWORD, DB_NAME)
            OR die(mysqli_connect_error());

DEFINE ('DB_HOST4', 'localhost');
DEFINE ('DB_USER4', 'puser');
DEFINE ('DB_PASSWORD4', 'password');
DEFINE ('DB_NAME4', 'osm1085');

$dbc4 = mysqli_connect (DB_HOST4, DB_USER4, DB_PASSWORD4, DB_NAME4)
      OR die(mysqli_connect_error());

?>
```

```
<?php # costs

$query = "UPDATE ztier4_premium_cost
      SET tier4_premium_cost = '$cost_tier4_premium_50'
      WHERE min_hp = 25
        AND max_hp = 50";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE ztier4_premium_cost
      SET tier4_premium_cost = '$cost_tier4_premium_175'
      WHERE min_hp = 50
        AND max_hp = 175";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE ztier4_premium_cost
      SET tier4_premium_cost = '$cost_tier4_premium_400'
      WHERE min_hp = 175
        AND max_hp = 400";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE ztier4_premium_cost
      SET tier4_premium_cost = '$cost_tier4_premium_400_plus'
      WHERE min_hp = 400
        AND max_hp = 9999";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';


$query = "UPDATE zretrofit_cost
```

```
        SET retrofit_cost = '$cost_retrofit_50'
        WHERE min_hp = 25
          AND max_hp = 50";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE zretrofit_cost
        SET retrofit_cost = '$cost_retrofit_125'
        WHERE min_hp = 50
          AND max_hp = 125";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE zretrofit_cost
        SET retrofit_cost = '$cost_retrofit_175'
        WHERE min_hp = 125
          AND max_hp = 175";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE zretrofit_cost
        SET retrofit_cost = '$cost_retrofit_300'
        WHERE min_hp = 175
          AND max_hp = 300";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE zretrofit_cost
        SET retrofit_cost = '$cost_retrofit_400'
        WHERE min_hp = 300
          AND max_hp = 400";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE zretrofit_cost
        SET retrofit_cost = '$cost_retrofit_600'
        WHERE min_hp = 400
          AND max_hp = 600";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query = "UPDATE zretrofit_cost
        SET retrofit_cost = '$cost_retrofit_600_plus'
        WHERE min_hp = 600
          AND max_hp = 9999";
if(!$result = @mysqli_query($dbc4, $query)) echo 'updatet';

$query0 = "SELECT doors_id, count(*)
          FROM `osm_vehicle_base`
          WHERE `calendar_year` = 2010
          AND doors_id != 2369
          AND doors_id != 1972
```

```
        AND doors_id != 1560
        GROUP BY doors_id
        ORDER BY count(*), doors_id";
$result0 = @mysqli_query($dbc4, $query0);

while ($row0 = mysqli_fetch_assoc($result0))
{
   $doors_id = $row0['doors_id'];

   $repower_cost = 0;
   $price_new = 0;
   $price_life = 0;
   $price_old = 0;
   $turnover_cost = 0;
   $full_turnover_cost = 0;

   $query = "TRUNCATE TABLE osm_vehicle_base_costs";
   if(!$result = @mysqli_query($dbc4, $query)) echo 'drop';

   $query = "INSERT INTO osm_vehicle_base_costs
         (doors_id, ein, calendar_year, veh_type, veh_model_year,
          eng_model_year, eng_hp, hp_max, calendar_year_replace,
          calendar_year_retrofit, veh_average_age,
          eng_index_tier)

         SELECT
          doors_id, ein, calendar_year, veh_type, veh_model_year,
          eng_model_year, eng_hp, hp_max, calendar_year_replace,
          calendar_year_retrofit, veh_average_age,
          eng_index_tier

         FROM osm_vehicle_base
         WHERE doors_id = $doors_id";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'insert';

  $query = "UPDATE osm_vehicle_base_costs
         INNER JOIN $vehicle_cost_file_name
          ON (osm_vehicle_base_costs.veh_type = $vehicle_cost_file_name.veh_type)
           AND (osm_vehicle_base_costs.calendar_year
               - osm_vehicle_base_costs.veh_model_year =
$vehicle_cost_file_name.veh_age)
         INNER JOIN ztier4_premium_cost
          ON (osm_vehicle_base_costs.eng_hp > min_hp
          AND osm_vehicle_base_costs.eng_hp <= max_hp)
         SET osm_vehicle_base_costs.price_new =
         IF(eng_index_tier>'T3',
```

```
            ($vehicle_cost_file_name.veh_replacement_cost
                                    + tier4_premium_cost/eng_hp),
            ($vehicle_cost_file_name.veh_replacement_cost))
        WHERE osm_vehicle_base_costs.calendar_year =
osm_vehicle_base_costs.calendar_year_replace";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'update1';

  $query = "UPDATE osm_vehicle_base_costs
        INNER JOIN zvehicle_cost
         ON (osm_vehicle_base_costs.veh_type = zvehicle_cost.veh_type)

        INNER JOIN osm_vehicle_base_costs as prior_year
         ON (osm_vehicle_base_costs.ein = prior_year.ein
           AND osm_vehicle_base_costs.calendar_year-1 =
prior_year.calendar_year)

        SET osm_vehicle_base_costs.price_old = veh_replacement_cost
        WHERE osm_vehicle_base_costs.calendar_year =
osm_vehicle_base_costs.calendar_year_replace
          AND osm_vehicle_base_costs.calendar_year - prior_year.veh_model_year
= veh_age";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'update3';

  $query = "UPDATE osm_vehicle_base_costs
        SET  cost_full_turnover = (price_new + '$cost_transport' - price_old) * eng_hp
        WHERE calendar_year = calendar_year_replace";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'update5';

  $query = "TRUNCATE TABLE osm_fleet_base_costs";
  $result = @mysqli_query($dbc4, $query);

  $query = "INSERT INTO osm_fleet_base_costs(doors_id, calendar_year)
              (SELECT DISTINCT doors_id, calendar_year
               FROM osm_vehicle_base_costs)";
  $result = @mysqli_query($dbc4, $query);

  $query = "SELECT doors_id, calendar_year,
             SUM(cost_full_turnover) AS cost_annual_full_turnover,
             SUM(cost_retrofit)     AS cost_annual_retrofit
        FROM osm_vehicle_base_costs
        GROUP BY doors_id, calendar_year";
  $result = @mysqli_query($dbc4, $query);

  while($row=mysqli_fetch_assoc($result))
  {
    $doors_id              = $row['doors_id'];
```

```
    $calendar_year           = $row['calendar_year'];
    $cost_annual_full_turnover = $row['cost_annual_full_turnover'];
    $cost_annual_retrofit     = $row['cost_annual_retrofit'];

    if($cost_annual_full_turnover===NULL)  $cost_annual_full_turnover=0;
    if($cost_annual_retrofit===NULL)      $cost_annual_retrofit=0;

    $discount = pow((1+$discount_rate/100), -(integer)($calendar_year -
$discount_year));

    $cost_annual_full = $cost_annual_full_turnover
                + $cost_annual_retrofit;

    $cost_annual_full_pv = $cost_annual_full * $discount;

  $cost_annual_full_turnover  = (integer)$cost_annual_full_turnover;
  $cost_annual_retrofit      = (integer)$cost_annual_retrofit;
  $cost_annual_full          = (integer)$cost_annual_full;
  $cost_annual_full_pv       = (integer)$cost_annual_full_pv;

    $query2 = "UPDATE osm_fleet_base_costs
          SET cost_annual_full_turnover  = '$cost_annual_full_turnover',
            cost_annual_retrofit      = '$cost_annual_retrofit',
            cost_annual_full          = '$cost_annual_full',
            cost_annual_full_pv       = '$cost_annual_full_pv'
          WHERE doors_id = '$doors_id'
            AND calendar_year = '$calendar_year'";
    if(!$result2 = @mysqli_query($dbc4, $query2)) echo 'update6';
  }

  $query = "TRUNCATE TABLE osm_vehicle_scenario_costs";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'drop';

  $query = "INSERT INTO osm_vehicle_scenario_costs
        (doors_id, ein, calendar_year, veh_type, veh_model_year,
         eng_model_year, eng_hp, hp_max, calendar_year_replace,
         calendar_year_retrofit, veh_average_age,
         eng_index_tier)

        SELECT
         doors_id, ein, calendar_year, veh_type, veh_model_year,
         eng_model_year, eng_hp, hp_max, calendar_year_replace,
         calendar_year_retrofit, veh_average_age,
         eng_index_tier

        FROM osm_vehicle_scenario
```

```
        WHERE doors_id = $doors_id";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'insert';

  $query = "UPDATE osm_vehicle_scenario_costs
        INNER JOIN $vehicle_cost_file_name
          ON (osm_vehicle_scenario_costs.veh_type =
$vehicle_cost_file_name.veh_type)
            AND (osm_vehicle_scenario_costs.calendar_year
                - osm_vehicle_scenario_costs.veh_model_year =
$vehicle_cost_file_name.veh_age)
        INNER JOIN ztier4_premium_cost
          ON (osm_vehicle_scenario_costs.eng_hp > min_hp
          AND osm_vehicle_scenario_costs.eng_hp <= max_hp)
        SET osm_vehicle_scenario_costs.price_new =
        IF(eng_index_tier>'T3',
            ($vehicle_cost_file_name.veh_replacement_cost
                                    + tier4_premium_cost/eng_hp),
            ($vehicle_cost_file_name.veh_replacement_cost))
        WHERE osm_vehicle_scenario_costs.calendar_year =
osm_vehicle_scenario_costs.calendar_year_replace";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'update1';

  $query = "UPDATE osm_vehicle_scenario_costs
        INNER JOIN zvehicle_cost
          ON (osm_vehicle_scenario_costs.veh_type = zvehicle_cost.veh_type)

        INNER JOIN osm_vehicle_scenario_costs as prior_year
          ON (osm_vehicle_scenario_costs.ein = prior_year.ein
            AND osm_vehicle_scenario_costs.calendar_year-1 =
prior_year.calendar_year)

        SET osm_vehicle_scenario_costs.price_old = veh_replacement_cost
        WHERE osm_vehicle_scenario_costs.calendar_year =
osm_vehicle_scenario_costs.calendar_year_replace
          AND osm_vehicle_scenario_costs.calendar_year -
prior_year.veh_model_year = veh_age";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'update3';

  $query = "UPDATE osm_vehicle_scenario_costs
        SET  cost_full_turnover = (price_new + '$cost_transport' - price_old) * eng_hp
        WHERE calendar_year = calendar_year_replace";
  if(!$result = @mysqli_query($dbc4, $query)) echo 'update5';

  $query = "UPDATE osm_vehicle_scenario_costs, zretrofit_cost
        SET  osm_vehicle_scenario_costs.cost_retrofit = zretrofit_cost.retrofit_cost
        WHERE calendar_year = calendar_year_retrofit
```

```
            AND osm_vehicle_scenario_costs.eng_hp > zretrofit_cost.min_hp
            AND osm_vehicle_scenario_costs.eng_hp < zretrofit_cost.max_hp";
    if(!$result = @mysqli_query($dbc4, $query)) echo 'update5';

    $query = "UPDATE osm_vehicle_scenario_costs, zretrofit_cost
          SET  osm_vehicle_scenario_costs.cost_retrofit = zretrofit_cost.retrofit_cost
          WHERE calendar_year = calendar_year_retrofit+10
            AND osm_vehicle_scenario_costs.eng_hp > zretrofit_cost.min_hp
            AND osm_vehicle_scenario_costs.eng_hp < zretrofit_cost.max_hp";
    if(!$result = @mysqli_query($dbc4, $query)) echo 'update5';

    $query = "TRUNCATE TABLE osm_fleet_scenario_costs";
    $result = @mysqli_query($dbc4, $query);

    $query = "INSERT INTO osm_fleet_scenario_costs(doors_id, calendar_year)
                  (SELECT DISTINCT doors_id, calendar_year
                    FROM osm_vehicle_scenario_costs)";
    $result = @mysqli_query($dbc4, $query);

    $query = "SELECT doors_id, calendar_year,
                  SUM(cost_full_turnover) AS cost_annual_full_turnover,
                  SUM(cost_retrofit)      AS cost_annual_retrofit
          FROM osm_vehicle_scenario_costs
          GROUP BY doors_id, calendar_year";
    $result = @mysqli_query($dbc4, $query);

    while($row=mysqli_fetch_assoc($result))
    {
       $doors_id               = $row['doors_id'];
       $calendar_year          = $row['calendar_year'];
       $cost_annual_full_turnover = $row['cost_annual_full_turnover'];
       $cost_annual_retrofit      = $row['cost_annual_retrofit'];

       if($cost_annual_full_turnover===NULL)  $cost_annual_full_turnover=0;
       if($cost_annual_retrofit===NULL)       $cost_annual_retrofit=0;

       $discount = pow((1+$discount_rate/100), -(integer)($calendar_year -
$discount_year));

       $cost_annual_full = $cost_annual_full_turnover
                    + $cost_annual_retrofit;

       $cost_annual_full_pv = $cost_annual_full * $discount;

    $cost_annual_full_turnover  = (integer)$cost_annual_full_turnover;
    $cost_annual_retrofit       = (integer)$cost_annual_retrofit;
```

```
    $cost_annual_full          = (integer)$cost_annual_full;
    $cost_annual_full_pv       = (integer)$cost_annual_full_pv;

      $query2 = "UPDATE osm_fleet_scenario_costs
              SET cost_annual_full_turnover  = '$cost_annual_full_turnover',
                  cost_annual_retrofit       = '$cost_annual_retrofit',
                  cost_annual_full           = '$cost_annual_full',
                  cost_annual_full_pv        = '$cost_annual_full_pv'
              WHERE doors_id = '$doors_id'
                AND calendar_year = '$calendar_year'";
      if(!$result2 = @mysqli_query($dbc4, $query2)) echo 'update6';
    }

    $query = 'REPLACE INTO osm_fleet_base_costs_cumulative
          SELECT *
          FROM osm_fleet_base_costs';
    $result = mysqli_query($dbc4, $query);

    $query = 'REPLACE INTO osm_fleet_scenario_costs_cumulative
          SELECT *
          FROM osm_fleet_scenario_costs';
    $result = mysqli_query($dbc4, $query);
}

?>
```

```
<?php  #create_fleet

    $doors_id_arr = array();
    $_SESSION['ren_name'] = 'zzz';
    $doors_id_arr[(integer)$doors_id] = $_SESSION['ren_name'];
    $_SESSION['doors_id_arr'] = $doors_id_arr;

    get_fleet_stats();

    $query = "SELECT *
          FROM temp_2010
          WHERE date_veh_sale IS NULL
            AND eng_hp >= 25";
    $result = @mysqli_query ($dbc, $query);

    while ($row = mysqli_fetch_assoc($result))
    {
      $ren_size      = $row['ren_size'];
      $ein           = $row['ein'];
```

```
    $veh_type      = $row['veh_type'];
    $veh_model_year = $row['veh_model_year'];
    $eng_model_year = $row['eng_model_year'];
    $eng_hp        = $row['eng_hp'];
    $vdecs_pm      = $row['vdecs_pm'];
    $vdecs_nox     = $row['vdecs_nox'];
    $low_use       = $row['low_use'];

    if (isset($row['date_vdecs_purchase']))
    {
       $date_vdecs_purchase = $row['date_vdecs_purchase'];
       $calendar_year_retrofit = substr($date_vdecs_purchase, 0, 4);
    }
    else
    {
       $calendar_year_retrofit = '0000';
    }

    $query4 = "INSERT INTO osm_vehicle (ren_size,
                doors_id, calendar_year, ein, veh_type,
                veh_model_year, eng_model_year, eng_hp, low_use,
                calendar_year_retrofit, vdecs_pm, vdecs_nox)
             VALUES ('$ren_size',
                '$doors_id', '2010', '$ein', '$veh_type',
                '$veh_model_year', '$eng_model_year', '$eng_hp', '$low_use',
                '$calendar_year_retrofit', '$vdecs_pm', '$vdecs_nox')";
              $result4 = @mysqli_query ($dbc4, $query4);
}

$query4 = "UPDATE osm_vehicle
        SET osm_vehicle.hp_max = 50
        WHERE osm_vehicle.eng_hp  >= 25
          AND osm_vehicle.eng_hp  <= 50";
             $result4 = @mysqli_query ($dbc4, $query4);

$query4 = "UPDATE osm_vehicle
        SET osm_vehicle.hp_max = 120
        WHERE osm_vehicle.eng_hp  > 50
          AND osm_vehicle.eng_hp  <= 120";
             $result4 = @mysqli_query ($dbc4, $query4);

$query4 = "UPDATE osm_vehicle
        SET osm_vehicle.hp_max = 175
        WHERE osm_vehicle.eng_hp  > 120
          AND osm_vehicle.eng_hp  <= 175";
             $result4 = @mysqli_query ($dbc4, $query4);
```

```
   $query4 = "UPDATE osm_vehicle
          SET osm_vehicle.hp_max = 250
          WHERE osm_vehicle.eng_hp  > 175
            AND osm_vehicle.eng_hp  <= 250";
               $result4 = @mysqli_query ($dbc4, $query4);

   $query4 = "UPDATE osm_vehicle
          SET osm_vehicle.hp_max = 500
          WHERE osm_vehicle.eng_hp  > 250
            AND osm_vehicle.eng_hp  <= 500";
               $result4 = @mysqli_query ($dbc4, $query4);

   $query4 = "UPDATE osm_vehicle
          SET osm_vehicle.hp_max = 750
          WHERE osm_vehicle.eng_hp  > 500
            AND osm_vehicle.eng_hp  <= 750";
               $result4 = @mysqli_query ($dbc4, $query4);

   $query4 = "UPDATE osm_vehicle
          SET osm_vehicle.hp_max = 1000
          WHERE osm_vehicle.eng_hp  > 750
            AND osm_vehicle.eng_hp  <= 1000";
               $result4 = @mysqli_query ($dbc4, $query4);

   $query4 = "UPDATE osm_vehicle
          SET osm_vehicle.hp_max = 9999
          WHERE osm_vehicle.eng_hp  > 1000
            AND osm_vehicle.eng_hp  <= 9999";
               $result4 = @mysqli_query ($dbc4, $query4);

?>
```

```
<?php  #create_new_calendar_year

$calendar_year_minus1 = $calendar_year-1;

$query = "SELECT *
       FROM osm_vehicle
       WHERE calendar_year = $calendar_year_minus1";
$result= @mysqli_query($dbc4, $query);

while($row = mysqli_fetch_assoc($result))
{
   $ren_size            = $row['ren_size'];
```

```
    $ein                = $row['ein'];
    $veh_type           = $row['veh_type'];
    $veh_model_year     = $row['veh_model_year'];
    $eng_model_year     = $row['eng_model_year'];
    $eng_hp             = $row['eng_hp'];
    $hp_max             = $row['hp_max'];
    $low_use            = $row['low_use'];
    $calendar_year_replace  = $row['calendar_year_replace'];
    $calendar_year_retrofit = $row['calendar_year_retrofit'];
    $vdecs_nox          = $row['vdecs_nox'];
    $vdecs_pm           = $row['vdecs_pm'];
    $veh_average_age    = $row['veh_average_age'];
    $veh_relative_age   = ($calendar_year - $veh_model_year) /$veh_average_age;
    $eng_index_tier     = $row['eng_index_tier'];
    $eng_index_nox      = $row['eng_index_nox'];
    $eng_index_pm       = $row['eng_index_pm'];


    $query2= "INSERT INTO osm_vehicle (ren_size,
                doors_id, calendar_year, ein, veh_type,
                veh_model_year, eng_model_year, eng_hp, hp_max, low_use,
                calendar_year_replace,
                calendar_year_retrofit, vdecs_nox, vdecs_pm,
                veh_average_age, veh_relative_age, eng_index_tier,
                eng_index_nox, eng_index_pm)
            VALUES ('$ren_size',
                '$doors_id', '$calendar_year', '$ein', '$veh_type',
                '$veh_model_year', '$eng_model_year', '$eng_hp', '$hp_max', '$low_use',
                '$calendar_year_replace',
                '$calendar_year_retrofit', '$vdecs_nox', '$vdecs_pm',
                '$veh_average_age', '$veh_relative_age', '$eng_index_tier',
                '$eng_index_nox', '$eng_index_pm')";

                $result2 = @mysqli_query ($dbc4, $query2);
}

include("insert_fleet_averages_targets.php");

?>
```

```
<?php  #do_retrofit

while($row = mysqli_fetch_assoc($result)
      and !$meets_fleet_target_pm
      and $retrofit_actual < $retrofit_needed)
```

```
{
   if ($calendar_year<=$end_year_double_retrofit)
   {
      $retrofit_actual += $row['eng_hp']*2;
   }
   else
   {
      $retrofit_actual += $row['eng_hp'];
   }
   $ein = $row['ein'];

   $query2 = "UPDATE osm_vehicle
         SET calendar_year_retrofit  = '$calendar_year',
            vdecs_pm      = 0.15
          WHERE ((calendar_year = '$calendar_year')
            AND (doors_id = '$doors_id')
            AND (ein = '$ein'))";
               if(!$result2 = @mysqli_query ($dbc4, $query2)) $message .= '_264';

   include("get_fleet_average.php");
   include("set_nox_pm_compliance_flags.php");
}

if(!$row = mysqli_fetch_assoc($result))
{
   $retrofit_pool_empty = 'Yes';
}

if($retrofit_actual>0)
{
   if($meets_fleet_target_nox)
   {
      $retrofit_carryover = $retrofit_carryover_begin
                  +max($retrofit_actual
                     + $turnover_tier4
                     - $retrofit_rate_forced*$total_hp , 0);
   }
   else
   {
      $retrofit_carryover = max($retrofit_carryover +
                     $retrofit_actual - $retrofit_needed, 0);
   }

   $retrofit_pct = $retrofit_actual / $total_hp * 100;
}
```

```
?>
```

```
<?php  #do_turnover

if(!$result = @mysqli_query ($dbc4, $query_fleet)) $message .= '_59';

while($row = mysqli_fetch_assoc($result)
    and (!$meets_fleet_target_nox
        and $turnover_actual < $turnover_needed
        or ($turnover_only
           and !$meets_fleet_target_pm
           and $turnover_actual < $retrofit_needed)))
{
   $ein = $row['ein'];
   $veh_type = $row['veh_type'];

   $query4 = "SELECT ROUND($replacement_vehicle_age_factor * veh_average_age)
as replacement_vehicle_age
           FROM zvehicle_average_age
          WHERE veh_type = '$veh_type'";
       $result4 = @mysqli_query ($dbc4, $query4);

   $row4 = mysqli_fetch_assoc($result4);
   $replacement_vehicle_age= $row4['replacement_vehicle_age'];

   $model_year = $calendar_year-$replacement_vehicle_age;

   if($run==1)
   {
      $model_year = max($model_year, 1999);
   }

   $replacement_model_age = $calendar_year-$model_year;

   $query2 = "UPDATE osm_vehicle
         SET calendar_year_replace   = '$calendar_year',
            veh_model_year         = '$model_year',
            eng_model_year         = '$model_year',
            veh_relative_age       = '$replacement_model_age'/veh_average_age,
            vdecs_pm               = '1'
          WHERE  doors_id       = '$doors_id'
            AND calendar_year  = '$calendar_year'
            AND ein            = '$ein'";
              if(!$result2 = @mysqli_query ($dbc4, $query2)) $message .= '.';
```

```
    include("insert_eng_index_target.php");

    include("get_fleet_average.php");
    include("set_nox_pm_compliance_flags.php");

    $turnover_actual += $row['eng_hp'];
}

if(!$row = mysqli_fetch_assoc($result))
{
    $turnover_pool_empty = 'Yes';
}

if($turnover_actual >0)
{
    if($meets_fleet_target_nox)
    {
        $turnover_carryover = $turnover_carryover_begin
                    + max($turnover_actual + $turnover_actual_base
                        - $turnover_rate_forced*$total_hp, 0);
    }
    else
    {
        $turnover_carryover = max($turnover_carryover_begin
                        + $turnover_actual + $turnover_actual_base
                        - $turnover_rate_forced*$total_hp, 0);
    }

    $turnover_pct = ($turnover_actual + $turnover_actual_base)/ $total_hp;
}


?>
```

```
<?php  #do_turnover_base

$cy_year = 'cy_' . $calendar_year;

if($economic_recovery=='na')
{
    $fleet_age_adjusted=$fleet_age_2010;
}
else
{
    $query0 = "SELECT SUM(eng_hp*(calendar_year-
```

```
                    IF(eng_model_year=2011 AND calendar_year=2010,
                                2010,eng_model_year))
                                * $cy_year)
                            / SUM(eng_hp)
                        AS fleet_age_adjusted
            FROM osm_vehicle
            INNER JOIN zequipment_class
              USING (veh_type)
            INNER JOIN zeconomic_recovery_factor
              USING (equipment_class)
            WHERE doors_id = $doors_id
             AND calendar_year = 2010
             AND economic_recovery = '$economic_recovery'
             AND low_use = 0";

   $result0 = @mysqli_query ($dbc4, $query0);
   $row0 = mysqli_fetch_assoc($result0);

   $fleet_age_adjusted = $row0['fleet_age_adjusted'];
}

$query_fleet = "SELECT ein, eng_hp, veh_type, low_use
            FROM osm_vehicle
            WHERE doors_id = '$doors_id'
              AND calendar_year = '$calendar_year'
              AND '$calendar_year' - calendar_year_retrofit >= 6
              AND low_use = 0
            ORDER BY veh_relative_age DESC, eng_index_tier, ein";

if(!$result = @mysqli_query ($dbc4, $query_fleet)) $message .= '_59';

while($row = mysqli_fetch_assoc($result)
    and ($fleet_age > $fleet_age_adjusted + $fleet_age_delta))
{
   $turnover_actual_base += $row['eng_hp'];

   $ein = $row['ein'];
   $veh_type = $row['veh_type'];
   $query4 = "SELECT ROUND($replacement_vehicle_age_factor * veh_average_age)
as replacement_vehicle_age
           FROM zvehicle_average_age
          WHERE veh_type = '$veh_type'";
       $result4 = @mysqli_query ($dbc4, $query4);

   $row4 = mysqli_fetch_assoc($result4);
   $replacement_vehicle_age= $row4['replacement_vehicle_age'];
```

```
   $model_year = $calendar_year-$replacement_vehicle_age;

   if($run==1)
   {
      $model_year = max($model_year, 1999);
   }

   $replacement_model_age = $calendar_year-$model_year;

   $query2 = "UPDATE osm_vehicle
         SET calendar_year_replace   = '$calendar_year',
            veh_model_year         = '$model_year',
            eng_model_year         = '$model_year',
            low_use              = '0',
            veh_relative_age       = '$replacement_model_age'/veh_average_age,
            vdecs_pm             = '1'
          WHERE  doors_id       = '$doors_id'
            AND calendar_year  = '$calendar_year'
            AND ein           = '$ein'";
               if(!$result2 = @mysqli_query ($dbc4, $query2)) $message .= '
do_turnover_base line 72 ';

   include("insert_eng_index_target.php");

   include("get_fleet_info.php");
}

if(!$row = mysqli_fetch_assoc($result))
{
   $turnover_pool_empty = 'Yes';
}


if($turnover_actual_base >0)
{
   if($meets_fleet_target_nox)
   {
      $turnover_carryover = $turnover_carryover_begin
                  + max($turnover_actual_base
                     - $turnover_rate_forced*$total_hp, 0);

   }
   else
   {
      $turnover_carryover = max($turnover_carryover_begin
```

```
                    + $turnover_actual_base
                    - $turnover_rate_forced*$total_hp, 0);
  }

  $turnover_pct = $turnover_actual_base/ $total_hp;
}


if($run == 0
 or ($run == 1 and ($fleet_target_nox == 0
          or $meets_fleet_target_nox
          or $turnover_rate_forced == 0)))
{
  if($economic_recovery=='na')
  {
    $fleet_age_delta +=  $fleet_age_2010 - $fleet_age;
  }
  else
  {
    $fleet_age_delta +=  $fleet_age_adjusted - $fleet_age;
  }
}

?>
```

```
<?php #doors_functions_1085

//=================================================================
============
function missing_engine()
{
GLOBAL $doors_id, $dbc, $message;

  $message = '';

  if(!isset($_SESSION['ren_name'])) $_SESSION['ren_name'] = 'missing_engine';

  if(!isset($_SESSION['doors_id_arr']))
  {
      $doors_id_arr = array();
      $doors_id_arr[(integer)$doors_id] = 'ren_name';
      $_SESSION['doors_id_arr'] = $doors_id_arr;
  }

  $doors_id_arr = $_SESSION['doors_id_arr'];
```

```
    $doors_id_key_arr = implode(", ", array_keys($doors_id_arr));


    $query = "SELECT ein, doors_id
            FROM rentity_vehicle
            LEFT JOIN vehicle
               USING (ein)
            LEFT JOIN zvehicle_man_mod
               USING (veh_man_mod_id)
            LEFT JOIN vehicle_engine
               USING (ein)
            LEFT JOIN engine
               USING (engine_id)
            LEFT JOIN engine_hp
               USING (engine_id)
            WHERE doors_id IN ($doors_id_key_arr)

              AND (engine.engine_id IS NULL
                 OR engine_hp.eng_hp IS NULL)";
    $result = @mysqli_query ($dbc, $query);

    if(mysqli_num_rows($result)>0)
    {
       while ($row = mysqli_fetch_assoc($result))
       {
          $message .= '<BR>Fleet DOORS ID: <FONT COLOR="BLACK">' .
$row['doors_id']
                   . '</FONT>, Vehicle with EIN: <FONT COLOR="BLACK">' . $row['ein']
                  . " </FONT>does not have an engine."
                  . " <BR>You must enter the engine"
                  . " information before proceeding.<BR>";
       }
     }

     // need to trigger for any of the multiple doors_id
    if ($message !== '')
    {
       return true;
    }
    else
    {
       return false;
    }
}
```

```
//=================================================================
=========
//

function create_temp_2010_table()
{
GLOBAL $doors_id, $dbc, $dbc2;

//=================================================================
=========
// Capture all vehicle history for fleet and store in a temp table for all
// subsequent queries

   $query = "DROP TABLE `temp_2010`";
   if($result = @mysqli_query ($dbc, $query)); // echo 'Dropped temp table<BR>';

   // $doors_id_arr is necessary to aggregate fleets
   $doors_id_arr = $_SESSION['doors_id_arr'];
   $doors_id_key_arr = implode(", ", array_keys($doors_id_arr));

   $query = "CREATE TABLE temp_2010
         (PRIMARY KEY (doors_id, ein, engine_id, date_veh_purchase,
                              date_eng_purchase, eng_hp))
         SELECT rentity_vehicle.doors_id, ren_size, vehicle.ein,
            date_veh_purchase, date_veh_inservice, date_veh_sale,
            veh_owner_id, veh_type, veh_manufacturer, veh_model,
            veh_model_year, veh_serial_number,
            NOT isnull(vehicle_low_use.ein) as low_use,
            NOT isnull(vehicle_low_use.ein) as repower,
            NOT isnull(vehicle_specialty.ein) as specialty,
            NOT isnull(engine_non_diesel.engine_id) as alt_fuel,
            NOT isnull(vehicle_program.ein) as program,
            engine_id, date_eng_purchase, date_eng_installed,
            date_eng_sale,
            eng_manufacturer, eng_model, eng_family, eng_serial_number,
            eng_model_year, eng_hp, eng_displacement,
            vdecs_id, vdecs_serial_number, date_vdecs_purchase,
            date_vdecs_sale, vdecs_family_name, 'vdecs_pm', 'vdecs_nox'
         FROM rentity_vehicle
         LEFT JOIN rentity_statistics
            USING (doors_id)
         LEFT JOIN vehicle
            USING (ein)
         LEFT JOIN vehicle_low_use
            USING (ein)
         LEFT JOIN vehicle_emergency
```

```
            USING (ein)
          LEFT JOIN vehicle_specialty
            USING (ein)
          LEFT JOIN vehicle_snow_removal
            USING (ein)
          LEFT JOIN vehicle_ag
            USING (ein)
          LEFT JOIN vehicle_awaiting_sale
            USING (ein)
          LEFT JOIN vehicle_island
            USING (ein)
          LEFT JOIN vehicle_program
            USING (ein)
          LEFT JOIN vehicle_engine
            USING (ein)
          LEFT JOIN zvehicle_man_mod
            USING (veh_man_mod_id)
          LEFT JOIN engine
            USING (engine_id)
          LEFT JOIN engine_hp
            USING (engine_id)
          LEFT JOIN engine_non_diesel
            USING (engine_id)
          LEFT JOIN zengine_man_mod
            USING (eng_man_mod_id)
          LEFT JOIN engine_vdecs
            USING (engine_id)
          LEFT JOIN vdecs
            USING (vdecs_id)
          WHERE doors_id IN ($doors_id_key_arr)
           AND vehicle_emergency.ein IS NULL
           AND vehicle_ag.ein IS NULL
           AND vehicle_snow_removal.ein IS NULL
           AND vehicle_awaiting_sale.ein IS NULL
           AND vehicle_island.ein IS NULL
           AND eng_hp >=25";
  if(!$result = @mysqli_query ($dbc, $query)) echo "_temp table didn't write. Two-
engine vehicles?";

$result = @mysqli_query($dbc, "Select * from temp_2010");

  $query = "UPDATE temp_2010
        SET vdecs_pm = '1',
          vdecs_nox = '1'";
  $result = @mysqli_query($dbc, $query);
```

```
    $query = "UPDATE temp_2010
            SET vdecs_pm = '0.15'
            WHERE vdecs_family_name IS NOT NULL";
    $result = @mysqli_query($dbc, $query);

    return;
}


?>
```

```
<?php #fleets_stats_2010

//=================================================================
========
function get_fleet_stats()
{
GLOBAL $doors_id,
     $ren_red_act_pct, $ren_red_act_2007, $ren_red_act_2010,
     $ren_red_act_method, $retirement_2006_2010_credit,
     $average_2007_hp_hrs, $activity_2007, $average_2007_hp, $activity_2010,
     $july_2007_hp, $march_2010_hp, $reduced_activity_credit,
     $total_hp_with_low_use , $total_hp_exempt, $num_veh_exempt,
      $num_veh_with_low_use,

     $total_hp_fleet_average_year_2006, $num_veh_fleet_average_year_2006,
     $total_hp_fleet_average_year_2007, $num_veh_fleet_average_year_2007,
     $total_hp_fleet_average_year_2008, $num_veh_fleet_average_year_2008,
     $total_hp_fleet_average_year_2009, $num_veh_fleet_average_year_2009,
     $total_hp_fleet_average_year_2010, $num_veh_fleet_average_year_2010,
     $total_hp_fleet_average_year_2011, $num_veh_fleet_average_year_2011,

     $num_veh_sold_2006_2011,
     $num_veh_added_2006_2009,
     $num_veh_added_2009_2010,
     $num_veh_added_2010_2011,

     $total_hp_low_use_year_2006, $num_veh_low_use_year_2006,
     $total_hp_low_use_year_2007, $num_veh_low_use_year_2007,
     $total_hp_low_use_year_2008, $num_veh_low_use_year_2008,
     $total_hp_low_use_year_2009, $num_veh_low_use_year_2009,
     $total_hp_low_use_year_2010, $num_veh_low_use_year_2010,
     $total_hp_low_use_year_2011, $num_veh_low_use_year_2011,
```

$total_hp_low_use, $num_veh_low_use,
$total_hp_repower, $num_veh_repower,
$total_hp_retrofit, $num_veh_retrofit,
$total_hp_alt_fuel, $num_veh_alt_fuel,
$total_hp_program, $num_veh_program,
$total_hp_t0, $num_veh_t0,
$total_hp_t1U, $num_veh_t1U,
$total_hp_t1Z, $num_veh_t1Z,
$total_hp_t2, $num_veh_t2,
$total_hp_t3, $num_veh_t3,
$total_hp_t4I, $num_veh_t4I,

$fleet_veh_age_by_count, $fleet_veh_age_by_hp, $fleet_eng_age_by_count,
$fleet_eng_age_by_hp, $early_replacement_credit,
$hp_reduction_09_10, $lowest_tier_hp_reduction_09_10,
$tier0_hp_reduction_09_10, $tier0_retirement_vdecs_credit,
$repower_hp, $double_retrofit_credit, $single_retrofit_credit,
$nox_credit, $pm_credit, $nox_bact_hp, $pm_bact_hp,
$nox_fleet_average_2010, $pm_fleet_average_2010,

$nox_fleet_target_year,
$pm_fleet_target_year,

$nox_fleet_target_2010,
$nox_fleet_target_2011,
$nox_fleet_target_2012,
$nox_fleet_target_2013,
$nox_fleet_target_2014,
$nox_fleet_target_2015,
$nox_fleet_target_2016,
$nox_fleet_target_2017,
$nox_fleet_target_2018,
$nox_fleet_target_2019,
$nox_fleet_target_2020,

$pm_fleet_target_2010,
$pm_fleet_target_2011,
$pm_fleet_target_2012,
$pm_fleet_target_2013,
$pm_fleet_target_2014,
$pm_fleet_target_2015,
$pm_fleet_target_2016,
$pm_fleet_target_2017,
$pm_fleet_target_2018,
$pm_fleet_target_2019,

```
$pm_fleet_target_2020,


  $meets_nox, $meets_pm, $ren_size,
  $meets_nox_fleet_average, $meets_nox_bact, $meets_pm_fleet_average,
  $meets_pm_bact, $turnover09_10, $double_nox_retrofit_credit,
  $permanent_low_use_nox_credit, $dbc, $message;


$ren_red_act_pct              = 0;
$ren_red_act_2007             = 0;
$ren_red_act_2010             = 0;
$ren_red_act_method           = 'NA';

$retirement_2006_2010_credit     = 0;

$average_2007_hp_hrs          = 0;
$activity_2007                = 0;
$average_2007_hp              = 0;
$activity_2010                = 0;
$july_2007_hp                 = 0;
$march_2010_hp                = 0;
$reduced_activity_credit      = 0;

$total_hp_fleet_average_year_2006 = 0;
$total_hp_fleet_average_year_2007 = 0;
$total_hp_fleet_average_year_2008 = 0;
$total_hp_fleet_average_year_2009 = 0;
$total_hp_fleet_average_year_2010 = 0;
$early_replacement_credit     = 0;

$hp_reduction_09_10           = 0; // THIS should be = to 10 - 09
$lowest_tier_hp_reduction_09_10  = 0;
$tier0_hp_reduction_09_10     = 0;
$tier0_retirement_vdecs_credit   = 0;

$repower_hp                   = 0;
$double_retrofit_credit       = 0;
$single_retrofit_credit       = 0;

$nox_credit                   = 0;
$pm_credit                    = 0;
$nox_bact_hp                  = 0;
$pm_bact_hp                   = 0;

$nox_fleet_average_2010       = 0;
```

```
$pm_fleet_average_2010          = 0;

$nox_fleet_target_year          = 0;
$pm_fleet_target_year           = 0;

$nox_fleet_target_2010          = 0;
$nox_fleet_target_2011          = 0;
$nox_fleet_target_2012          = 0;
$nox_fleet_target_2013          = 0;
$nox_fleet_target_2014          = 0;
$nox_fleet_target_2015          = 0;
$nox_fleet_target_2016          = 0;
$nox_fleet_target_2017          = 0;
$nox_fleet_target_2018          = 0;
$nox_fleet_target_2020          = 0;

$pm_fleet_target_2010           = 0;
$pm_fleet_target_2011           = 0;
$pm_fleet_target_2012           = 0;
$pm_fleet_target_2013           = 0;
$pm_fleet_target_2014           = 0;
$pm_fleet_target_2015           = 0;
$pm_fleet_target_2016           = 0;
$pm_fleet_target_2017           = 0;
$pm_fleet_target_2018           = 0;
$pm_fleet_target_2019           = 0;
$pm_fleet_target_2020           = 0;

//=================================================================
=========

  if(isset($_SESSION['doors_id_arr'])
     and count($_SESSION['doors_id_arr'])>1)
  {
     $ren_size = 'L';
  }
  else
  {
     $calendar_year = "2010";
     $query = "SELECT ren_size
           FROM rentity_statistics
           WHERE doors_id = '$doors_id'
             AND calendar_year = '$calendar_year'";
     $result = @mysqli_query($dbc, $query);
     $row = mysqli_fetch_assoc($result);
     $ren_size = $row['ren_size'];
```

```
    }

    create_temp_2010_table();


//=================================================================
==========
// Current fleet including low use

    $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                       COUNT(ein) as num_veh
                  FROM temp_2010
                  WHERE date_veh_sale IS NULL
                    AND date_eng_sale IS NULL";

    $result = @mysqli_query ($dbc, $query);
    $row = mysqli_fetch_assoc($result);
    $total_hp_with_low_use = $row['total_hp'];
    $num_veh_with_low_use = $row['num_veh'];

//=================================================================
=========
// vehicles (hp) in fleet average 2006-2010

for ($year_query=2006 ; $year_query<2012; $year_query++ )
{
    // this creates a variable variable with names:
    // num_veh_fleet_average_year_2006 and total_hp_fleet_average_year_2006
    // num_veh_fleet_average_year_2007 and total_hp_fleet_average_year_2007
    // etc. through 2011

    $num_veh_fleet_average_year_var = 'num_veh_fleet_average_year_' . $year_query;
    $total_hp_fleet_average_year_var = 'total_hp_fleet_average_year_' . $year_query;

    $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0)  as total_hp,
                       COUNT(ein) as num_veh
            FROM temp_2010
            WHERE !low_use
              AND date_veh_purchase < '$year_query-03-02'
              AND ((date_veh_sale IS NULL)
                OR (date_veh_sale > '$year_query-03-01'))
              AND date_eng_installed < '$year_query-03-02'
              AND (date_eng_sale IS NULL
                OR (date_eng_sale > '$year_query-03-01'))";

    $result = @mysqli_query ($dbc, $query);
```

```
   $row = mysqli_fetch_assoc($result);
   $$num_veh_fleet_average_year_var = $row['num_veh'];
   $$total_hp_fleet_average_year_var = $row['total_hp'];
}

//=================================================================
=========
// vehicles (hp) in low-use 2006-2010

for ($year_query=2006 ; $year_query<2012; $year_query++ )
{
   // this creates a variable variable with names:
   // num_veh_fleet_average_year_2006 and total_hp_fleet_average_year_2006
   // num_veh_fleet_average_year_2007 and total_hp_fleet_average_year_2007
   // etc. through 2011

   $num_veh_low_use_year_var = 'num_veh_low_use_year_' . $year_query;
   $total_hp_low_use_year_var = 'total_hp_low_use_year_' . $year_query;

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0)  as total_hp,
                    COUNT(ein) as num_veh
             FROM temp_2010
             WHERE low_use
               AND date_veh_purchase < '$year_query-03-02'
               AND ((date_veh_sale IS NULL)
                 OR (date_veh_sale > '$year_query-03-01'))
               AND date_eng_installed < '$year_query-03-02'
               AND (date_eng_sale IS NULL
                 OR (date_eng_sale > '$year_query-03-01'))";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $$num_veh_low_use_year_var = $row['num_veh'];
   $$total_hp_low_use_year_var = $row['total_hp'];
}

//=================================================================
=========
// vehicles sold / added

   $query = "SELECT COUNT(ein) as num_veh_sold_2006_2011
             FROM temp_2010
             WHERE !low_use
               AND (date_veh_sale > '2006-03-01')
               AND (date_veh_sale < '2011-03-01')";
```

```
$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$num_veh_sold_2006_2011 = $row['num_veh_sold_2006_2011'];

$query = "SELECT COUNT(ein) as num_veh_added_2006_2009
        FROM temp_2010
        WHERE !low_use
          AND date_veh_purchase >= '2006-03-01'
          AND date_veh_purchase < '2009-03-02'";

$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$num_veh_added_2006_2009 = $row['num_veh_added_2006_2009'];

$query = "SELECT COUNT(ein) as num_veh_added_2009_2010
        FROM temp_2010
        WHERE !low_use
          AND date_veh_purchase >= '2009-03-01'
          AND date_veh_purchase < '2010-03-02'";

$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$num_veh_added_2009_2010 = $row['num_veh_added_2009_2010'];

$query = "SELECT COUNT(ein) as num_veh_added_2010_2011
        FROM temp_2010
        WHERE !low_use
          AND date_veh_purchase >= '2010-03-01'
          AND date_veh_purchase < '2011-03-02'";

$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$num_veh_added_2010_2011 = $row['num_veh_added_2010_2011'];

//================================================================
========

$retirement_2006_2010_credit = max($total_hp_fleet_average_year_2006
                        -$total_hp_fleet_average_year_2010, 0);

//================================================================
==========
// Low-use vehicles

$query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                COUNT(ein) as num_veh
```

```
                FROM temp_2010
                WHERE low_use
                  AND date_veh_sale IS NULL
                  AND date_eng_sale IS NULL";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $total_hp_low_use = $row['total_hp'];
   $num_veh_low_use = $row['num_veh'];

//================================================================
==========
// Repowers

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                    COUNT(ein) as num_veh
          FROM temp_2010
          WHERE !low_use
            AND date_veh_sale IS NULL
            AND date_eng_sale IS NOT NULL";

   $result = @mysqli_query ($dbc, $query);

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $total_hp_repower = $row['total_hp'];
   $num_veh_repower = $row['num_veh'];

//================================================================
==========
// Retrofits

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                    COUNT(ein) as num_veh
                FROM temp_2010
                WHERE vdecs_family_name IS NOT NULL
                  AND date_veh_sale IS NULL
                  AND date_eng_sale IS NULL";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $total_hp_retrofit = $row['total_hp'];
   $num_veh_retrofit = $row['num_veh'];

//================================================================
==========
```

```
// Alt-fuel vehicles

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                     COUNT(ein) as num_veh
                  FROM temp_2010
                  WHERE alt_fuel
                    AND date_veh_sale IS NULL
                    AND date_eng_sale IS NULL";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $total_hp_alt_fuel = $row['total_hp'];
   $num_veh_alt_fuel = $row['num_veh'];

//=================================================================
===========
// SOON Moyer

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                     COUNT(ein) as num_veh
                  FROM temp_2010
                  WHERE program
                    AND date_veh_sale IS NULL
                    AND date_eng_sale IS NULL";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $total_hp_program = $row['total_hp'];
   $num_veh_program = $row['num_veh'];

//=================================================================
=========
// Tier 0s

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                     COUNT(ein) as num_veh
            FROM temp_2010
            LEFT JOIN zengine_index
               USING (eng_model_year)
            WHERE date_veh_sale IS NULL
              AND eng_hp >= eng_index_min_hp
              AND eng_hp <= eng_index_max_hp
              AND eng_index_tier = 'T0'";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
```

```
   if (mysqli_num_rows($result)>0)
   {
      $total_hp_t0 = $row['total_hp'];
      $num_veh_t0 = $row['num_veh'];
   }

//=================================================================
=========
// Tier 1s

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                     COUNT(ein) as num_veh
            FROM temp_2010
            LEFT JOIN zengine_index
               USING (eng_model_year)
            WHERE date_veh_sale IS NULL
              AND eng_hp >= eng_index_min_hp
              AND eng_hp <= eng_index_max_hp
              AND eng_index_tier = 'T1U'";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);

   if (mysqli_num_rows($result)>0)
   {
      $total_hp_t1U = $row['total_hp'];
      $num_veh_t1U = $row['num_veh'];
   }

//=================================================================
=========
// Tier 1Zs

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                     COUNT(ein) as num_veh
            FROM temp_2010
            LEFT JOIN zengine_index
               USING (eng_model_year)
            WHERE date_veh_sale IS NULL
              AND eng_hp >= eng_index_min_hp
              AND eng_hp <= eng_index_max_hp
              AND eng_index_tier = 'T1Z'";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
```

```
   if (mysqli_num_rows($result)>0)
   {
      $total_hp_t1Z = $row['total_hp'];
      $num_veh_t1Z = $row['num_veh'];
   }

//=================================================================
=========
// Tier 2s

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                    COUNT(ein) as num_veh
             FROM temp_2010
             LEFT JOIN zengine_index
                USING (eng_model_year)
             WHERE date_veh_sale IS NULL
               AND eng_hp >= eng_index_min_hp
               AND eng_hp <= eng_index_max_hp
               AND eng_index_tier = 'T2'";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);

   if (mysqli_num_rows($result)>0)
   {
      $total_hp_t2 = $row['total_hp'];
      $num_veh_t2 = $row['num_veh'];
   }

//=================================================================
=========
// Tier 3s

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                    COUNT(ein) as num_veh
             FROM temp_2010
             LEFT JOIN zengine_index
                USING (eng_model_year)
             WHERE date_veh_sale IS NULL
               AND eng_hp >= eng_index_min_hp
               AND eng_hp <= eng_index_max_hp
               AND eng_index_tier = 'T3'";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
```

```
   if (mysqli_num_rows($result)>0)
   {
      $total_hp_t3 = $row['total_hp'];
      $num_veh_t3 = $row['num_veh'];
   }

//=================================================================
=========
// Tier 4Is

   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp,
                    COUNT(ein) as num_veh
             FROM temp_2010
             LEFT JOIN zengine_index
                USING (eng_model_year)
             WHERE date_veh_sale IS NULL
              AND eng_hp >= eng_index_min_hp
              AND eng_hp <= eng_index_max_hp
              AND eng_index_tier = 'T4I'";

   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);

   if (mysqli_num_rows($result)>0)
   {
      $total_hp_t4I = $row['total_hp'];
      $num_veh_t4I = $row['num_veh'];
   }

//=================================================================
=========
// average fleet age of vehicles (hp) in fleet average

$query = "SELECT
             SUM(IF(veh_model_year<2011,(2010-veh_model_year),0))
                          /COUNT(ein) as fleet_veh_age_by_count,
             SUM(IF(veh_model_year<2011,(2010-veh_model_year),0)*eng_hp)
                          /SUM(eng_hp) as fleet_veh_age_by_hp,
             SUM(IF(eng_model_year<2011,(2010-eng_model_year),0))
                          /COUNT(ein) as fleet_eng_age_by_count,
             SUM(IF(eng_model_year<2011,(2010-eng_model_year),0)*eng_hp)
                          /SUM(eng_hp) as fleet_eng_age_by_hp
          FROM temp_2010
          WHERE !low_use
           AND date_veh_sale IS NULL
```

```
        AND date_eng_sale IS NULL";

$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$fleet_veh_age_by_count = $row['fleet_veh_age_by_count'];
$fleet_veh_age_by_hp    = $row['fleet_veh_age_by_hp'];
$fleet_eng_age_by_count = $row['fleet_eng_age_by_count'];
$fleet_eng_age_by_hp    = $row['fleet_eng_age_by_hp'];

//================================================================
========
// Start of the reduced activity calculations

   // July 2007 hp
   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as
july_2007_hp
          FROM temp_2010
          WHERE !low_use
            AND date_veh_purchase < '2007-07-01'
            AND ((date_veh_sale IS NULL)
               OR (date_veh_sale > '2007-07-01'))
            AND date_eng_installed < '2007-07-01'
            AND ((date_eng_sale IS NULL)
               OR (date_eng_sale > '2007-07-01'))";
   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $july_2007_hp = $row['july_2007_hp'];

// Reduced activity method
$query = "SELECT *
       FROM rentity_reduced_activity
       WHERE doors_id = '$doors_id'";

$result = @mysqli_query ($dbc, $query);
if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);

   $ren_red_act_method = $row['ren_red_act_method'];

   if($ren_red_act_method == '')
   {
      $ren_red_act_method = 'NA';
   }

   $ren_red_act_2007   = $row['ren_red_act_2007'];
```

```
   $ren_red_act_2010   = $row['ren_red_act_2010'];

   if($ren_red_act_2007 > 0)
   {
      $ren_red_act_pct = ($ren_red_act_2007 - $ren_red_act_2010)*100
                       / $ren_red_act_2007;
   }

   if ($ren_red_act_method == 'revenue'
      or $ren_red_act_method == 'employment'
      or $ren_red_act_method == 'production'
      or $ren_red_act_method == 'other')
   {
      $ren_red_act_pct =  min($ren_red_act_pct, 20);
   }

   $ren_red_act_pct =  number_format(max($ren_red_act_pct, 0), 1,".",",");

   // March 2010 hp
   $query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as
march_2010_hp
          FROM temp_2010
          WHERE !low_use
            AND date_veh_purchase < '2010-03-01'
            AND (date_veh_sale IS NULL)
            AND date_eng_installed < '2010-03-01'
            AND (date_eng_sale IS NULL)";
   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);
   $march_2010_hp = $row['march_2010_hp'];

   // average_2007_hp_hrs
   $query = "SELECT IF(veh_red_act_hours_2007 IS NOT NULL,
                  (SUM(veh_red_act_hours_2007)/COUNT(veh_red_act_hours_2007)
                * $retirement_2006_2010_credit), 0) as average_2007_hp_hrs
        FROM temp_2010
        LEFT JOIN vehicle_reduced_activity
          USING (ein)
        WHERE !low_use
          AND (date_veh_sale < '2010-03-31')
          AND (date_eng_sale IS NULL
            OR date_eng_sale > '2010-03-31')";

   $result = @mysqli_query ($dbc, $query);
   if (mysqli_num_rows($result)>0)
   {
```

```
   $row = mysqli_fetch_assoc($result);
   $average_2007_hp_hrs = $row['average_2007_hp_hrs'];
}

// activity_2007
$query = "SELECT IF(veh_red_act_hours_2007 IS NOT NULL,
                (SUM(eng_hp*veh_red_act_hours_2007)
                 - $average_2007_hp_hrs), 0) as activity_2007
    FROM temp_2010
    LEFT JOIN vehicle_reduced_activity
     USING (ein)
    WHERE !low_use
     AND date_veh_purchase < '2008-01-01'
     AND (date_veh_sale IS NULL
      OR date_veh_sale > '2007-01-01')
     AND date_eng_installed < '2008-01-01'
     AND (date_eng_sale IS NULL
      OR date_eng_sale > '2007-01-01')";

$result = @mysqli_query ($dbc, $query);
if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $activity_2007 = $row['activity_2007'];
}

// average 2007 hp
$query = "SELECT ROUND(SUM(eng_hp*
        if( (date_veh_sale > '2007-01-01')
              and (date_veh_sale<'2007-12-31'),
            (DATE_FORMAT(date_veh_sale, '%j')
             - DATE_FORMAT('2007-01-01', '%j'))
                  /365,1)), 0)
          as average_2007_hp
       FROM temp_2010
       WHERE !low_use
        AND date_veh_purchase < '2007-01-01'
        AND (date_veh_sale IS NULL
         OR date_veh_sale > '2007-01-01')
        AND date_eng_installed < '2007-01-01'
        AND (date_eng_sale IS NULL
         OR date_eng_sale > '2007-01-01')";

$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$average_2007_hp = $row['average_2007_hp'];
```

```
// activity_2010
$query = "SELECT IF(veh_red_act_hours_2010 IS NOT NULL,
            SUM(eng_hp*veh_red_act_hours_2010), 0) as activity_2010
    FROM temp_2010
    LEFT JOIN vehicle_reduced_activity
     USING (ein)
    WHERE !low_use
     AND date_veh_purchase < '2010-04-01'
     AND (date_veh_sale IS NULL
      OR date_veh_sale >= '2009-03-01')
     AND date_eng_installed < '2010-04-01'
     AND (date_eng_sale IS NULL
      OR date_eng_sale >= '2009-03-01')";

$result = @mysqli_query ($dbc, $query);
if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $activity_2010 = $row['activity_2010'];
}

$reduced_activity_credit = 0;
//================================================================
========

if ($ren_red_act_method == 'hours')
{
   // check to see if the owner has entered hours of operation for
   // at least 95% of their 2010 fleet hp
   $query = "SELECT SUM(eng_hp) as hp_pool
         FROM rentity_vehicle
         LEFT JOIN vehicle_reduced_activity
          USING (doors_id, ein)
         LEFT JOIN vehicle
           USING (ein)
         LEFT JOIN zvehicle_man_mod
           USING (veh_man_mod_id)
         LEFT JOIN vehicle_engine
           USING (ein)
         LEFT JOIN engine_hp
           USING (engine_id)
         WHERE rentity_vehicle.doors_id = $doors_id
          AND (ISNULL(date_veh_sale)
              OR date_veh_sale >= '2010-03-01')";
```

```
$result = @mysqli_query ($dbc, $query);
if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $hp_pool = $row['hp_pool'];
}

$query = "SELECT SUM(eng_hp) as hp_entered
        FROM rentity_vehicle
        IINER JOIN vehicle_reduced_activity
          USING (doors_id, ein)
        LEFT JOIN vehicle
           USING (ein)
        LEFT JOIN zvehicle_man_mod
           USING (veh_man_mod_id)
        LEFT JOIN vehicle_engine
           USING (ein)
        LEFT JOIN engine_hp
           USING (engine_id)
        WHERE doors_id = $doors_id
          AND NOT ISNULL(veh_red_act_hours_2010)
          AND (veh_red_act_hours_2010 != '')
          AND (ISNULL(date_veh_sale)
              OR date_veh_sale >= '2010-03-01')";

$result = @mysqli_query ($dbc, $query);
if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $hp_entered = $row['hp_entered'];
}

$not_enough_hp = 0;

if ($hp_pool > 0)
{
   if(($hp_entered / $hp_pool) < 0.95)
   {
      $ren_red_act_pct = 0;
      $reduced_activity_credit = 0;
   }
   else
   {
      if ($activity_2007 > 0)
      { // see line 153
         $ren_red_act_pct = ($activity_2007 - $activity_2010)*100
```

```
                                    / $activity_2007;

                $ren_red_act_pct =  number_format(max($ren_red_act_pct, 0), 1,".","");

                $reduced_activity_credit = $ren_red_act_pct/100*($july_2007_hp
                                    - min($retirement_2006_2010_credit,
                                      $average_2007_hp-$march_2010_hp));

            }
          }
        }
    }
    else
    {
       $reduced_activity_credit = $ren_red_act_pct/100*$july_2007_hp
                            - $retirement_2006_2010_credit;
    }

    $reduced_activity_credit = max($reduced_activity_credit, 0);
}

//=================================================================
=========
// Early Replacement Credit - Turnover (Horsepower)

// Tier 0 vehicles retired before 2009-03-01
$query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        LEFT JOIN zengine_index
           USING (eng_model_year)
        WHERE !low_use
          AND date_veh_purchase < '2006-03-01'
          AND (date_veh_sale < '2009-03-01')
          AND date_eng_installed < '2006-03-01'
          AND (date_eng_sale IS NULL
            OR date_eng_sale > '2009-03-01')
          AND eng_hp >= eng_index_min_hp
          AND eng_hp <= eng_index_max_hp
          AND eng_index_tier = 'T0'";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
    $row = mysqli_fetch_assoc($result);
    $early_replacement_credit = $row['total_hp'];
```

```
}

for ($year_query=2007 ; $year_query<2010; $year_query++ )
{
   $total_hp_fleet_average_year_var = 'total_hp_fleet_average_year_' . $year_query;
   $early_replacement_credit -= $$total_hp_fleet_average_year_var * 0.08;
}

$hp_reduction_06_09 = max($total_hp_fleet_average_year_2006
                  - $total_hp_fleet_average_year_2009, 0);
$hp_reduction_06_10 = max($total_hp_fleet_average_year_2006
                  - $total_hp_fleet_average_year_2010, 0);

$early_replacement_credit -= $hp_reduction_06_10;

$early_replacement_credit = max($early_replacement_credit,0);


//=================================================================
=========
// vehicles retired in 2009-2010 turnover

// find 09-10 hp reduction
$query = "SELECT  IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        WHERE !low_use
          AND date_veh_purchase < '2009-03-01'
          AND (date_veh_sale >= '2009-03-01')
          AND (date_veh_sale < '2010-03-01')
          AND date_eng_installed < '2009-03-01'
          AND (date_eng_sale IS NULL
            OR date_eng_sale > '2010-03-01')";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $hp_reduction_09_10 = $row['total_hp'];
}

// find lowest tier in 2009 fleet
$query = "SELECT DISTINCT eng_index_tier
        FROM temp_2010
        LEFT JOIN zengine_index
           USING (eng_model_year)
```

```
        WHERE !low_use
          AND date_veh_purchase < '2009-03-01'
          AND (date_veh_sale IS NULL
            OR date_veh_sale < '2010-03-01')
          AND date_eng_installed < '2009-03-01'
          AND (date_eng_sale IS NULL
            OR date_eng_sale > '2010-03-01')
          AND eng_hp >= eng_index_min_hp
          AND eng_hp <= eng_index_max_hp
        ORDER BY eng_index_tier";

$result = @mysqli_query ($dbc, $query);
$row = mysqli_fetch_assoc($result);
$lowest_tier_2009 = $row['eng_index_tier'];

// lowest tier hp reduction
$query = "SELECT  IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        LEFT JOIN zengine_index
           USING (eng_model_year)
        WHERE !low_use
          AND date_veh_purchase < '2009-03-01'
          AND (date_veh_sale >= '2009-03-01')
          AND (date_veh_sale < '2010-03-01')
          AND date_eng_installed < '2009-03-01'
          AND (date_eng_sale IS NULL
            OR date_eng_sale > '2010-03-01')
          AND eng_hp >= eng_index_min_hp
          AND eng_hp <= eng_index_max_hp
          AND (eng_index_tier = 'T0'
            OR eng_index_tier = 'T1U'
            OR eng_index_tier <= '$lowest_tier_2009')";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $lowest_tier_hp_reduction_09_10 = $row['total_hp'];
}

$turnover09_10 = $lowest_tier_hp_reduction_09_10
              - min($hp_reduction_09_10, $retirement_2006_2010_credit);

$turnover09_10 = max($turnover09_10,0);
```

```
//================================================================
=========
// Tier 0 retirement VDECS credit

// tier 0 hp reduction 09-10
$query = "SELECT  IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        LEFT JOIN zengine_index
           USING (eng_model_year)
        WHERE !low_use
          AND date_veh_purchase < '2009-03-01'
          AND (date_veh_sale >= '2009-03-01')
          AND (date_veh_sale < '2010-03-01')
          AND date_eng_installed < '2009-03-01'
          AND (date_eng_sale IS NULL
            OR date_eng_sale > '2010-03-01')
          AND eng_hp >= eng_index_min_hp
          AND eng_hp <= eng_index_max_hp
          AND eng_index_tier = 'T0'";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $tier0_hp_reduction_09_10 = $row['total_hp'];
}

$tier0_retirement_vdecs_credit = min($tier0_hp_reduction_09_10,
                                $hp_reduction_09_10)
                           - min($retirement_2006_2010_credit,
                                $hp_reduction_09_10);

$tier0_retirement_vdecs_credit = max($tier0_retirement_vdecs_credit, 0);


//================================================================
=========
// Repowers

$query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        WHERE !low_use
          AND date_veh_purchase < '2010-03-01'
          AND date_veh_sale IS NULL
          AND date_eng_sale IS NOT NULL";
```

```
$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $repower_hp = $row['total_hp'];
}


//=================================================================
=========
// Double Retrofit for NOx retrofits

$query = "SELECT IF(SUM(eng_hp) IS NOT NULL,
                SUM(eng_hp*(1-vdecs_nox)*100)/60, 0) as total_hp
        FROM temp_2010
        WHERE !low_use
          AND date_vdecs_purchase IS NOT NULL
          AND date_vdecs_purchase < '2010-03-01'
          AND date_veh_sale IS NULL
          AND date_eng_sale IS NULL";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $double_nox_retrofit_credit = $row['total_hp']*2;
}

//=================================================================
=========
// Permanent low-use NOx credit

$query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        INNER JOIN vehicle_low_use
          USING (ein)
        WHERE low_use
          AND (veh_low_use_type = 'designated'
             OR  veh_low_use_type = 'designated_outside')
          AND date_veh_sale IS NULL
          AND date_eng_sale IS NULL";

$result = @mysqli_query ($dbc, $query);
```

```
if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $permanent_low_use_nox_credit = $row['total_hp'];
}

//=================================================================
=========
// Double Retrofit

$query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        WHERE !low_use
          AND date_vdecs_purchase IS NOT NULL
          AND date_vdecs_purchase < '2010-01-01'
          AND date_veh_sale IS NULL
          AND date_eng_sale IS NULL";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $double_retrofit_credit = $row['total_hp']*2;
}

//=================================================================
=========
// Single Retrofit

$query = "SELECT IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) as total_hp
        FROM temp_2010
        WHERE !low_use
          AND date_vdecs_purchase IS NOT NULL
          AND date_vdecs_purchase > '2010-03-01'
          AND date_veh_sale IS NULL
          AND date_eng_sale IS NULL";

$result = @mysqli_query ($dbc, $query);

if (mysqli_num_rows($result)>0)
{
   $row = mysqli_fetch_assoc($result);
   $single_retrofit_credit = $row['total_hp'];
}
```

```
//=================================================================
=========

$nox_credit =  $retirement_2006_2010_credit
          + $reduced_activity_credit
          + $early_replacement_credit
          + $repower_hp
          + $turnover09_10
          + $double_nox_retrofit_credit
          + $permanent_low_use_nox_credit;

$pm_credit =  $retirement_2006_2010_credit
         + $reduced_activity_credit
         + $tier0_retirement_vdecs_credit
         + $double_retrofit_credit
         + $single_retrofit_credit;

//=================================================================
=========
// bact

$nox_bact_hp = $total_hp_fleet_average_year_2009 * 0.08;
$pm_bact_hp  = $total_hp_fleet_average_year_2009 * 0.2;

//=================================================================
==========
// get 2010 fleet averages, see write_fleet_average() in doors_function


     $query = "SELECT
              IF(SUM(eng_hp) IS NOT NULL,
                 SUM(eng_hp*eng_index_nox*vdecs_nox)/SUM(eng_hp),0)
                       AS nox_fleet_average,
              IF(SUM(eng_hp) IS NOT NULL,
                 SUM(eng_hp*eng_index_pm*vdecs_pm)/SUM(eng_hp),0)
                       AS pm_fleet_average

            FROM temp_2010
            INNER JOIN zengine_index
              USING (eng_model_year)
            WHERE !low_use
             AND date_veh_sale IS NULL
             AND date_eng_sale IS NULL
             AND (zengine_index.eng_index_min_hp <= eng_hp)
             AND (zengine_index.eng_index_max_hp >= eng_hp)";
```

```
    $result = @mysqli_query ($dbc, $query);

  if(mysqli_num_rows($result)>0)
  {
    $row = mysqli_fetch_assoc($result);

    $nox_fleet_average_2010  = number_format($row['nox_fleet_average'], 1);
    $pm_fleet_average_2010   = number_format($row['pm_fleet_average'], 2);
  }

//=================================================================
==========
// determine fleet targets

/*
  $query = "SELECT
        ROUND(Sum(eng_hp*eng_target_nox)
                  /IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) , 1)
              AS nox_fleet_target,
        ROUND(Sum(eng_hp*eng_target_pm)
                  /IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) , 2)
              AS pm_fleet_target
        FROM zengine_target, temp_2010
        INNER JOIN zengine_index
          USING (eng_model_year)
        WHERE !low_use
         AND date_veh_sale IS NULL
         AND date_eng_sale IS NULL
           AND (zengine_target.eng_target_min_hp <= eng_hp)
           AND (zengine_target.eng_target_max_hp >= eng_hp)
           AND (eng_target_fleet_size = '$ren_size')
         AND target_year = '2010'";
  $result = @mysqli_query ($dbc, $query);
  $row = mysqli_fetch_assoc($result);

  $nox_fleet_target_2010  = $row['nox_fleet_target'];
  $pm_fleet_target_2010   = $row['pm_fleet_target'];
*/

//=================================================================
==========
// determine fleet targets


$begin_year = 2010;
$target_year = 2020;
```

```
if ($ren_size !== 'S')
{
   for ($i=$begin_year; $i<=$target_year; $i++)
   {
      $query = "SELECT
               IF(SUM(eng_hp) IS NOT NULL,
                     SUM(eng_hp*eng_target_nox)/SUM(eng_hp),0)
                      AS nox_fleet_target
              FROM zengine_target, temp_2010
              INNER JOIN zengine_index
                 USING (eng_model_year)
              WHERE !low_use
               AND date_veh_sale IS NULL
               AND date_eng_sale IS NULL
                  AND (zengine_target.eng_target_min_hp <= eng_hp)
                  AND (zengine_target.eng_target_max_hp >= eng_hp)
                  AND (eng_target_fleet_size = '$ren_size')
            AND calendar_year = '$i'";

      $result = @mysqli_query ($dbc, $query);
      $row = mysqli_fetch_assoc($result);

      $nox_fleet_target_year = 'nox_fleet_target_' . $i;

      $$nox_fleet_target_year =  number_format($row['nox_fleet_target'], 1);
   }
}

for ($i=$begin_year; $i<=$target_year; $i++)
{
   $query = "SELECT
               IF(SUM(eng_hp) IS NOT NULL,
                     SUM(eng_hp*eng_target_pm)/SUM(eng_hp),0)
                           AS pm_fleet_target
           FROM zengine_target, temp_2010
           INNER JOIN zengine_index
              USING (eng_model_year)
           WHERE !low_use
            AND date_veh_sale IS NULL
            AND date_eng_sale IS NULL
               AND (zengine_target.eng_target_min_hp <= eng_hp)
               AND (zengine_target.eng_target_max_hp >= eng_hp)
               AND (eng_target_fleet_size = '$ren_size')
            AND calendar_year = '$i'";
```

```
   $result = @mysqli_query ($dbc, $query);
   $row = mysqli_fetch_assoc($result);

   $pm_fleet_target_year = 'pm_fleet_target_' . $i;

   $$pm_fleet_target_year =  number_format($row['pm_fleet_target'], 2);
}

//=================================================================
=========

   if ($ren_size=='S'
      or $ren_size=='M')
   {
      $meets_nox_fleet_average  = 'NA';
      $meets_nox_bact           = 'NA';
      $meets_nox              = 'Met';

      $meets_pm_fleet_average   = 'NA';
      $meets_pm_bact            = 'NA';
      $meets_pm               = 'Met';
   }
   else
   {


//=================================================================
===========
   // set compliance flags

      $meets_nox_fleet_average  = 'Not Met';
      $meets_nox_bact           = 'Not Met';
      $meets_nox              = 'Not Met';

      $meets_pm_fleet_average   = 'Not Met';
      $meets_pm_bact            = 'Not Met';
      $meets_pm               = 'Not Met';

      if($nox_bact_hp <= $nox_credit)
      {
         $meets_nox_bact = 'Met';
         $meets_nox      = 'Met';
      }

      if($nox_fleet_average_2010 <= $nox_fleet_target_2010)
```

```
      {
         $meets_nox_fleet_average  = 'Met';
         $meets_nox_bact           = 'NA';
         $meets_nox                = 'Met';
      }

      if($pm_bact_hp <= $pm_credit)
      {
         $meets_pm_bact  = 'Met';
         $meets_pm       = 'Met';
      }

      if($pm_fleet_average_2010 <= $pm_fleet_target_2010)
      {
         $meets_pm_fleet_average = 'Met';
         $meets_pm_bact          = 'NA';
         $meets_pm               = 'Met';
      }
   }
   }
?>
```

```
A<?php  #get_fleet_average

$query3 = "SELECT
        ROUND(Sum(eng_hp*eng_index_nox*vdecs_nox)
                        /IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) , 1)
                AS fleet_average_nox
        FROM osm_vehicle
        WHERE calendar_year = '$calendar_year'";

$result3 = @mysqli_query ($dbc4, $query3);
$row3 = mysqli_fetch_assoc($result3);

$fleet_average_nox =  number_format($row3['fleet_average_nox'], 1);


$query3 = "SELECT
        ROUND(Sum(eng_hp*eng_index_pm*vdecs_pm)
                        /IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) , 2)
                AS fleet_average_pm
        FROM osm_vehicle
        WHERE calendar_year = '$calendar_year'";
```

```
$result3 = @mysqli_query ($dbc4, $query3);
$row3 = mysqli_fetch_assoc($result3);

$fleet_average_pm =  number_format($row3['fleet_average_pm'], 2);

?>
```

```
<?php  #get_fleet_info


$query0 = "SELECT SUM(eng_hp)    AS total_hp,
           COUNT(*)      AS veh_count,
           SUM(eng_hp*(calendar_year-
                  IF(eng_model_year=2011 AND calendar_year=2010,
                                 2010,eng_model_year)))
                        / SUM(eng_hp)
                  AS fleet_age
       FROM osm_vehicle
       WHERE doors_id = $doors_id
        AND calendar_year = $calendar_year
        AND low_use = 0";

$result0 = @mysqli_query ($dbc4, $query0);
$row0 = mysqli_fetch_assoc($result0);
$veh_count = $row0['veh_count'];

if ($veh_count == 0)
{
   $total_hp         = 0;
   $fleet_age        = 0;
}
else
{
   $total_hp         = $row0['total_hp'];
   $fleet_age        = $row0['fleet_age'];

   if($calendar_year == '2010')
   {
      $fleet_age_2010     = $fleet_age;
      $fleet_age_adjusted = $fleet_age;

      $query_fleet = "SELECT veh_type
                  FROM osm_vehicle
                  WHERE doors_id = '$doors_id'
                   AND calendar_year = '2010'
```

```
                    AND '2010' - calendar_year_retrofit >= 6
                    AND low_use = 0
                  ORDER BY veh_relative_age DESC, eng_index_tier, ein";

    if(!$result = @mysqli_query ($dbc4, $query_fleet)) $message .= '_59';

    $row = mysqli_fetch_assoc($result);
    $veh_type = $row['veh_type'];

    $query4 = "SELECT veh_average_age as replacement_vehicle_age
          FROM zvehicle_average_age
          WHERE veh_type = '$veh_type'";
      $result4 = @mysqli_query ($dbc4, $query4);

    $row4 = mysqli_fetch_assoc($result4);
    $replacement_vehicle_age= $row4['replacement_vehicle_age'];

    if(fmod($doors_id, 2)>0)
    {
       $fleet_age_delta = 2*(($fleet_age_2010
                    - round($replacement_vehicle_age))
                      /$veh_count);
    }
  }
}

?>
```

```
<?php  #get_fleet_target

if ($run==0)
{
  $fleet_target_nox=0;
  $fleet_target_pm=0;
}
else
{
  $query = "SELECT
        ROUND(Sum(eng_hp*eng_target_nox)
                    /IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) , 1)
              AS fleet_target_nox
        FROM osm_vehicle
        WHERE calendar_year = '$calendar_year'";
```

```
   $result = @mysqli_query ($dbc4, $query);
   $row = mysqli_fetch_assoc($result);

   $fleet_target_nox =  number_format($row['fleet_target_nox'], 1);


   $query = "SELECT
         ROUND(Sum(eng_hp*eng_target_pm)
                        /IF(SUM(eng_hp) IS NOT NULL, SUM(eng_hp), 0) , 2)
                  AS fleet_target_pm
         FROM osm_vehicle
         WHERE calendar_year = '$calendar_year'";

   $result = @mysqli_query ($dbc4, $query);
   $row = mysqli_fetch_assoc($result);

   $fleet_target_pm =  number_format($row['fleet_target_pm'], 2);
}

?>
```

```
<?php  # htm_initialize  ?>


<!--
=========================================================================
=======-->

      <TD colspan="2"><FIELDSET><legend><FONT
COLOR="RED"><b>INITIALIZE</b></FONT></legend>

     <TABLE BORDER="0" cellpadding="2" CELLSPACING="1"  width="100%"
bgcolor="#D0D0D0">

        <TR><TD>
           Run base
          </TD><TD>
          <INPUT TYPE="CHECKBOX" NAME="run_base" CHECKED>
        </TD></TR>

        <TR><TD>
           Run scenario
          </TD><TD>
          <INPUT TYPE="CHECKBOX" NAME="run_scenario" CHECKED>
```

```
        </TD></TR>

        <TR><TD>
          End year
          </TD><TD><SELECT NAME="end_year">
<?php           for ($i=2011; $i<= 2030; $i++)
          {
            if (isset($end_year) and ($end_year == $i))
            {
              echo '<OPTION  SELECTED="SELECTED">' . $i . '</OPTION>';
            }
            else
            {
              echo '<OPTION>' . $i . '</OPTION>';
            }
          }
?>
          </SELECT>
        </TD></TR>

        <TR><TD>
          Fleet target file name
          </TD><TD>
          <INPUT TYPE="TEXT" NAME="target_file_name"
          SIZE="26" MAXLENGTH="25"
          <?php if(isset($target_file_name)) echo ' VALUE="' . $target_file_name . '"' ?>
          >
        </TD></TR>

 <!--      <TR><TD>
           NOx targets only, retrofit credit
          </TD><TD>
          <INPUT TYPE="CHECKBOX" NAME="nox_targets_only"
          <?php if($nox_targets_only) echo ' CHECKED="CHECKED"' ?>
          >
        </TD></TR> -->

        <TR><TD>
          Vehicle cost file name
          </TD><TD>
          <INPUT TYPE="TEXT" NAME="vehicle_cost_file_name"
          SIZE="26" MAXLENGTH="25"
          <?php if(isset($vehicle_cost_file_name)) echo ' VALUE="' .
$vehicle_cost_file_name . '"' ?>
          >
        </TD></TR>
```

```
        <TR><TD>
           Do cost after run simulation
           </TD><TD>
           <INPUT TYPE="CHECKBOX" NAME="link_cost"
           <?php if($link_cost) echo ' CHECKED="CHECKED"' ?>
           >
        </TD></TR>

        <TR><TD>Economic Recovery
        </TD><TD>
        Long term <INPUT TYPE="RADIO" NAME="economic_recovery"
value="long_term"
        checked="checked"
        >
        </TD></TR>

 <!--       <TR><TD colspan="2">
                NA <INPUT TYPE="RADIO"
NAME="economic_recovery" value="na"
        <?php
           if ($economic_recovery == 'na') echo 'checked = "checked"';
        ?>
        > 
        Slow <INPUT TYPE="RADIO" NAME="economic_recovery" value="slow"
        <?php
           if ($economic_recovery == 'slow') echo 'checked = "checked"';
        ?>
        > 
        Average <INPUT TYPE="RADIO" NAME="economic_recovery" value="average"
        <?php
           if ($economic_recovery == 'average') echo 'checked = "checked"';
        ?>
        > 
        Fast <INPUT TYPE="RADIO" NAME="economic_recovery" value="fast"
        <?php
           if ($economic_recovery == 'fast') echo 'checked = "checked"';
        ?>
             ></TD>
        </TR> -->

        <TR><TD>
           Run name
           </TD><TD>
           <INPUT TYPE="TEXT" NAME="run_name"
           SIZE="26" MAXLENGTH="35"
```

```
        <?php

         if(isset($run_name)) echo ' VALUE="' . $run_name . '"' ?>
        >
      </TD></TR>

    </TABLE>


    </FIELDSET></TD>
```

```
<?php #intialize_base

if($fleet_age_2010 < 4)
{
    $replacement_vehicle_age_factor = 0;
}
if($fleet_age_2010 >= 4 And $fleet_age_2010 < 8)
{
    $replacement_vehicle_age_factor = 0;
}
if($fleet_age_2010 >= 8 And $fleet_age_2010 < 12)
{
    $replacement_vehicle_age_factor = 0.17;
}
if($fleet_age_2010 >= 12 And $fleet_age_2010 < 16)
{
    $replacement_vehicle_age_factor = 0.33;
}
if($fleet_age_2010 >= 16 And $fleet_age_2010 < 20)
{
    $replacement_vehicle_age_factor = 0.5;
}
if($fleet_age_2010 >= 20)
{
    $replacement_vehicle_age_factor = 0.75;
}

?>
```

```
<?php  #initialize_fleet
```

```
$calendar_year = 2010;

$fleet_age_delta=0;
$economic_recovery_factor=0;

$turnover_forced = 0;
$retrofit_forced = 0;

$turnover_carryover=0;
$retrofit_carryover=0;

$expiring_nox_credit = 0;
$expiring_pm_credit = 0;


?>
```

```
<?php  #initialize_run

$message = '';

$end_year              = 2011;
$target_file_name      = 'zengine_target';
$vehicle_cost_file_name = 'zvehicle_cost';
$run_name              = 'Run';
$economic_recovery     = 'long_term';

$turnover_only = 0;

$pm_credit_for_turnover_factor = 0;

$end_year_double_retrofit = 2010;

$new_vehicle_turnover_exemption_age = 10;

$discount_rate = 5.0;
$discount_year = 2010;
$cost_transport = 10;

$cost_retrofit_50 = 16750;
$cost_retrofit_125 = 17588;
$cost_retrofit_175 = 19733;
$cost_retrofit_300 = 24796;
$cost_retrofit_400 = 28763;
```

```
$cost_retrofit_600 = 52333;
$cost_retrofit_600_plus = 52333;

$cost_tier4_premium_50 = 8000;
$cost_tier4_premium_175 = 12000;
$cost_tier4_premium_400 = 18000;
$cost_tier4_premium_400_plus =30000;

$free_2012_for_2010=0;


if (isset($_POST['run_sim1']))
{
   $end_year            = 2030;
   $target_file_name      = 'zet_csx5';
}


?>
```

```
<?php  #initialize_scenario

if($fleet_age_2010 < 4)
{
      $replacement_vehicle_age_factor = 0;
}
if($fleet_age_2010 >= 4 And $fleet_age_2010 < 8)
{
      $replacement_vehicle_age_factor = 0;
}
if($fleet_age_2010 >= 8 And $fleet_age_2010 < 12)
{
      $replacement_vehicle_age_factor = 0.08;
}
if($fleet_age_2010 >= 12 And $fleet_age_2010 < 16)
{
      $replacement_vehicle_age_factor = 0.17;
}
if($fleet_age_2010 >= 16 And $fleet_age_2010 < 20)
{
      $replacement_vehicle_age_factor = 0.25;
}
if($fleet_age_2010 >= 20)
{
      $replacement_vehicle_age_factor = 0.33;
```

```
}

?>
```

```
<?php  #initialize_year

$turnover_carryover_begin = $turnover_carryover;
$turnover_needed=0;
$turnover_actual_base=0;
$turnover_actual=0;
$turnover_pct=0;
$turnover_pool_empty = 'No';


$turnover_tier=0;
$turnover_tier4=0;
$expiring_nox_credit_begin = $expiring_nox_credit;

$retrofit_carryover_begin = $retrofit_carryover;
$retrofit_needed=0;
$retrofit_actual=0;
$retrofit_pct=0;
$retrofit_pool_empty = 'No';

$expiring_pm_credit_begin = $expiring_pm_credit;

if($calendar_year==2010) $turnover_rate_forced = 0;
if($calendar_year==2011) $turnover_rate_forced = .048;
if($calendar_year==2012) $turnover_rate_forced = .048;
if($calendar_year==2013) $turnover_rate_forced = .144;
if($calendar_year==2014) $turnover_rate_forced = .08;
if($calendar_year==2015) $turnover_rate_forced = .08;

if($calendar_year>2015)
{
   $turnover_rate_forced = .1;
}

if($calendar_year==2010) $retrofit_rate_forced = 0;
if($calendar_year==2011) $retrofit_rate_forced = .12;
if($calendar_year==2012) $retrofit_rate_forced = .12;
if($calendar_year==2013) $retrofit_rate_forced = .36;

if($calendar_year>2013)
```

```
{
   $retrofit_rate_forced = .2;
}


if (isset($_POST['run_sim1']))
{

   if($calendar_year<=2013) $turnover_rate_forced = 0;
   if($calendar_year==2014) $turnover_rate_forced = .048;
   if($calendar_year>=2015 and $calendar_year<=2017) $turnover_rate_forced = .08;
   if($calendar_year>=2018) $turnover_rate_forced = .1;

   $retrofit_rate_forced = 0;
}

$annual_turnover_cost = 0;
$annual_repower_cost = 0;
$annual_full_turnover_cost = 0;
$annual_retrofit_cost = 0;

if($run==1 and $calendar_year == 2012)
{
   $expiring_nox_credit = 0;
   $expiring_nox_credit_begin = 0;
   $expiring_pm_credit = 0;
   $expiring_pm_credit_begin = 0;
}


?>
```

```
<?php #insert_engine_index_target

   $query4 = "UPDATE osm_vehicle
         INNER JOIN zengine_index
           USING (eng_model_year)
         SET osm_vehicle.eng_index_tier  = zengine_index.eng_index_tier,
            osm_vehicle.eng_index_pm    = zengine_index.eng_index_pm,
            osm_vehicle.eng_index_nox   = zengine_index.eng_index_nox
         WHERE (osm_vehicle.eng_hp >= zengine_index.eng_index_min_hp)
           AND (osm_vehicle.eng_hp <= zengine_index.eng_index_max_hp)
           AND ein = '$ein'";
   if (!$result4 = @mysqli_query ($dbc4, $query4)) $message .= '_166';
```

```
   $query4 = "UPDATE osm_vehicle
          INNER JOIN $target_file_name
            USING (calendar_year)
          SET osm_vehicle.eng_target_nox = $target_file_name.eng_target_nox,
             osm_vehicle.eng_target_pm  = $target_file_name.eng_target_pm
          WHERE   calendar_year      = '$calendar_year'
             AND osm_vehicle.eng_hp  >= $target_file_name.eng_target_min_hp
             AND osm_vehicle.eng_hp  <= $target_file_name.eng_target_max_hp
             AND $target_file_name.eng_target_fleet_size = '$ren_size'
            AND ein = '$ein'";
   if(!$result4 = @mysqli_query ($dbc4, $query4)) $message .=
'_insert_eng_index_target_27';


?>
```

```
<?php #insert_fleet_averages_targets

   $query4 = "UPDATE osm_vehicle
          INNER JOIN zengine_index
            USING (eng_model_year)
          SET osm_vehicle.eng_index_tier  = zengine_index.eng_index_tier,
             osm_vehicle.eng_index_pm    = zengine_index.eng_index_pm,
             osm_vehicle.eng_index_nox   = zengine_index.eng_index_nox
          WHERE (osm_vehicle.eng_hp >= zengine_index.eng_index_min_hp)
            AND (osm_vehicle.eng_hp <= zengine_index.eng_index_max_hp)";

   if (!$result4 = @mysqli_query ($dbc4, $query4)) $message .= '_166';


   $query4 = "UPDATE osm_vehicle
          INNER JOIN $target_file_name
            USING (calendar_year)
          SET osm_vehicle.eng_target_nox = $target_file_name.eng_target_nox,
             osm_vehicle.eng_target_pm  = $target_file_name.eng_target_pm
          WHERE   calendar_year      = '$calendar_year'
             AND osm_vehicle.eng_hp  >= $target_file_name.eng_target_min_hp
             AND osm_vehicle.eng_hp  <= $target_file_name.eng_target_max_hp
             AND $target_file_name.eng_target_fleet_size = '$ren_size'";

   if(!$result4 = @mysqli_query ($dbc4, $query4)) $message .= '_123';

?>
```

```
<?php #insert_vehicle_average_age

   $query4 = "UPDATE osm_vehicle
          INNER JOIN zvehicle_average_age
            USING ( veh_type )
          SET osm_vehicle.veh_average_age =
zvehicle_average_age.veh_average_age";
                $result4 = @mysqli_query ($dbc4, $query4);

   $query4 = "UPDATE osm_vehicle
          SET veh_relative_age = (calendar_year - eng_model_year)/veh_average_age
          WHERE calendar_year     = '$calendar_year'";
               $result4 = @mysqli_query ($dbc4, $query4);

?>
```

```
<?php # move_fleet_to_base_scenario

   if($run==0)
   {
      $query = 'REPLACE INTO osm_vehicle_base
                SELECT *
                FROM osm_vehicle';
      $result = mysqli_query($dbc4, $query);
   }
   else
   {
      $query = 'REPLACE INTO osm_vehicle_scenario
                SELECT *
                FROM osm_vehicle';
      $result = mysqli_query($dbc4, $query);
   }

?>
```

```
<?php  #run_sim

$query0 = "SELECT doors_id
       FROM rentity";
$result0 = @mysqli_query($dbc, $query0);
```

```
while ($row0 = mysqli_fetch_assoc($result0))
{
   $doors_id = $row0['doors_id'];
   $doors_id_arr = array();
   $doors_id_arr[(integer)$doors_id] = 'ren_name';
   $_SESSION['doors_id_arr'] = $doors_id_arr;

   if(!missing_engine())
   {
      $fleet_doors_id_arr[] = $row0['doors_id'];
   }
}

foreach($fleet_doors_id_arr as $key => $doors_id)
{
   for ($run=0; $run<2; $run++)
   {
      mysqli_query ($dbc4, "TRUNCATE TABLE osm_vehicle");
      include("initialize_fleet.php");
      include("initialize_year.php");
      include("create_fleet.php");
      include("calculate_early_credit.php");
      include("insert_vehicle_average_age.php");
      include("get_fleet_info.php");
//echo $doors_id . ' hp ' . $total_hp . 'oit<BR>';
      if($total_hp>0)
      {
//echo $doors_id . ' hp ' . $total_hp . 'in<BR>';
         include("get_fleet_target.php");
         include("get_fleet_average.php");
         if($run==0) include("initialize_base.php");
         if($run==1) include("initialize_scenario.php");
/*
         for ($calendar_year=2011; $calendar_year < $end_year+1; $calendar_year++)
         {
            include("initialize_year.php");

            if (isset($_POST['run_sim1']) and $calendar_year==2015)
            {
               $turnover_carryover =+ $retirement_2006_2010_credit/2;
            }

            include("create_new_calendar_year.php");
            include("insert_vehicle_average_age.php");
            include("get_fleet_info.php");
            include("get_fleet_target.php");
```

```
            include("get_fleet_average.php");
            include("set_nox_pm_compliance_flags.php");

            if($run == 0
              or ($run == 1 and ($fleet_target_nox == 0
                          or $turnover_rate_forced == 0
                          or $meets_fleet_target_nox)))
            {
               include("initialize_base.php");
            }
            else
            {
               include("initialize_scenario.php");
            }

            include("do_turnover_base.php");

            if($run == 1
               and $fleet_target_nox > 0
               and !$meets_fleet_target_nox
               and $turnover_rate_forced > 0
               and !$free_2014)
            {
               include("set_turnover_rate_and_veh_pool.php");
               include("do_turnover.php");
            }

             if($run == 1
               and $fleet_target_pm > 0
               and !$meets_fleet_target_pm
               and !$turnover_only
               and !$free_2014)
            {
               include("set_retrofit_rate_and_veh_pool.php");
               include("do_retrofit.php");
            }
         }
      */   include("move_fleet_to_base_scenario.php");
       }
   }
}

?>
```

```
<?php  #set_nox_pm_compliance_flags
```

```
if ($run==0)
{
   $meets_fleet_target_nox = 1;
   $meets_fleet_target_pm = 1;
}
else
{
   if ($fleet_average_nox <= $fleet_target_nox)
   {
      $meets_fleet_target_nox = 1;
   }
   else
   {
      $meets_fleet_target_nox = 0;
   }

   if ($fleet_average_pm <= $fleet_target_pm)
   {
      $meets_fleet_target_pm = 1;
   }
   else
   {
      $meets_fleet_target_pm = 0;
   }
}

?>
```

```
<?php #set_retrofit_rate_and_veh_pool


if($calendar_year == 2020)
{
   $retrofit_carryover = 0;
}

$retrofit_forced = $total_hp * $retrofit_rate_forced;

$retrofit_carryover += $turnover_tier4 + $turnover_tier;

if($run==1
   and $retrofit_forced > 0
   and !$meets_fleet_target_pm)
{
```

```
    if($expiring_pm_credit >= $retrofit_forced)
    {
       $expiring_pm_credit = $expiring_pm_credit - $retrofit_forced;
       $retrofit_needed = 0;
    }
    else
    {
       $retrofit_needed = $retrofit_forced - $expiring_pm_credit;
       $expiring_pm_credit = 0;
       if($retrofit_carryover >= $retrofit_needed)
       {
          $retrofit_carryover = $retrofit_carryover - $retrofit_needed;
          $retrofit_needed = 0;
       }
       else
       {
          $retrofit_needed = $retrofit_needed - $retrofit_carryover;
          $retrofit_carryover = 0;
       }
    }
}
else
{
        $retrofit_needed = 0;
}

$query = "SELECT ein, eng_hp
        FROM osm_vehicle
        WHERE calendar_year = '$calendar_year'
          AND ('$calendar_year' - eng_model_year > 4)
          AND (vdecs_pm = 1)
          AND (eng_index_tier < 'T4')
          AND eng_model_year > 1991
          AND eng_hp >= 56
          AND eng_hp <= 500
        ORDER BY eng_index_tier DESC, eng_hp DESC, ein";

if(!$result = @mysqli_query ($dbc4, $query)) $message .= '_260';

?>
```

```
<?php # set_turnover_rate_and_veh_pool


$turnover_forced = $total_hp * $turnover_rate_forced;
```

```
$tunover_forced_minus_base = $turnover_forced - $turnover_actual_base;

if($run==1
   and $tunover_forced_minus_base > 0
   and !$meets_fleet_target_nox)
{
  if($expiring_nox_credit >= $tunover_forced_minus_base)
   {
      $expiring_nox_credit = $expiring_nox_credit - $tunover_forced_minus_base;
      $turnover_needed = 0;
   }
   else
   {
      $turnover_needed = $tunover_forced_minus_base - $expiring_nox_credit;
      $expiring_nox_credit = 0;

      if($turnover_carryover >= $turnover_needed)
      {
         $turnover_carryover = $turnover_carryover - $turnover_needed;
         $turnover_needed = 0;
      }
      else
      {
         $turnover_needed = $turnover_needed - $turnover_carryover;
         $turnover_carryover = 0;
      }
   }
}
else
{
   $turnover_needed = 0;
}

if($calendar_year < 2013)
{
   $query_fleet = "SELECT *
                FROM osm_vehicle
                WHERE doors_id = '$doors_id'
                  AND calendar_year = '$calendar_year'
                  AND (calendar_year - veh_model_year) >=
$new_vehicle_turnover_exemption_age
                  AND eng_index_tier < 'T1U'
                  AND '$calendar_year' - calendar_year_retrofit >= 6
                  AND low_use = 0
                ORDER BY eng_index_tier, veh_relative_age DESC, ein";
```

```
}
else
{
   $query_fleet = "SELECT *
                FROM osm_vehicle
                WHERE doors_id = '$doors_id'
                  AND calendar_year = '$calendar_year'
                  AND (calendar_year - veh_model_year) >=
$new_vehicle_turnover_exemption_age
                  AND eng_index_tier < 'T4I'
                  AND '$calendar_year' - calendar_year_retrofit >= 6
                  AND low_use = 0
                ORDER BY eng_index_tier, veh_relative_age DESC, ein";
}

?>
```

```
<!-- show_costs_total -->

<TABLE border="1" cellpadding="5" cellspacing="5" bgcolor="#CEEFBD">


   <TR><TD bgcolor="#E0E0E0">Run</TD>
      <TD bgcolor="#E0E0E0">Calendar Year</TD>
      <TD bgcolor="#E0E0E0">Full Turnover</TD>
      <TD bgcolor="#E0E0E0">Retrofit</TD>
      <TD bgcolor="#E0E0E0">Full Annual</TD>
      <TD bgcolor="#E0E0E0">PV Full Annual</TD>
   </TR>

<?php

   $query = "SELECT calendar_year,
                SUM(cost_annual_full_turnover) AS cost_annual_full_turnover,
                SUM(cost_annual_retrofit) AS cost_annual_retrofit,
                SUM(cost_annual_full) AS cost_annual_full,
                SUM(cost_annual_full_pv) AS cost_annual_full_pv
           FROM osm_fleet_base_costs_cumulative
           GROUP BY calendar_year
           ORDER BY calendar_year";

$result = @mysqli_query ($dbc4, $query);

if(mysqli_num_rows($result)==0)
```

```
{
   echo '<TR><TD colspan="13" bgcolor="#FF0000"><CENTER><B>
            No rows in cost tables</TD></TR>';
}

while ($row = mysqli_fetch_array($result))
{
   $cost_annual_full_turnover = number_format($row['cost_annual_full_turnover'], 0,
"",",");
   $cost_annual_retrofit     = number_format($row['cost_annual_retrofit'], 0, "",",");
   $cost_annual_full         = number_format($row['cost_annual_full'], 0, "",",");
   $cost_annual_full_pv      = number_format($row['cost_annual_full_pv'], 0, "",",");

   echo '<TR>';
   echo '<TD bgcolor="#FFFFFF"> Base </TD>';
   echo '<TD bgcolor="#FFFFFF">' . $row['calendar_year'] . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_full_turnover . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_retrofit . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_full . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_full_pv . '</TD>';
   echo '</TR>';
}

echo '<TR><TD bgcolor="#E0E0E0">Run</TD>
      <TD bgcolor="#E0E0E0">Calendar Year</TD>
      <TD bgcolor="#E0E0E0">Full Turnover</TD>
      <TD bgcolor="#E0E0E0">Retrofit</TD>
      <TD bgcolor="#E0E0E0">Full Annual</TD>
      <TD bgcolor="#E0E0E0">PV Full Annual</TD>
    </TR>';

   $query = "SELECT calendar_year,
                SUM(cost_annual_full_turnover) AS cost_annual_full_turnover,
                SUM(cost_annual_retrofit) AS cost_annual_retrofit,
                SUM(cost_annual_full) AS cost_annual_full,
                SUM(cost_annual_full_pv) AS cost_annual_full_pv
           FROM osm_fleet_scenario_costs_cumulative
           GROUP BY calendar_year
           ORDER BY calendar_year";
$result = @mysqli_query ($dbc4, $query);

if(mysqli_num_rows($result)==0)
{
   echo '<TR><TD colspan="13" bgcolor="#FF0000"><CENTER><B>
            No rows in cost tables</TD></TR>';
}
```

```
while ($row = mysqli_fetch_array($result))
{
   $cost_annual_full_turnover = number_format($row['cost_annual_full_turnover'], 0,
"","","");
   $cost_annual_retrofit     = number_format($row['cost_annual_retrofit'], 0, "","","");
   $cost_annual_full         = number_format($row['cost_annual_full'], 0, "","","");
   $cost_annual_full_pv      = number_format($row['cost_annual_full_pv'], 0, "","","");

   echo '<TR>';
   echo '<TD bgcolor="#FFFFFF"> Scenario </TD>';
   echo '<TD bgcolor="#FFFFFF">' . $row['calendar_year'] . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_full_turnover . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_retrofit . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_full . '</TD>';
   echo '<TD bgcolor="#FFFFC6">' . $cost_annual_full_pv . '</TD>';
   echo '</TR>';
}

?>

</TABLE><BR><BR>
```

IV. Off-Road Emission Inventory Model

a. Off-road Emissions Inventory Model and Input Tables

The Off-road Emissions Inventory model uses the final output generated by the Off-road Simulation Model (OSM – see previous section for model details). The two sub-procedures titled in this printout as 'OSM Emissions' and 'Emissions Coefficients' encompass the programming behind the emissions inventory. This code runs in Microsoft Access and relies on input tables that were developed by ARB staff. 'Emissions Coefficients' is run separately from 'OSM Emissions' and is explained within that sub-procedure. The 'OSM Emissions' procedure mainly handles formatting and emissions manipulation. The comments that accompany each code are provided to help users understand the purpose of the code (**comments/explanations are in non-italicized font**). This printout is identical to the code within the Emissions Inventory model provided at this time.

Input Tables
The following list contains all the input tables. Each table has the following information: the name of the table, the name of the section(s) it is located, how it is used, and the fields and units used in that section:

Activity / Cumulative Hours Table – "ActivityCmHrs"
EmissionsCoefficients procedure:

- Section: "EmissionFactors"
  Field name: "Cumulative Hours Final"
  Purpose: Cumulative hours for individual vehicle types relate the total hours a vehicle type has been used in its life to the deterioration rate, i.e. emission rates are slightly higher with higher cumulative hours
  Units: hours
- Section: "LoadActivity"
  Field name: "DOORS Adjusted Final"
  Purpose: Annual hours for individual vehicle types are stored in a field to be multiplied against emission rates to get annual emissions (hours are renormalized in osmEmissions before being used, see procedures)
  Units: hours/year

Air Basin Allocation Table – "AirBasinAllocation"
osmEmissions procedure:

- Sections: "BaselineAllocation2" and "ScenarioAllocation2"
  Field name: "Allocation"
  Purpose: Allocation factors distribute aggregate emissions into air basins, both sections have identical methodologies
  Units: unitless

Population Adjustment Table – "BasePop"
osmEmissions procedure:

- Section: "AdjustPop1"
  Field name: "Adjusted Population"
  Purpose: Populations input to the *osmEmissions* procedure are incomplete and so the estimated real-world population found in BasePop is used to scale up population to reflect the accurate population
  Units: number of vehicles

Brake Specific Fuel Consumption Table – "BSFuelConsumption"
EmissionsCoefficients procedure:

- Section: "BSFCFactors"
  Field name: "BSFC"
  Purpose: Fuel Consumption rates are multiplied to calculate total fuel consumption
  Units: pounds of fuel / (horsepower * hour)

Emission Factors / Deterioration Rate Table – "EMFACupdate"
EmissionsCoefficients procedure:

- Section: "EmissionFactors"
  Field names: NOx, NOx Det, PM, PM Det, HC, HC Det
  Purpose: Emission factors (NOx, PM, HC) are used to calculate total emissions. Deterioration rates (NOx Det, PM Det, HC Det) are used with cumulative hours (see above) to calculate the increase in emissions due to a vehicle's age
  Units (EF): grams / (horsepower * hour)
  Units (DR): grams / (horsepower * hour * hour)

Fuel Correction Factor Table – "FuelCorrectionFactorUpdate"
EmissionsCoefficients procedure:

- Section: "FuelCorrectionFactor"
  Field name: NOX, PM, HC
  Purpose: Factors are multiplied against emissions to account for the reductions from fuel improvements
  Units: unitless

Growth Factors – "GrowthFactor"
osmEmissions procedure:

- Section: "GrowEmissions"
  Field name: "GrowthFactor"
  Purpose: Growth factors are multiplied against rated horsepower to reflect the economic growth expected within different sectors
  Units: unitless

Load Factors – "LoadFactor"
EmissionsCoefficients procedure:

- Section: "LoadFactor"
  Field name: "Adj ARB LF"

Purpose: Load factors are multiplied against emissions to reflect the actual running conditions during operations.
Units: unitless

Lookup Equipment Type Table – "LookupEquipmentType"
EmissionsCoefficients and *osmEmissions* procedures:

- Used throughout model
  Field names: "Equipment Type" and "EquipmentTypeID"
  Purpose: To save space, equipment IDs are used instead of the actual names of equipment types

b. Off-road Emissions Inventory Code

Terminology

Some terminology used in the Off-road Emissions Inventory code is used for simplicity. The following terms are defined for this code only – other models may use different naming conventions and these do not represent the any official ARB definitions.

Baseline (sometimes 'base'): the OSM output generated under business-as-usual
Scenario (sometimes 'scen'): the OSM output generated under the proposed regulation
Emission Coefficient: a number that contains load factor, fuel correction factor, emission factor information all in one. It can be multiplied against a population and horsepower to generate emissions.
'Unique vehicle type' and 'specificity': There are different vehicle types such as 'forklifts' or 'excavators' so in common terms a specific vehicle type could mean what type of vehicle it is. However, in this model vehicles are considered unique or different from each other if they have different ages, horse-powers, or at times fleet location. Throughout the code the 'level of specificity' refers to how a particular section is considering differences (i.e. at times vehicles are unique just by name, at other times they are specific or unique to age, horsepower, etc.).

EMISSIONS COEFFICIENTS

Sub EmCo()

DoCmd.SetWarnings False

'The 'EmissionsCoefficients' table is created as a generic multiplier for any population of vehicles. The table contains information about emission factors, fuel correction factors, load factors, fuel consumption rates, and activities for all unique types of equipment. A piece of equipment is designated unique by having a combination of calendar year, model year, horsepower, and equipment type. Equipment type categories have been designated to reflect general off-road equipment categories. Each record in EmissionsCoefficients is to be used as a multiplier for calculating emissions. Units are grams / (horsepower * hour). Activity is loaded as a separate value so that

renormalization issues can be worked out in a separate module without affecting the emissions coefficients themselves.

'MakeUniqueVehicles - The following query is used to create a table with all unique categories. The table 'GrowthFactor' contains all calendar years; 'EMFACupdate' contains all horsepowers and model years; 'LookupEquipmentType' contains all equipment types. No values are entered or calculated and a placeholder of '1' is used for each emission category for each unique equipment category. Calendar Years are limited from 2009 to 2030 and model years from 89 years before a calendar year to 1 year after. These limitations are to include extreme outliers and allow for any slight future variations while making results uniform (same number of MYs in each CY). Equipment type IDs are used instead of equipment names for the sake of saving memory space and will be used consistently throughout the program.
'INTO EmissionsCoefficients

DoCmd.RunSQL "SELECT GrowthFactor.CalendarYear, LookupEquipmentType.EquipmentTypeID, EMFACupdate!HP AS HorsePower, EMFACupdate![Model Year] AS ModelYear, [GrowthFactor]![CalendarYear]-[EMFACupdate]![Model Year] AS Age, CDbl(1) AS BSFC, CDbl(1) AS HC, CDbl(1) AS NOx, CDbl(1) AS PM INTO EmissionsCoefficients FROM EMFACupdate, GrowthFactor INNER JOIN LookupEquipmentType ON GrowthFactor.EquipmentClass = LookupEquipmentType.[Equipment Class] WHERE (((GrowthFactor.CalendarYear) <= 2029 And (GrowthFactor.CalendarYear) >= 2009) And (([EMFACupdate]![Model Year]) >= ([GrowthFactor]![CalendarYear] - 89) And ([EMFACupdate]![Model Year]) <= ([GrowthFactor]![CalendarYear] + 1) And ([EMFACupdate]![Model Year]) <= 2030)) ORDER BY GrowthFactor.CalendarYear, LookupEquipmentType.EquipmentTypeID, EMFACupdate!HP, EMFACupdate![Model Year] DESC;"

'EmissionFactors - Cumulative hours from table 'ActivityCmHrs' and emission factors and deterioration rates from table 'EMFACupdate' are used to calculate emissions factor values for EmissionCoefficients. The following equations all calculate a grams/(HP*hour) emission factor. Deterioration rates and emission factors are derived to multiply into these equations as shown. They are multiplied against the placeholders which are initially set at 1. The table 'LookupEquipmentType' is used to join EmissionsCoefficients to ActivityCmHrs as ID's are used in large tables and names are used in small ones to identify vehicle type (this is a space saving technique). BSFC rates are calculated separately in the next query.
'NOx = 1 * ([Emission Factor] + ([Deterioration Rate] * [Cumulative Hours]))
'PM = 1 * ([Emission Factor] + ([Deterioration Rate] * [Cumulative Hours]))
'HC = 1 * ([Emission Factor] + ([Deterioration Rate] * [Cumulative Hours]))
'UPDATE EmissionsCoefficients

DoCmd.RunSQL "UPDATE ActivityCmHrs INNER JOIN ((EmissionsCoefficients INNER JOIN EMFACupdate ON (EmissionsCoefficients.HorsePower =

EMFACupdate.HP) AND (EmissionsCoefficients.ModelYear = EMFACupdate.[Model Year])) INNER JOIN LookupEquipmentType ON EmissionsCoefficients.EquipmentTypeID = LookupEquipmentType.EquipmentTypeID) ON (ActivityCmHrs.Equipment = LookupEquipmentType.[Equipment Type]) AND (ActivityCmHrs.Age = EmissionsCoefficients.Age) SET EmissionsCoefficients.HC = [EmissionsCoefficients]![HC]([EMFACupdate]![HC]+([EMFACupdate]![HC Det]*[ActivityCmHrs]![Cumulative Hours Final])), EmissionsCoefficients.NOx = [EmissionsCoefficients]![NOx]*([EMFACupdate]![NOx]+([EMFACupdate]![NOx Det]*[ActivityCmHrs]![Cumulative Hours Final])), EmissionsCoefficients.PM = [EmissionsCoefficients]![PM]*([EMFACupdate]![PM]+([EMFACupdate]![PM Det]*[ActivityCmHrs]![Cumulative Hours Final]));"*

'BSFCFactors - Brake specific fuel consumption rates from the table 'BSFuelConsumption' are multiplied directly as in the following equation to the placeholder '1'. The values calculated have units of pounds/(HP*hour). BSFC values are specific to the model year and horsepower of a given vehicle. However, when load factors are applied to the EmissionsCoefficients table, BSFC becomes vehicle type specific as well.
'BSFC = BSFC * 1
'UPDATE EmissionsCoefficients

*DoCmd.RunSQL "UPDATE BSFuelConsumption INNER JOIN EmissionsCoefficients ON (BSFuelConsumption.MY = EmissionsCoefficients.ModelYear) AND (BSFuelConsumption.[ARB HP] = EmissionsCoefficients.HorsePower) SET EmissionsCoefficients.BSFC = EmissionsCoefficients!BSFC*BSFuelConsumption!BSFC;"*

'LoadFactor - Load factors from table 'LoadFactor' (field: 'Adj ARB LF') are unitless and are multiplied directly to EmissionsCoefficients. They are specific to equipment type only. They apply to all four coefficients: BSFC, NOx, PM, and HC.
'UPDATE EmissionsCoefficients

DoCmd.RunSQL "UPDATE LoadFactor INNER JOIN EmissionsCoefficients ON LoadFactor.EquipmentTypeID = EmissionsCoefficients.EquipmentTypeID SET EmissionsCoefficients.BSFC = [EmissionsCoefficients]![BSFC][LoadFactor]![Adj ARB LF], EmissionsCoefficients.HC = [EmissionsCoefficients]![HC]*[LoadFactor]![Adj ARB LF], EmissionsCoefficients.NOx = [EmissionsCoefficients]![NOx]*[LoadFactor]![Adj ARB LF], EmissionsCoefficients.PM = [EmissionsCoefficients]![PM]*[LoadFactor]![Adj ARB LF];"*

'FuelCorrectionFactor - Fuel Correction Factors from the table 'FuelCorrectionFactorUpdate' are unitless and are multiplied directly to NOx and PM but not HC or BSFC. They are model year and horsepower specific. BSFC has no FCF and

HC has a value of 0.72 that applies to all horsepower and model year categories. This value is coded into the following query.
'UPDATE EmissionsCoefficients

DoCmd.RunSQL "UPDATE EmissionsCoefficients INNER JOIN FuelCorrectionFactorUpdate ON (EmissionsCoefficients.ModelYear = FuelCorrectionFactorUpdate.[Model Yr]) AND (EmissionsCoefficients.HorsePower = FuelCorrectionFactorUpdate.Hp) SET EmissionsCoefficients.NOx = [EmissionsCoefficients]![NOx][FuelCorrectionFactorUpdate]![NOX], EmissionsCoefficients.PM = [EmissionsCoefficients]![PM]*[FuelCorrectionFactorUpdate]![PM], EmissionsCoefficients.HC = [EmissionsCoefficients]![HC]*0.72;"*

'ActivityColumn - Activity must be renormalized in the module 'OsmEmissions' before it can be applied to equipment or emissions. This query creates a column for activity so that it can be manipulated separately from emissions coefficients values during renormalization (see OsmEmissions).
'ALTER EmissionsCoefficients

DoCmd.RunSQL "ALTER TABLE EmissionsCoefficients ADD COLUMN [Activity] DOUBLE;"

'LoadActivity - The following query uploads activity values in units of hours/year by equipment type and age into the blank column created above. These are taken from the table 'ActivityCmHrs'. The table 'LookupEquipmentType' is used again for linking equipment ID's to the corresponding equipment type names. These will be renormalized in the module 'osmEmissions' before they are multiplied to emissions and populations.
'UPDATE EmissionsCoefficients

DoCmd.RunSQL "UPDATE ActivityCmHrs INNER JOIN (EmissionsCoefficients INNER JOIN LookupEquipmentType ON EmissionsCoefficients.EquipmentTypeID = LookupEquipmentType.EquipmentTypeID) ON (ActivityCmHrs.Age = EmissionsCoefficients.Age) AND (ActivityCmHrs.Equipment = LookupEquipmentType.[Equipment Type]) SET EmissionsCoefficients.Activity = [ActivityCmHrs]![DOORS Adjusted Final];"

DoCmd.SetWarnings True

End Sub

OSM EMISSIONS

Sub OsmEmissions()

DoCmd.SetWarnings False

'LoadTemplate - OSM output is loaded 'as is' with designated names 'Osm_vehicle_base' and 'Osm_vehicle_scenario'. The table 'TemplateOSM' is a table for the emissions inventory that is used for formatting OSM output. The following query creates a copy of TemplateOSM for inputting both OSM tables. A copy is created so that each time this routine is run the template for formatting stays untouched.
'INTO osmEmissions

DoCmd.RunSQL "SELECT TemplateOSM. INTO osmEmissions FROM TemplateOSM;"*

'InputOSM - Input all needed information from OSM output tables 'Osm_vehicle_base' and 'Osm_vehicle_scenario.' These two tables are condensed to one for the sake of saving memory space and ease of programming. Tables share common characteristics like calendar years, horsepower, fleet ID, etc., so that no informational integrity is lost in condensing to one table. Instead of loading equipment type names, the table LookupEquipmentType is used to load ID numbers for all the unique vehicle types. This is also done for the sake of saving memory space and programming ease. From here on equipment ID's are used as much as possible for consistency.
'APPEND osmEmissions

DoCmd.RunSQL "INSERT INTO osmEmissions (FleetSize, DoorsID, CalendarYear, EquipmentTypeID, HP, HorsepowerBin, LowUse, BaseAge, BaseModelYear, BaseTier, BaseCYRetrofit, BaseVDECSNOx, BaseVDECSPM, ScenAge, ScenModelYear, ScenTier, ScenCYRetrofit, ScenVDECSNOx, ScenVDECSPM) SELECT osm_vehicle_base.Field1, osm_vehicle_base.Field2, osm_vehicle_base.Field4, LookupEquipmentType.EquipmentTypeID, osm_vehicle_base.Field8, osm_vehicle_base.Field9, osm_vehicle_base.Field10, osm_vehicle_base!Field4-osm_vehicle_base!Field7 AS BaseAge, osm_vehicle_base.Field7, osm_vehicle_base.Field17, osm_vehicle_base.Field12, osm_vehicle_base.Field13, osm_vehicle_base.Field14, osm_vehicle_base!Field4-osm_vehicle_scenario!Field7 AS ScenAge, osm_vehicle_scenario.Field7, osm_vehicle_scenario.Field17, osm_vehicle_scenario.Field12, osm_vehicle_scenario.Field13, osm_vehicle_scenario.Field14 " & _
"FROM (osm_vehicle_base INNER JOIN LookupEquipmentType ON osm_vehicle_base.Field5 = LookupEquipmentType.[Equipment Type]) INNER JOIN osm_vehicle_scenario ON (osm_vehicle_base.Field2 = osm_vehicle_scenario.Field2) AND (osm_vehicle_base.Field8 = osm_vehicle_scenario.Field8) AND (osm_vehicle_base.Field4 = osm_vehicle_scenario.Field4) AND (osm_vehicle_base.Field3 = osm_vehicle_scenario.Field3) AND (osm_vehicle_base.Field1 = osm_vehicle_scenario.Field1) AND (LookupEquipmentType.[Equipment Type] = osm_vehicle_scenario.Field5);"

'EmissionsActivityColumns - Activity will be loaded and emissions calculated from the table 'EmissionsCoefficients.' The following query simply creates blank columns for these fields.
'ALTER osmEmissions

DoCmd.RunSQL "ALTER TABLE osmEmissions ADD COLUMN [BaseActivity] DOUBLE, [BaseBSFC] DOUBLE, [BaseNOx] DOUBLE, [BasePM] DOUBLE, [BaseHC] DOUBLE, [ScenActivity] DOUBLE, [ScenBSFC] DOUBLE, [ScenNOx] DOUBLE, [ScenPM] DOUBLE, [ScenHC] DOUBLE;"

'Some of the following procedures use the table 'EmissionsCoefficients.' This table is created by the module 'EmCoefficient', sub routine 'EmCo'. The code and explanation for deriving the table can be found there.

'LoadBaseActivity - The following query loads activity for baseline emissions from the table 'EmissionsCoefficients'. Equipment type and model year designate the activity in hours per year. Baseline and Scenario activity are loaded separately because the same piece of equipment can have different ages under each scenario.
'UPDATE osmEmissions

DoCmd.RunSQL "UPDATE osmEmissions INNER JOIN EmissionsCoefficients ON (osmEmissions.BaseModelYear = EmissionsCoefficients.ModelYear) AND (osmEmissions.HorsepowerBin = EmissionsCoefficients.HorsePower) AND (osmEmissions.CalendarYear = EmissionsCoefficients.CalendarYear) AND (osmEmissions.EquipmentTypeID = EmissionsCoefficients.EquipmentTypeID) SET osmEmissions.BaseActivity = IIf([osmEmissions]![LowUse]=0,[EmissionsCoefficients]![Activity],200);"

'LoadScenActivity - Loads scenario activity based on equipment type and the scenario's age. Same as LoadBaseActivity using scenario input.
'UPDATE osmEmissions

DoCmd.RunSQL "UPDATE osmEmissions INNER JOIN EmissionsCoefficients ON (osmEmissions.ScenModelYear = EmissionsCoefficients.ModelYear) AND (osmEmissions.HorsepowerBin = EmissionsCoefficients.HorsePower) AND (osmEmissions.CalendarYear = EmissionsCoefficients.CalendarYear) AND (osmEmissions.EquipmentTypeID = EmissionsCoefficients.EquipmentTypeID) SET osmEmissions.ScenActivity = IIf([osmEmissions]![LowUse]=0,[EmissionsCoefficients]![Activity],200);"

"""""""The following set of queries is to renormalize the fleet specific yearly activity. Growth is handled separately from activity so increases in activity resulting from vehicle turnover are renormalized so total fleet activity stays constant. Specificity within a fleet: groupings by fleet, equipment type, and horsepower are renormalized.

'ActivityRenormalize1 - The first step is summing the total number of hours each calendar year specific to fleet, equipment type, and horsepower. These activity values vary by calendar year and must be renormalized. Base and scenario activity are summed together.

'INTO Activity1

DoCmd.RunSQL "SELECT osmEmissions.CalendarYear, osmEmissions.DoorsID, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, Sum(osmEmissions.BaseActivity) AS SumOfBaseActivity, Sum(osmEmissions.ScenActivity) AS SumOfScenActivity INTO Activity1 FROM osmEmissions GROUP BY osmEmissions.CalendarYear, osmEmissions.DoorsID, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, osmEmissions.LowUse HAVING (((osmEmissions.LowUse)<>1));"

'ActivityRenormalize2 - The summation of activity just as in ActivityRenormalize1 exclusive to calendar year 2009. This is used as the numerator for the fraction calculated in ActivityRenormalize3

'INTO Activity2

DoCmd.RunSQL "SELECT osmEmissions.CalendarYear, osmEmissions.DoorsID, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, Sum(osmEmissions.BaseActivity) AS SumOfBaseActivity, Sum(osmEmissions.ScenActivity) AS SumOfScenActivity INTO Activity2 FROM osmEmissions GROUP BY osmEmissions.CalendarYear, osmEmissions.DoorsID, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, osmEmissions.LowUse HAVING (((osmEmissions.CalendarYear)=2009) AND ((osmEmissions.LowUse)<>1));"

'ActivityRenormalize3 - Within a given fleet, equipment type, and horsepower (just as Activity1 and Activity2), the base year activity (2009) is divided by each successive calendar year's activity. The fraction activity2009/activityCY ('CY' representing any given calendar year) is to be multiplied against every individual vehicle cancelling out the overall fleet activity growth or reduction relative to 2009 thus recovering the original overall activity.

'INTO Activity3

DoCmd.RunSQL "SELECT Activity1.CalendarYear, Activity1.DoorsID, Activity1.EquipmentTypeID, Activity1.HorsepowerBin, [Activity2]![SumOfBaseActivity]/[Activity1]![SumOfBaseActivity] AS RenormFactorBase, [Activity2]![SumOfScenActivity]/[Activity1]![SumOfScenActivity] AS RenormFactorScen INTO Activity3 FROM Activity1 INNER JOIN Activity2 ON (Activity1.HorsepowerBin = Activity2.HorsepowerBin) AND (Activity1.EquipmentTypeID = Activity2.EquipmentTypeID) AND (Activity1.DoorsID = Activity2.DoorsID);"

'''''''''

'RenormalizeActivity - Renormalization Fractions are multiplied directly to every individual equipment in osmEmissions.
'UPDATE osmEmissions

DoCmd.RunSQL "UPDATE Activity3 INNER JOIN osmEmissions ON (Activity3.CalendarYear = osmEmissions.CalendarYear) AND (Activity3.DoorsID = osmEmissions.DoorsID) AND (Activity3.EquipmentTypeID = osmEmissions.EquipmentTypeID) AND (Activity3.HorsepowerBin = osmEmissions.HorsepowerBin) SET osmEmissions.BaseActivity = IIf([osmEmissions]![LowUse]=0,[osmEmissions]![BaseActivity][Activity3]![RenormFactorBase],[osmEmissions]![BaseActivity]), osmEmissions.ScenActivity = IIf([osmEmissions]![LowUse]=0,[osmEmissions]![ScenActivity]*[Activity3]![RenormFactorScen],[osmEmissions]![ScenActivity]);"*

'BaselineEmissions - Values from 'EmissionsCoefficients' are used to calculate brake specific fuel consumption (BSFC), NOx Emissions, PM emissions, and HC emissions. PM and NOx have VDECS factors representing filter reductions in emissions that are multiplied directly to results. EmissionsCoefficients are all units of g/(HP*hr) except BSFC which is pounds/(HP*hr). These units allow the direct multiplication against the activity and horsepower in osmEmissions. For information on EmissionsCoefficients see module 'EmCoefficient'
'BSFC = BSFC*Activity*HP, NOx = NOx*Activity*HP*VDECSNOx, PM = PM*Activity*HP*VDECSPM, HC = HC*Activity*HP
'UPDATE osmEmissions

DoCmd.RunSQL "UPDATE EmissionsCoefficients INNER JOIN osmEmissions ON (EmissionsCoefficients.EquipmentTypeID = osmEmissions.EquipmentTypeID) AND (EmissionsCoefficients.CalendarYear = osmEmissions.CalendarYear) AND (EmissionsCoefficients.HorsePower = osmEmissions.HorsepowerBin) AND (EmissionsCoefficients.ModelYear = osmEmissions.BaseModelYear) SET osmEmissions.BaseBSFC = [osmEmissions]![BaseActivity][EmissionsCoefficients]![BSFC]*[osmEmissions]![HP], osmEmissions.BaseNOx = [osmEmissions]![BaseActivity]*[EmissionsCoefficients]![NOx]*[osmEmissions]![BaseVDECSNOx]*[osmEmissions]![HP], osmEmissions.BasePM = [osmEmissions]![BaseActivity]*[EmissionsCoefficients]![PM]*[osmEmissions]![HP]*[osmEmissions]![BaseVDECSPM], osmEmissions.BaseHC = [osmEmissions]![BaseActivity]*[EmissionsCoefficients]![HC]*[osmEmissions]![HP];"*

'ScenarioEmissions - Same methodology as 'BaselineEmissions' used to calculate scenario emissions. Scenario model year and age are used instead of baseline values.
'UPDATE osmEmissions

DoCmd.RunSQL "UPDATE EmissionsCoefficients INNER JOIN osmEmissions ON (EmissionsCoefficients.EquipmentTypeID = osmEmissions.EquipmentTypeID) AND (EmissionsCoefficients.CalendarYear = osmEmissions.CalendarYear) AND (EmissionsCoefficients.HorsePower = osmEmissions.HorsepowerBin) AND (EmissionsCoefficients.ModelYear = osmEmissions.ScenModelYear) SET osmEmissions.ScenBSFC = [osmEmissions]![ScenActivity][EmissionsCoefficients]![BSFC]*[osmEmissions]![HP], osmEmissions.ScenNOx = [osmEmissions]![ScenActivity]*[EmissionsCoefficients]![NOx]*[osmEmissions]![ScenVDECSNOx]*[osmEmissions]![HP], osmEmissions.ScenPM = [osmEmissions]![ScenActivity]*[EmissionsCoefficients]![PM]*[osmEmissions]![ScenVDECSPM]*[osmEmissions]![HP], osmEmissions.ScenHC = [osmEmissions]![ScenActivity]*[EmissionsCoefficients]![HC]*[osmEmissions]![HP];"*

"""""The following set of queries calculates the adjustment factor that reflects the differences between reported equipment available in osmEmissions and the actual population. The table 'BasePop' reflects real-world populations and is used to calculate the adjustment factor.

'INTO SumPopET1 - The population in osmEmissions Calendar Year 2009 is counted.

DoCmd.RunSQL "SELECT osmEmissions.CalendarYear, osmEmissions.EquipmentTypeID, Count(osmEmissions.CalendarYear) AS CountOfEIN INTO SumPopET1 FROM osmEmissions GROUP BY osmEmissions.CalendarYear, osmEmissions.EquipmentTypeID HAVING (((osmEmissions.CalendarYear)=2009));"

'INTO SumPopET2 - 'BasePopulation' contains a real-world approximation of populations. A common adjustment factor was applied across every equipment type resulting in the 'Adjusted Population'. The proportions of these populations relative to the osmEmissions populations are found in the following query. These factors will scale up populations to a more real-world value. Factors are specific to equipment type.

DoCmd.RunSQL "SELECT LookupEquipmentType.EquipmentTypeID, [BasePop]![Adjusted Population]/[SumPopET1]![CountOfEIN] AS AdjustmentFraction INTO SumPopET2 FROM BasePop INNER JOIN (SumPopET1 INNER JOIN LookupEquipmentType ON SumPopET1.EquipmentTypeID = LookupEquipmentType.EquipmentTypeID) ON BasePop.[Equiment Type] = LookupEquipmentType.[Equipment Type];"

'PopulationAdjustment - Population adjustment factor calculated above is used to adjust emissions.
'BSFC = BSFC*PopFactor, NOx = NOx*PopFactor, PM = PM*PopFactor, HC = HC*PopFactor

'UPDATE osmEmissions

DoCmd.RunSQL "UPDATE osmEmissions INNER JOIN SumPopET2 ON osmEmissions.EquipmentTypeID = SumPopET2.EquipmentTypeID SET osmEmissions.BaseBSFC = [osmEmissions]![BaseBSFC][SumPopET2]![AdjustmentFraction], osmEmissions.BaseNOx = [osmEmissions]![BaseNOx]*[SumPopET2]![AdjustmentFraction], osmEmissions.BasePM = [osmEmissions]![BasePM]*[SumPopET2]![AdjustmentFraction], osmEmissions.BaseHC = [osmEmissions]![BaseHC]*[SumPopET2]![AdjustmentFraction], osmEmissions.ScenBSFC = [osmEmissions]![ScenBSFC]*[SumPopET2]![AdjustmentFraction], osmEmissions.ScenNOx = [osmEmissions]![ScenNOx]*[SumPopET2]![AdjustmentFraction], osmEmissions.ScenPM = [osmEmissions]![ScenPM]*[SumPopET2]![AdjustmentFraction], osmEmissions.ScenHC = [osmEmissions]![ScenHC]*[SumPopET2]![AdjustmentFraction];"*

'''''''''

'GrowEmissions - Growth factors were derived to reflect the growth industries will have into the future. These are available in the table 'GrowthFactors.' Growth factors are specific to calendar year and equipment class (sector).' Instead of attempting to grow populations or activities, growth is applied directly to emissions to reflect an overall growth.
'BSFC = BSFC * GrowthFactor, NOx = NOx * GrowthFactor, PM = PM * GrowthFactor, HC = HC * GrowthFactor,
'UPDATE osmEmissions

*DoCmd.RunSQL "UPDATE (GrowthFactor INNER JOIN osmEmissions ON GrowthFactor.CalendarYear = osmEmissions.CalendarYear) INNER JOIN LookupEquipmentType ON (LookupEquipmentType.[Equipment Class] = GrowthFactor.EquipmentClass) AND (osmEmissions.EquipmentTypeID = LookupEquipmentType.EquipmentTypeID) SET osmEmissions.BaseBSFC = osmEmissions!BaseBSFC*GrowthFactor!GrowthFactor, osmEmissions.BaseNOx = osmEmissions!BaseNOx*GrowthFactor!GrowthFactor, osmEmissions.BasePM = osmEmissions!BasePM*GrowthFactor!GrowthFactor, osmEmissions.BaseHC = osmEmissions!BaseHC*GrowthFactor!GrowthFactor, osmEmissions.ScenBSFC = osmEmissions!ScenBSFC*GrowthFactor!GrowthFactor, osmEmissions.ScenNOx = osmEmissions!ScenNOx*GrowthFactor!GrowthFactor, osmEmissions.ScenPM = osmEmissions!ScenPM*GrowthFactor!GrowthFactor, osmEmissions.ScenHC = osmEmissions!ScenHC*GrowthFactor!GrowthFactor;"*

'GramsToTons - Grams per year are converted to tons per year by factor = 1/(453.59237*2000)
'Update osmEmissions

*DoCmd.RunSQL "UPDATE osmEmissions SET osmEmissions.BaseNOx = [osmEmissions]![BaseNOx]/(453.59237*2000), osmEmissions.BasePM = [osmEmissions]![BasePM]/(453.59237*2000), osmEmissions.BaseHC = [osmEmissions]![BaseHC]/(453.59237*2000), osmEmissions.ScenNOx = [osmEmissions]![ScenNOx]/(453.59237*2000), osmEmissions.ScenPM = [osmEmissions]![ScenPM]/(453.59237*2000), osmEmissions.ScenHC = [osmEmissions]![ScenHC]/(453.59237*2000);"*

""""""""""""The table 'osmEmissions' is specific to all vehicles run through the program OSM. A spatial allocation of emissions is desired so the following 9 queries allocate emissions to air basins around California while at the same time formatting the final output to be used by the form 'UserForm.'

'BaselineAllocation1 - Emissions are summed without individual vehicle or fleet specificity: Grouped by Calendar Year, fleet size, equipment type, horsepower, and model year. Baseline is done separate from Scenario because results are model year specific and each has varying populations and emissions when grouped by model year. Results are put into the table 'osmEmBaseAll'.
'INTO osmEmBaseAll

DoCmd.RunSQL "SELECT osmEmissions.CalendarYear, osmEmissions.FleetSize, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, osmEmissions.BaseModelYear, Sum(osmEmissions.BaseBSFC) AS SumOfBaseBSFC, Sum(osmEmissions.BaseNOx) AS SumOfBaseNOx, Sum(osmEmissions.BasePM) AS SumOfBasePM, Sum(osmEmissions.BaseHC) AS SumOfBaseHC INTO osmEmAllBase FROM osmEmissions GROUP BY osmEmissions.CalendarYear, osmEmissions.FleetSize, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, osmEmissions.BaseModelYear;"

'ScenarioAllocation1 - Just as in BaselineAllocation1, emissions are summed by groups for location allocation. Results are put into a table 'osmEmScenAll'.
'INTO osmEmScenAll

DoCmd.RunSQL "SELECT osmEmissions.CalendarYear, osmEmissions.FleetSize, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, osmEmissions.ScenModelYear, Sum(osmEmissions.ScenBSFC) AS SumOfScenBSFC, Sum(osmEmissions.ScenNOx) AS SumOfScenNOx, Sum(osmEmissions.ScenPM) AS SumOfScenPM, Sum(osmEmissions.ScenHC)

AS SumOfScenHC INTO osmEmAllScen FROM osmEmissions GROUP BY osmEmissions.CalendarYear, osmEmissions.FleetSize, osmEmissions.EquipmentTypeID, osmEmissions.HorsepowerBin, osmEmissions.ScenModelYear;"

'Now that baseline and scenario emissions have been separated, the following six queries combine the information back into one table for programming ease and saving memory. The first two queries count how many unique vehicle types (by calendar year, age, type, etc.) there are in the baseline table. These vehicle types don't exist in the scenario table and must be formatted to be included. The first query counts all vehicle types in baseline.

DoCmd.RunSQL "SELECT osmEmAllBase.CalendarYear, osmEmAllBase.FleetSize, osmEmAllBase.EquipmentTypeID, osmEmAllBase.HorsepowerBin, osmEmAllBase.BaseModelYear INTO osmEmAllBaseUnique FROM osmEmAllBase;"

'This second query deletes entries from baseline that also appear in scenario, thus leaving unique baseline entries.

DoCmd.RunSQL "DELETE DISTINCTROW osmEmAllBaseUnique. FROM osmEmAllBaseUnique INNER JOIN osmEmAllScen ON (osmEmAllBaseUnique.BaseModelYear = osmEmAllScen.ScenModelYear) AND (osmEmAllBaseUnique.HorsepowerBin = osmEmAllScen.HorsepowerBin) AND (osmEmAllBaseUnique.EquipmentTypeID = osmEmAllScen.EquipmentTypeID) AND (osmEmAllBaseUnique.FleetSize = osmEmAllScen.FleetSize) AND (osmEmAllBaseUnique.CalendarYear = osmEmAllScen.CalendarYear);"*

'The following query enters vehicle type information from the scenario table into a new table 'osmEmissionsForAirBasin1.' It also creates empty fields for scenario emissions information.

DoCmd.RunSQL "SELECT osmEmAllScen.CalendarYear, osmEmAllScen.FleetSize, osmEmAllScen.EquipmentTypeID, osmEmAllScen.HorsepowerBin, [osmEmAllScen]![ScenModelYear] AS ModelYear, CDbl(0) AS BaseBSFC, CDbl(0) AS BaseNOx, CDbl(0) AS BasePM, CDbl(0) AS BaseHC, CDbl(0) AS ScenBSFC, CDbl(0) AS ScenNOx, CDbl(0) AS ScenPM, CDbl(0) AS ScenHC INTO osmEmissionsForAirBasin1 FROM osmEmAllScen;"

'The following query enters the same vehicle information as above for the unique vehicle types in the baseline table.

DoCmd.RunSQL "INSERT INTO osmEmissionsForAirBasin1 (CalendarYear, FleetSize, EquipmentTypeID, HorsepowerBin, ModelYear, BaseBSFC, BaseNOx, BasePM, BaseHC, ScenBSFC, ScenNOx, ScenPM, ScenHC)

SELECT osmEmAllBaseUnique.CalendarYear, osmEmAllBaseUnique.FleetSize, osmEmAllBaseUnique.EquipmentTypeID, osmEmAllBaseUnique.HorsepowerBin, osmEmAllBaseUnique.BaseModelYear, 0 AS BaseBSFC, 0 AS BaseNOx, 0 AS BasePM, 0 AS BaseHC, 0 AS ScenBSFC, 0 AS ScenNOx, 0 AS ScenPM, 0 AS ScenHC FROM osmEmAllBaseUnique;"

'Baseline emissions are loaded.

DoCmd.RunSQL "UPDATE osmEmissionsForAirBasin1 INNER JOIN osmEmAllBase ON (osmEmissionsForAirBasin1.ModelYear = osmEmAllBase.BaseModelYear) AND (osmEmissionsForAirBasin1.HorsepowerBin = osmEmAllBase.HorsepowerBin) AND (osmEmissionsForAirBasin1.EquipmentTypeID = osmEmAllBase.EquipmentTypeID) AND (osmEmissionsForAirBasin1.FleetSize = osmEmAllBase.FleetSize) AND (osmEmissionsForAirBasin1.CalendarYear = osmEmAllBase.CalendarYear) SET osmEmissionsForAirBasin1.BaseBSFC = [osmEmAllBase]![SumOfBaseBSFC], osmEmissionsForAirBasin1.BaseNOx = [osmEmAllBase]![SumOfBaseNOx], osmEmissionsForAirBasin1.BasePM = [osmEmAllBase]![SumOfBasePM], osmEmissionsForAirBasin1.BaseHC = [osmEmAllBase]![SumOfBaseHC];"

'Scenario emissions are loaded

DoCmd.RunSQL "UPDATE osmEmissionsForAirBasin1 INNER JOIN osmEmAllScen ON (osmEmissionsForAirBasin1.ModelYear = osmEmAllScen.ScenModelYear) AND (osmEmAllScen.HorsepowerBin = osmEmissionsForAirBasin1.HorsepowerBin) AND (osmEmissionsForAirBasin1.EquipmentTypeID = osmEmAllScen.EquipmentTypeID) AND (osmEmAllScen.FleetSize = osmEmissionsForAirBasin1.FleetSize) AND (osmEmissionsForAirBasin1.CalendarYear = osmEmAllScen.CalendarYear) SET osmEmissionsForAirBasin1.ScenBSFC = [osmEmAllScen]![SumOfScenBSFC], osmEmissionsForAirBasin1.ScenNOx = [osmEmAllScen]![SumOfScenNOx], osmEmissionsForAirBasin1.ScenPM = [osmEmAllScen]![SumOfScenPM], osmEmissionsForAirBasin1.ScenHC = [osmEmAllScen]![SumOfScenHC];"

'This final query allocates both baseline and scenario emissions to air basins around California. Allocation factors are calendar year and equipment class (sector) specific. Each entry in osmEmissionsForAirBasin1 is allocated to the 15 different are basins.

DoCmd.RunSQL "SELECT osmEmissionsForAirBasin1.CalendarYear, osmEmissionsForAirBasin1.FleetSize, osmEmissionsForAirBasin1.EquipmentTypeID, osmEmissionsForAirBasin1.HorsepowerBin, osmEmissionsForAirBasin1.ModelYear, AirBasinAllocation.AirBasin,

*osmEmissionsForAirBasin1!BaseBSFC*AirBasinAllocation!Allocation AS BaseBSFC, osmEmissionsForAirBasin1!BaseNOx*AirBasinAllocation!Allocation AS BaseNOx, osmEmissionsForAirBasin1!BasePM*AirBasinAllocation!Allocation AS BasePM, osmEmissionsForAirBasin1!BaseHC*AirBasinAllocation!Allocation AS BaseHC,*
*osmEmissionsForAirBasin1!ScenBSFC*AirBasinAllocation!Allocation AS ScenBSFC, osmEmissionsForAirBasin1!ScenNOx*AirBasinAllocation!Allocation AS ScenNOx, osmEmissionsForAirBasin1!ScenPM*AirBasinAllocation!Allocation AS ScenPM, osmEmissionsForAirBasin1!ScenHC*AirBasinAllocation!Allocation AS ScenHC INTO osmEmissionsForAirBasin2 " & _*
"FROM (osmEmissionsForAirBasin1 INNER JOIN LookupEquipmentType ON osmEmissionsForAirBasin1.EquipmentTypeID = LookupEquipmentType.EquipmentTypeID) INNER JOIN AirBasinAllocation ON (osmEmissionsForAirBasin1.CalendarYear = AirBasinAllocation.CalendarYear) AND (LookupEquipmentType.[Equipment Class] = AirBasinAllocation.[Equipment Class]);"

'''''''''

DoCmd.SetWarnings True

End Sub

Attachment B

Fleet Survey Results

The table below provides a summary of the results from the 1000 fleet survey used to determine the non-compliance rate for DOORS reporting. Staff used the results from this survey to determine the overall Statewide California off-road diesel population subject to the off-road diesel rule. Refer to section 1.C for a more detailed description of how these data were used to calculate the non-compliance estimate.

Survey Response	Number of Fleets
Agriculture (not subject to rule)	151
Already reported	97
Needs to report	73
No off-road vehicles	73
No Response	224
Could not be Reached	382
Total	1000

Attachment C

Air Resources Board

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Linda S. Adams
Secretary for
Environmental Protection

TO: David Chou, Manager
Off-Road Modeling and Assessment Section

FROM: John Karim, Manager
In-Use Retrofit Section

DATE: April 1, 2010

SUBJECT: ESTIMATED LOAD FACTORS FOR THE SHOWCASE AND SUPPLEMENTAL ENVIRONMENTAL PROJECTS (SEP) EQUIPMENT

Background:

The In-Use Retrofit Section (IURS) has been involved in a number of projects, such as the Showcase and SEPs, to demonstrate the viability of diesel emission control devices in a variety of off-road environments as well as to evaluate new emission control systems that might be verified by the Air Resources Board (Board). In order to do so, IURS required the use of a robust and a vibration/shock resistant data-logger suitable for the off-road environment. The data-logger was specifically designed by staff to facilitate first hand data acquisition and storage of critical parameters for the evaluation of after-treatment devices. As a result of the data-logging of retrofitted equipment, an extensive data set is being compiled for the purpose of monitoring and verifying the operation of after-treatment devices for the off-road heavy-duty diesel fleet. This data set has been proven to be very valuable in providing real-world information about the off-road heavy-duty diesel fleet's load activities, annual operational hours, duty cycles, and other interesting trends that the Board would use for recommending regulatory efforts and updating inventory modeling factors. Staff were assigned the task of computing the load factors for the off-road fleet from the data set that was collected by IURS. This report includes the estimated load factors per fleet and the average estimated load factors per category.

Calculation Methodology:

The data-logger collects real-time engine and exhaust data to ensure the operation of the after-treatment device. The data set includes exhaust temperature and engine speed, and additional engine parameters when the equipment has an Electronic Control Unit (ECU). The data set was reviewed and screened for accuracy and the estimated

load factors were calculated. The exhaust temperature and engine speed data were used as surrogates for estimating percentage load per instant. In addition, information from equipment that reported ECU load data were analyzed and average load data was calculated. The following equation was applied to estimate the percent load value:

Estimated Percent Load per second = $(S - S_{min} / S_{max} - S_{min}) * 100$
where S is the surrogate data (exhaust temperature or engine speed).

Data Set:

The evaluated data sets consisted of 60 retrofitted and data-logged pieces of equipment. Load factor estimation was computed for all 60 based on exhaust temperature. Out of these 60, 52 also had engine speed data for estimation, and 10 also had ECU percent load data used for analysis. These data sets were used to calculate the estimated load factors. The data analysis consisted of detailed review and calculation of about 630 data files. The table below shows the categorical breakdown of the data set:

No.	Category	Year Range	Year Average	Year Mode	HP Range	HP Average	Tier Range	Tier Mode	No. of Vehicles	No. of Downloads
1	Wheel Loader	2004	2004	2004	272	272	2	2	1	5
2	Tractor-Loader-Backhoe	1996-2006	2000	1999	47-362	135.1	0-2	1	9	65
3	Scraper	2000-2001	2000	2000	457-632	545.6	1-2	1	7	77
4	Rubber Tired Dozer	1982	1982	1982	255	255	0	0	1	1
5	Rubber Tired Loader	1992-2004	1997	1995	95-375	214	0-2	0	11	93
6	Rough Terrain Forklift	1999-2005	2001	N/A	107-200	147	1-2	1	4	38
7	Other Mobile Off-Road	2000-2006	2003	2000	77-439	146.8	1-2	1	6	19
8	Off-Highway Tractor	2006-2007	2007	2007	125-140	130	2-3	3	9	167
9	Grader	2000-2004	2003	2004	185-225	197.3	1-2	2	4	29
10	Excavator	1994-2002	1999	2002	148-439	241.7	0-2	1	6	115
11	Crawler Tractor	1998-2001	2000	N/A	255-370	312.5	1	1	2	24

Summary:

After review and evaluation of the IURS data set, it was concluded that in general the load factors based on the two surrogates produced comparable results to those in the 2007 Off-Road Model; however, the ECU data appear to yield lower factors than this Model. There were two equipment categories, the Rough Terrain Forklift and the Grader, where the Model was 62% to 67% higher than what was computed using the surrogates. Since the estimates in the Model were 69% to 192% higher, respectively,

than the average load factors computed using the ECU data in the two instances where ECU data were available, staff evaluated additional data from the Heavy-duty Diesel Laboratory in Downtown Los Angeles and from field tests that were conducted by IURS using their Portable Emission Measurement System (PEMS). The analysis of these additional data (not shown in this report) confirmed the observed trend showing the ECU data with lower load factors than the surrogates. The reliability of the ECU data was also confirmed by the Measurement Allowance Program, which concluded that load information reported by the ECU was reliable and may be used for the In-Use Compliance Verification Program. The table below summarizes the load factor data:

Category	2007 Off-Road Model Load Factor	IURS Load Factor			COMPARISON (% difference)		
		Temperature Based	RPM Based	ECU Based	2007 Off-Road Model vs. Temperature Based	2007 Off-Road Model vs. RPM Based	2007 Off-Road Model vs. ECU
Wheel Loader Avg. HP 272	55	60	45	N/A	-9%	+22%	N/A
Tractor-Loader-Backhoe Avg. HP 135	55	42	45	N/A	+32%	+21%	N/A
Scraper Avg. HP 546	72	56	58	N/A	+28%	+24%	N/A
Rubber Tired Dozer Avg. HP 255	59	59	57	N/A	+1%	+3%	N/A
Rubber Tired Loader Avg. HP 214	54	52	46	N/A	+5%	+16%	N/A
Rough Terrain Forklift Avg. HP 147	60	37	36	21	+63%	+67%	+192%
Other Mobile Off-Road Avg. HP 147	62	49	67	N/A	+27%	-7%	N/A
Off-Highway Tractor Avg. HP 130	65	56	59	38	+16%	+10%	+69%
Grader Avg. HP 197	61	38	47	N/A	+62%	+30%	N/A
Excavator Avg. HP 242	57	61	64	N/A	-7%	-11%	N/A
Crawler Tractor Avg. HP 313	64	70	61	N/A	-9%	+5%	N/A

Twelve figures are attached to this memorandum to show these findings. Figure 1 shows the IURS load factors and the 2007 Off-Road Model's load factors for all equipment categories. The subsequent figures (Fig. 2 to 12) show equipment load

activity per category. The data set is available upon request.

The ever growing IURS data set, as a result of additional equipment being retrofitted under the Showcase and the SEP programs, provides a true snapshot of the off-road heavy-duty diesel fleet activities in California for both the private and the public sectors. Staff is working with equipment manufacturers to find solutions for acquiring ECU data from non-standard CAN Bus communication protocols to improve the IURS data set. Continued evaluation of these data would assist the Board in its efforts to reduce harmful emissions for this sector.

In conclusion, utilizing estimated load factors using surrogates could be overestimating the actual engine load by 69% to 192%, respectively, for the off-road fleet. Should you need additional information, please contact me at (626) 459-4303 or via email at jkarim@arb.ca.gov.

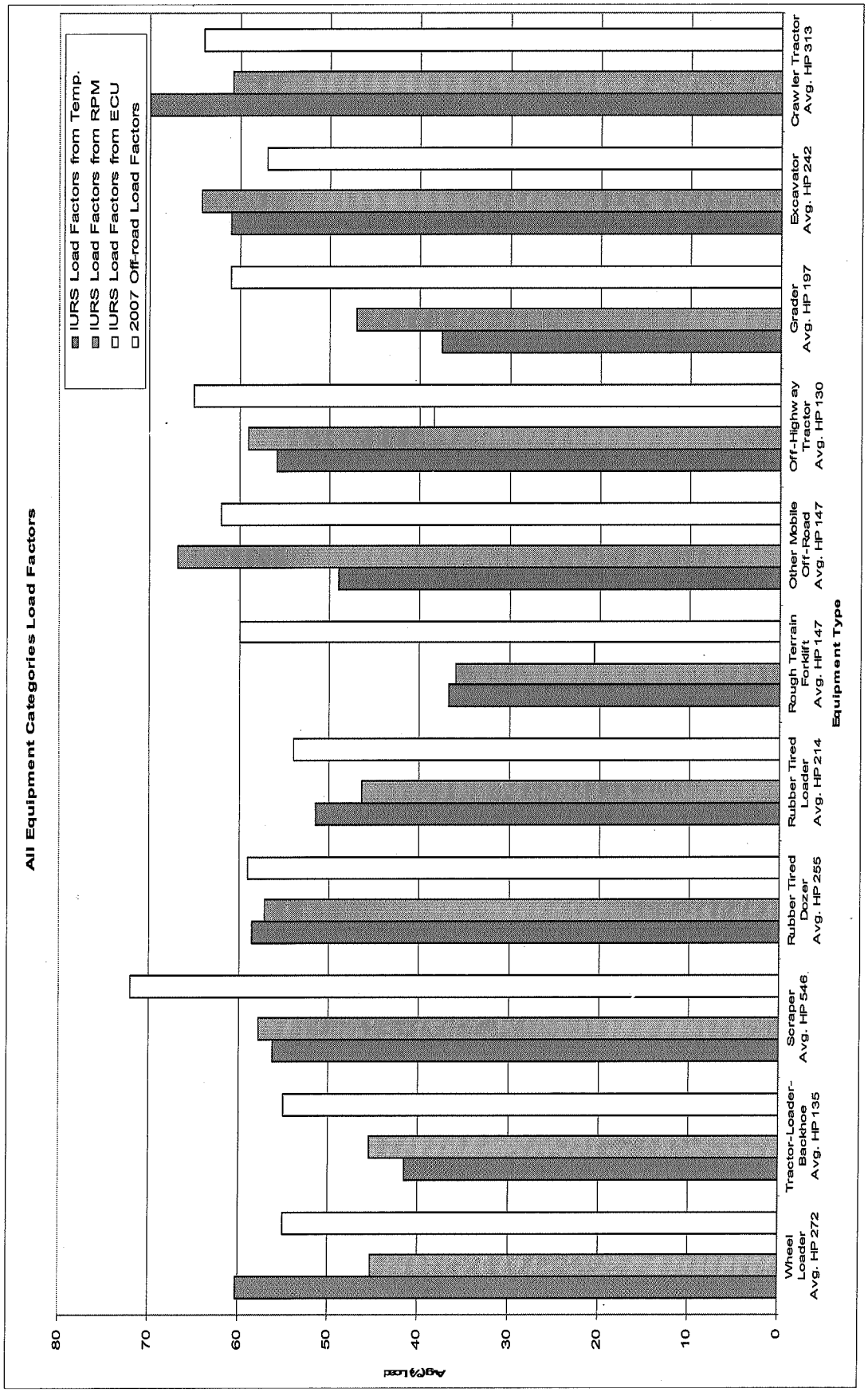


Figure 1. Load Factors for All Categories

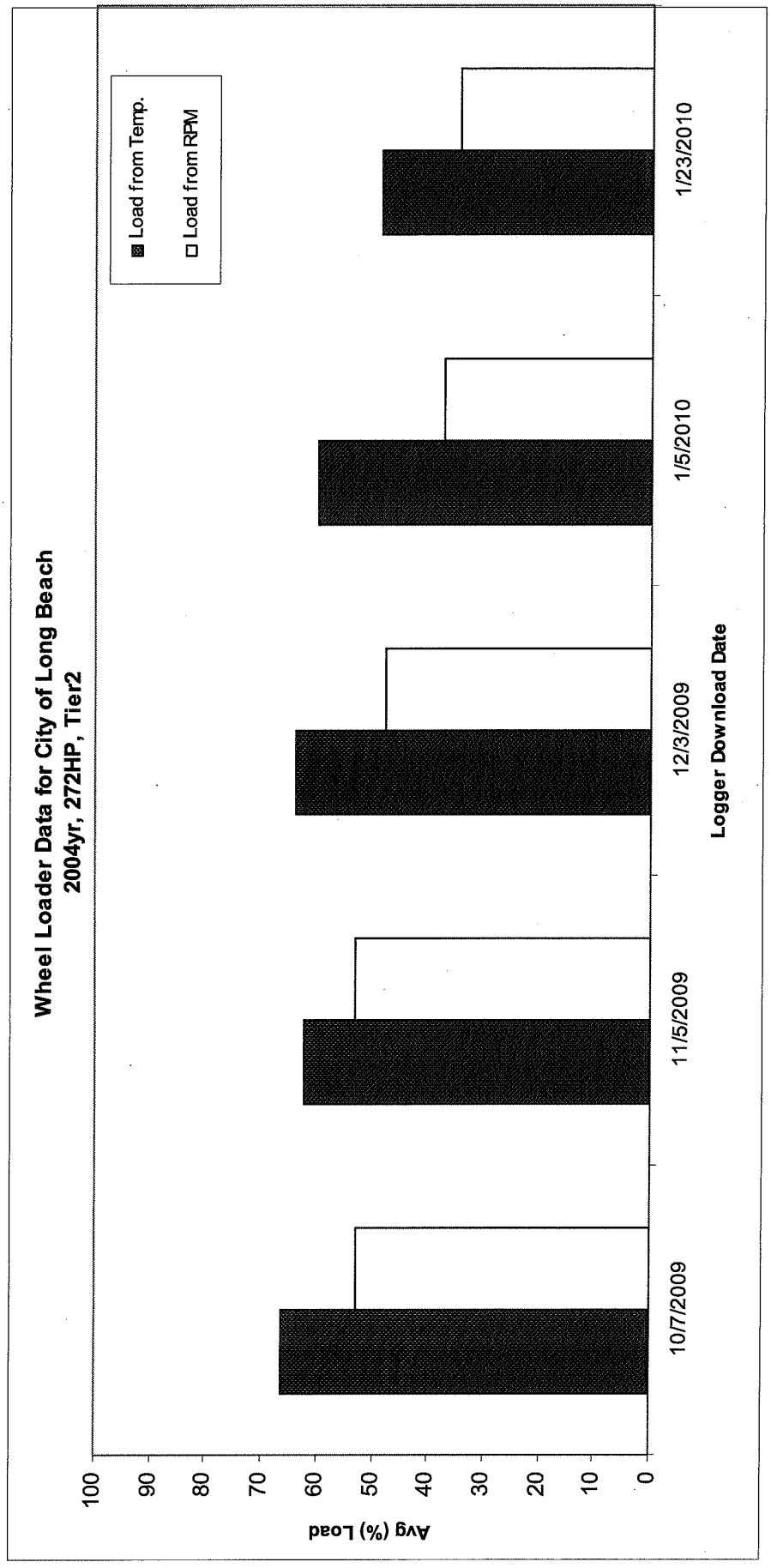


Figure 2. Wheel Loader Load Activity per Fleet

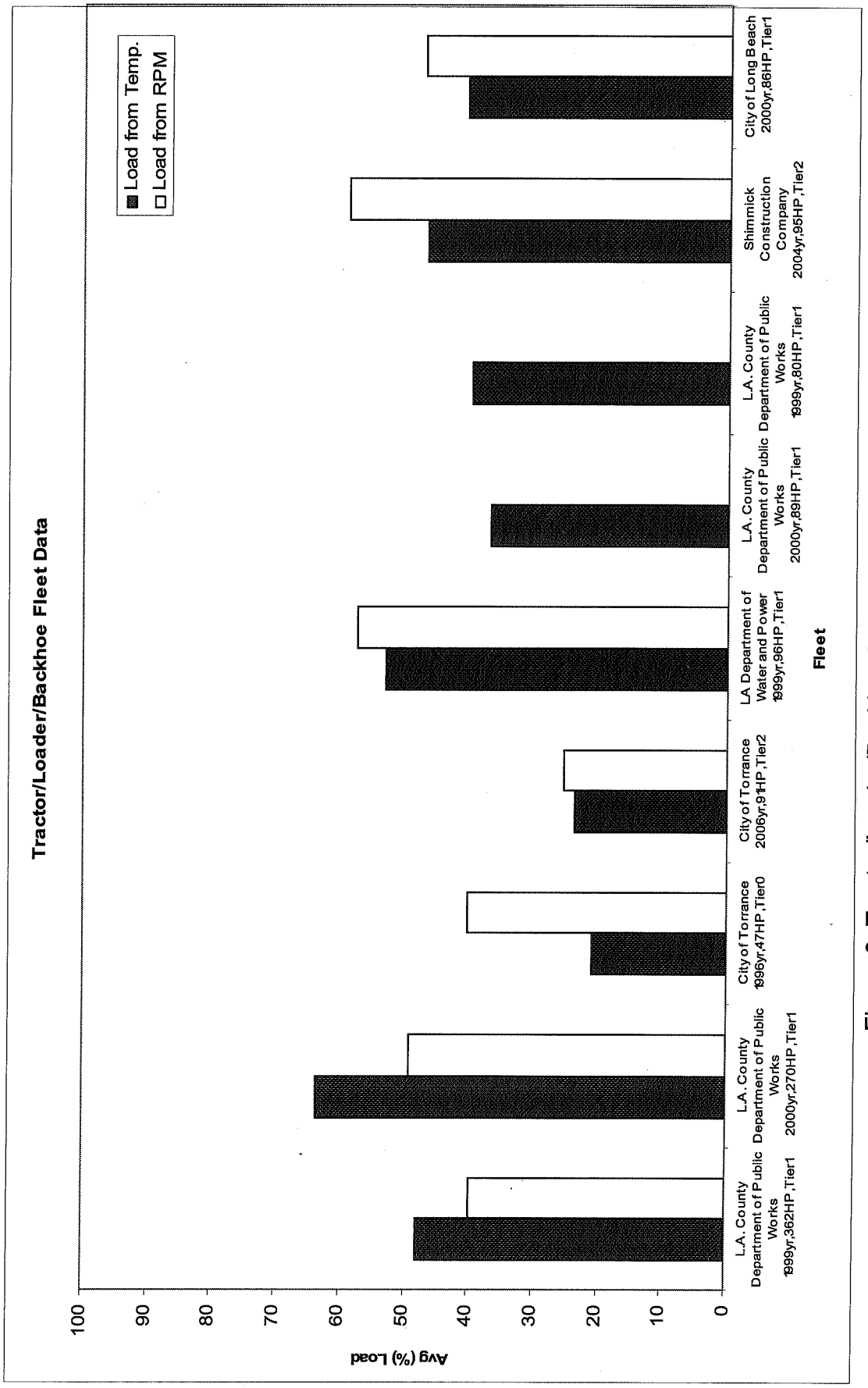


Figure 3. Tractor/Loader/Backhoe Load Activity per Fleet

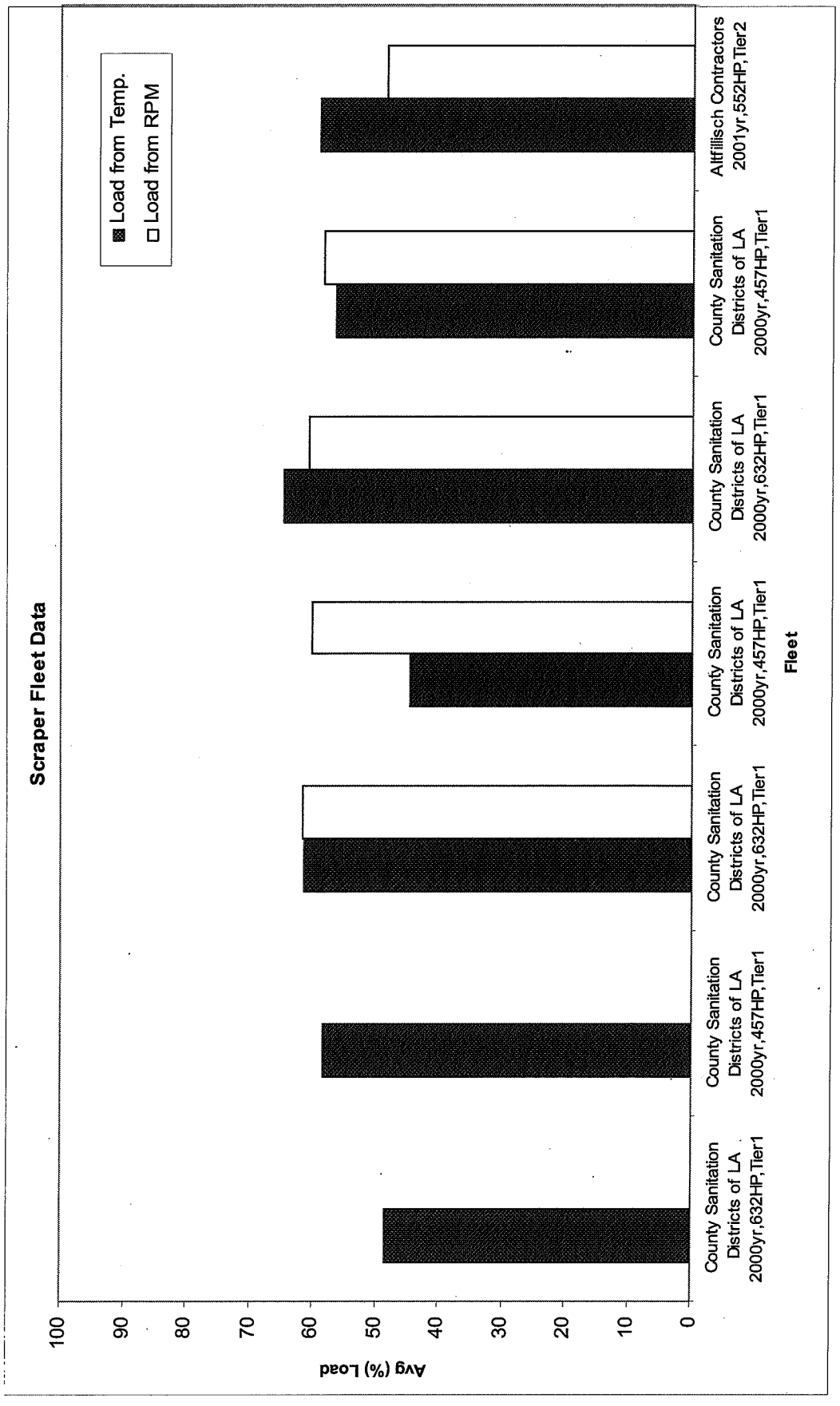


Figure 4. Scraper Load Activity per Fleet

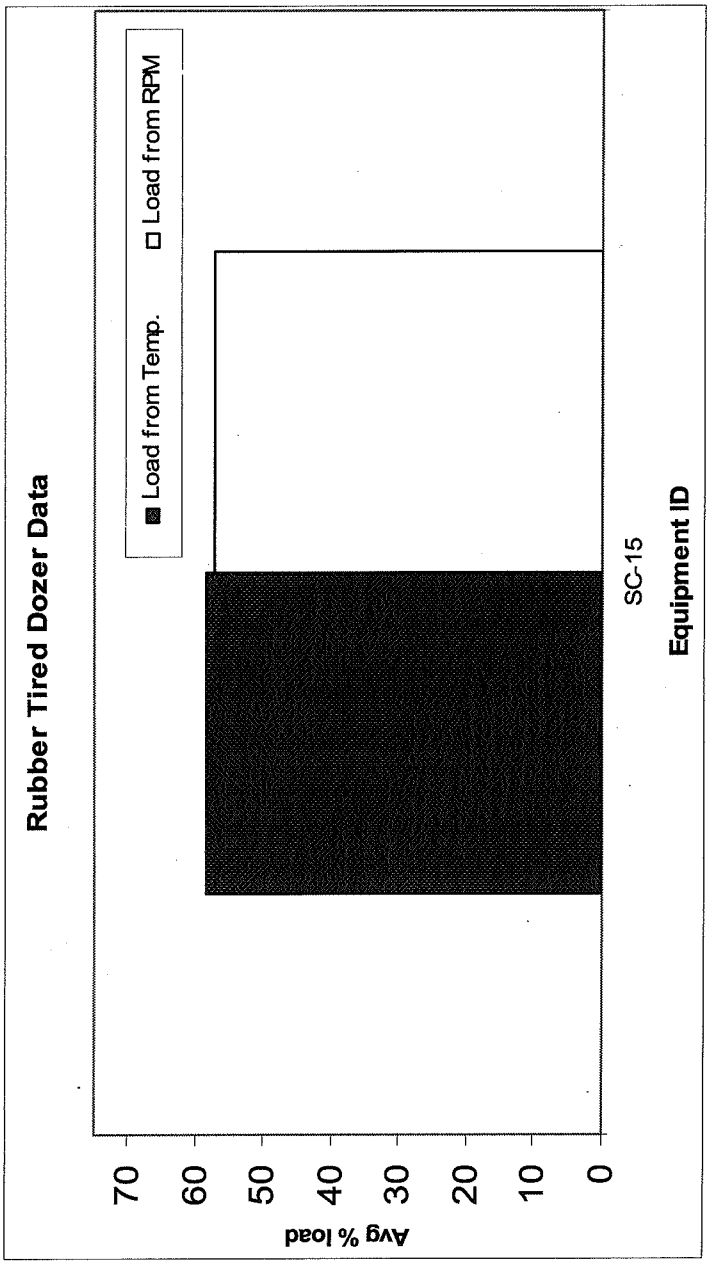


Figure 5. Rubber Tired Dozer Load Activity

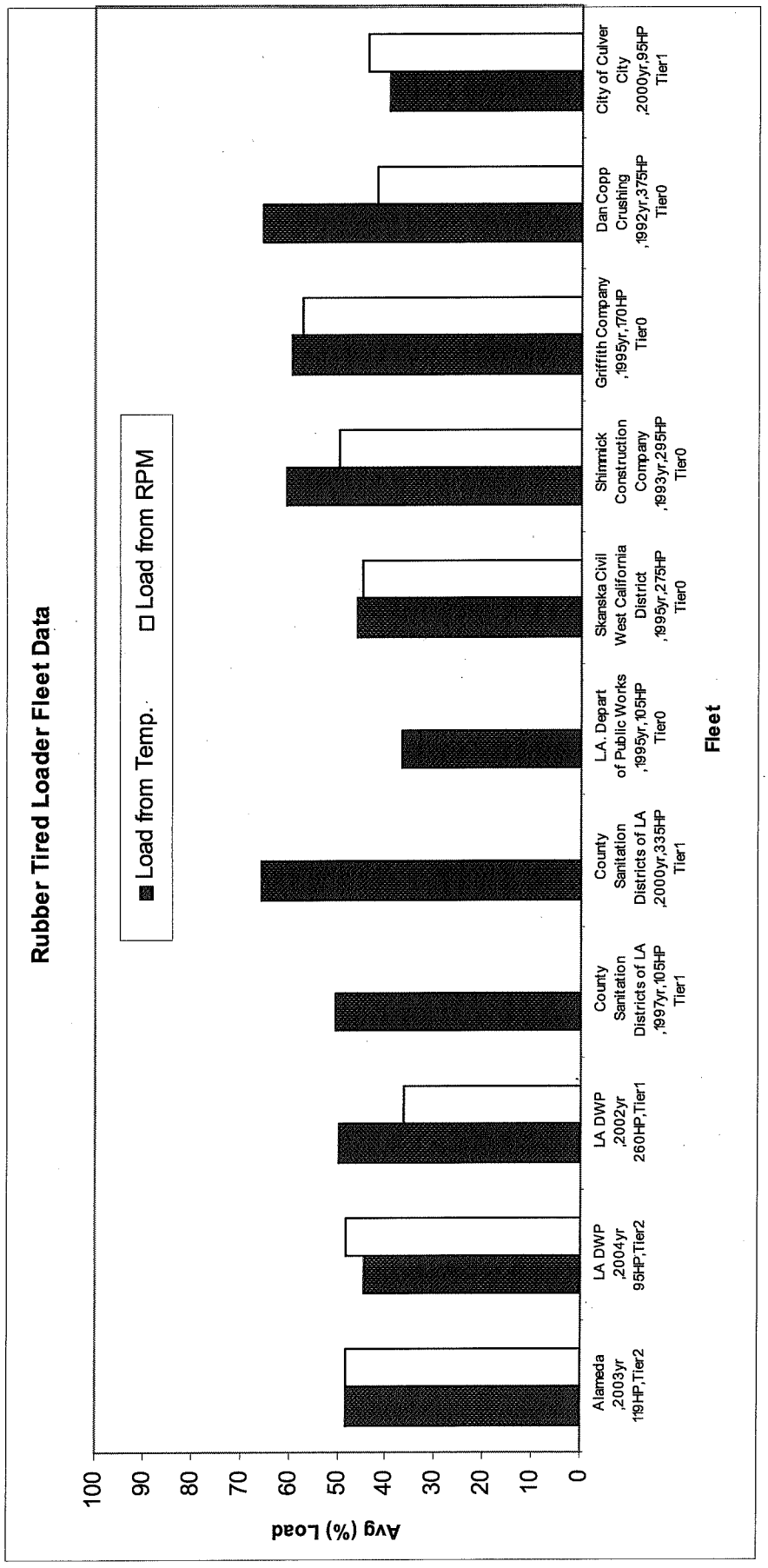


Figure 6. Rubber Tired Loader Load Activity per Fleet

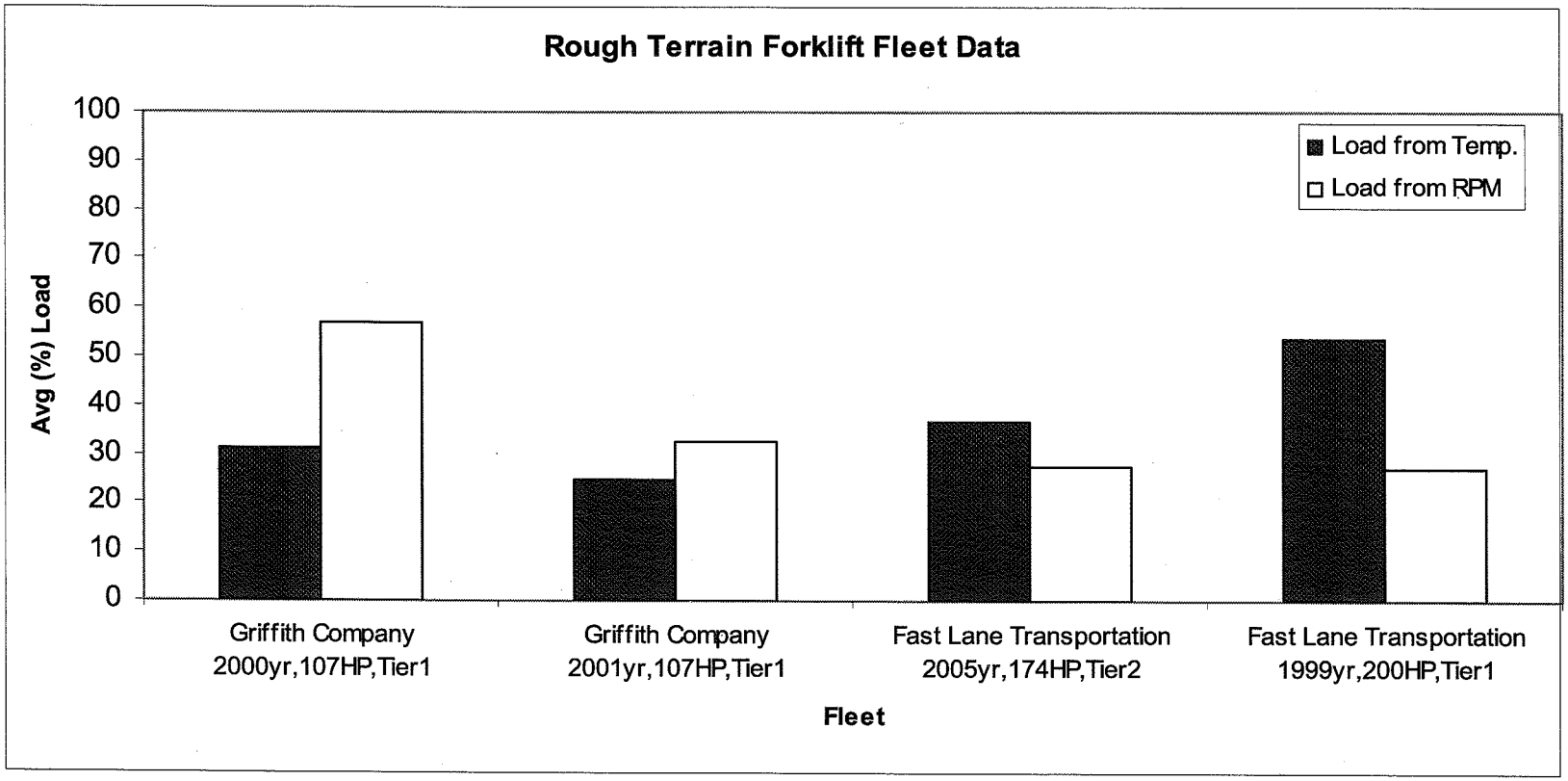


Figure 7. Rough Terrain Forklift Load Activity per Fleet

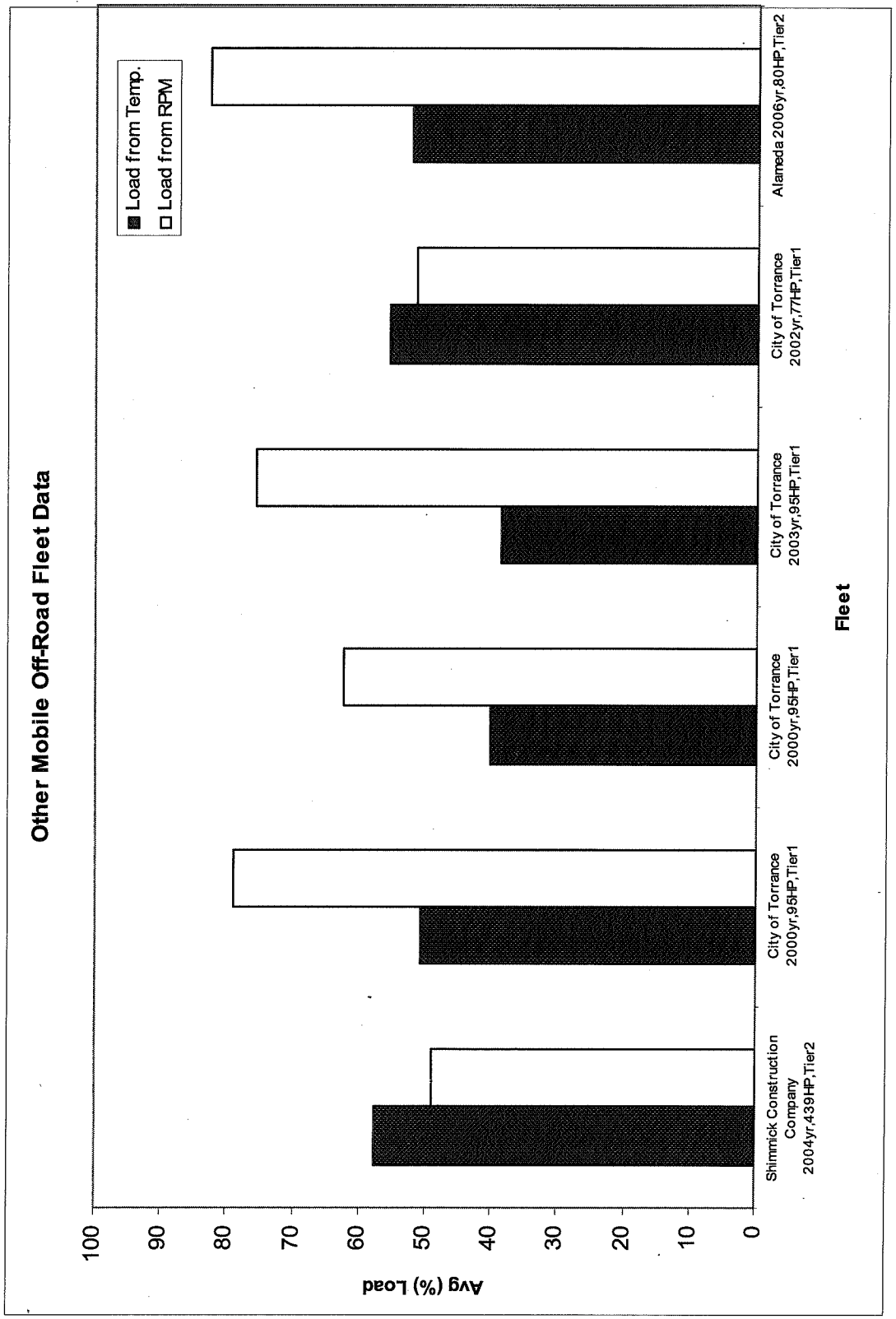


Figure 8. Other Mobile Off-Road Load Activity per Fleet

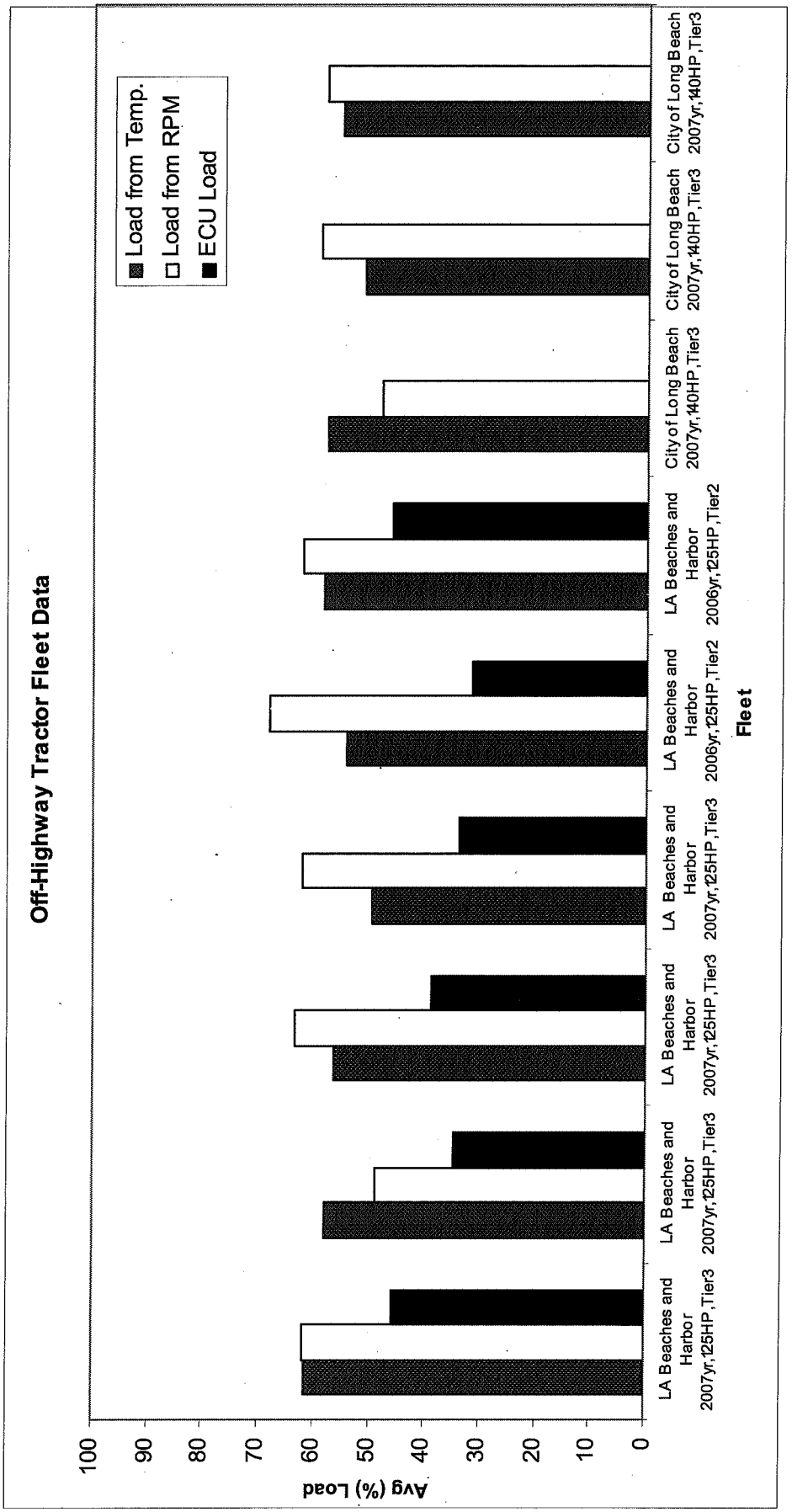


Figure 9. Off-Highway Tractor Load Activity per Fleet

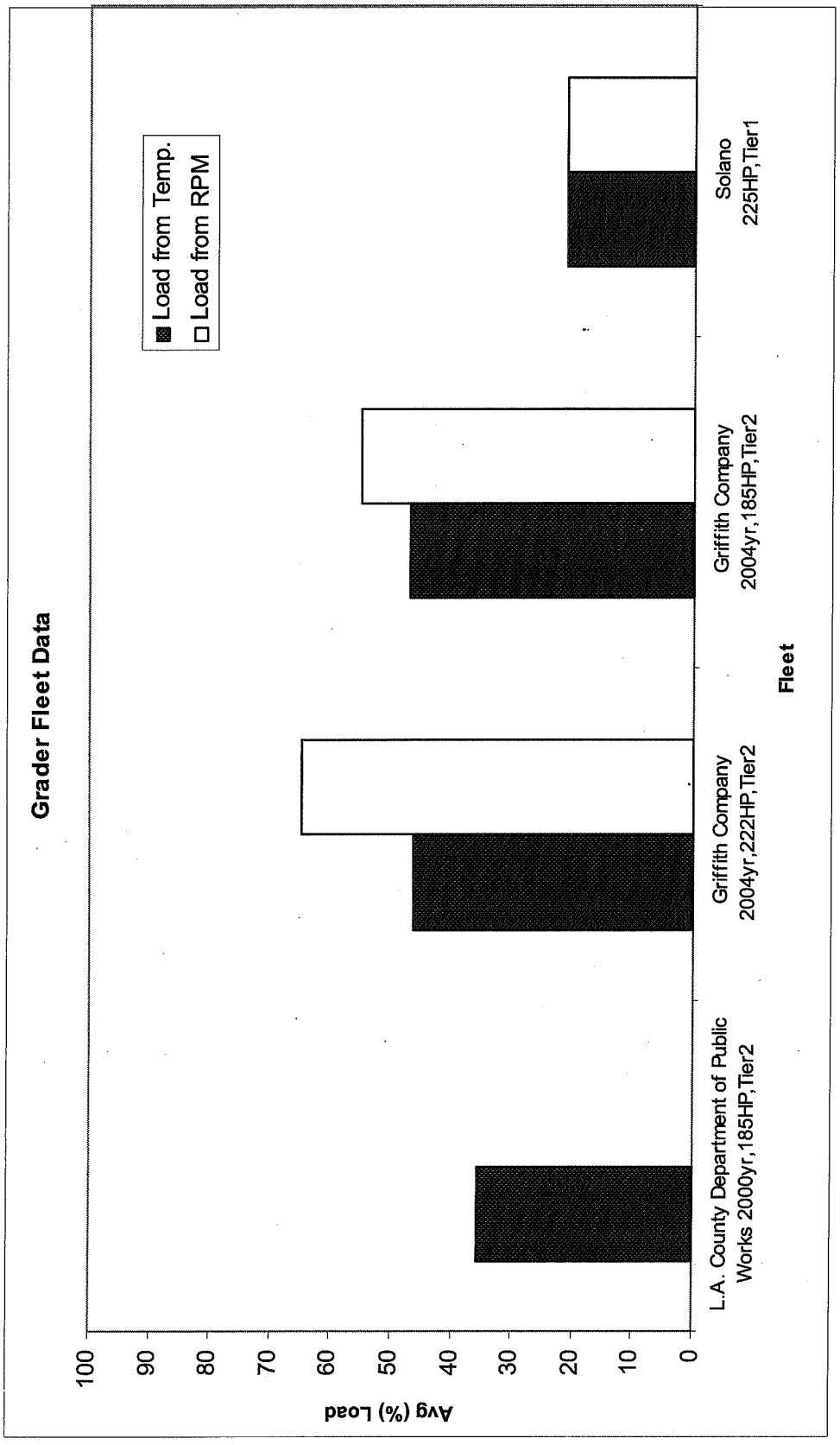


Figure 10. Grader Load Activity per Fleet

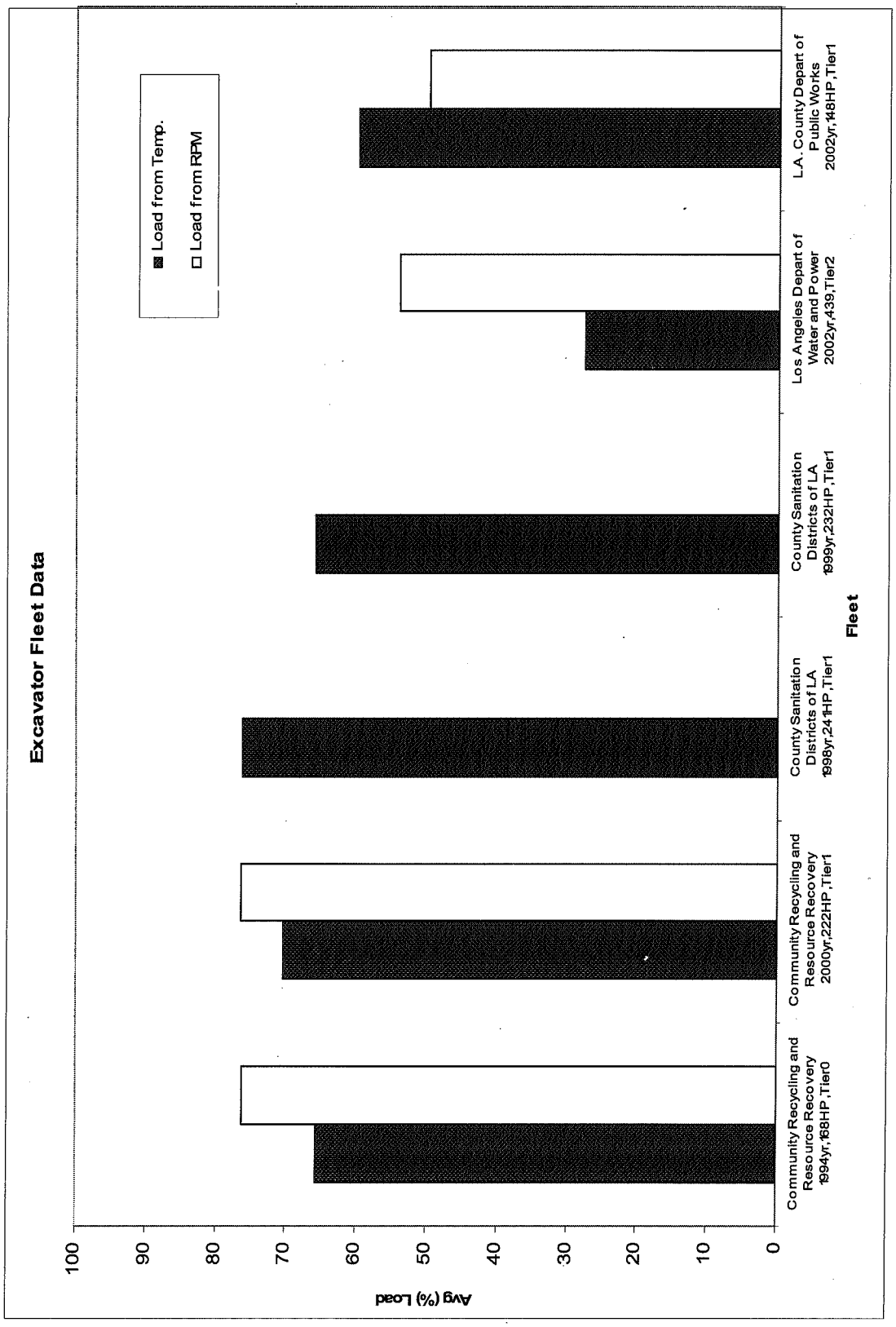


Figure 11. Excavator Load Activity per Fleet

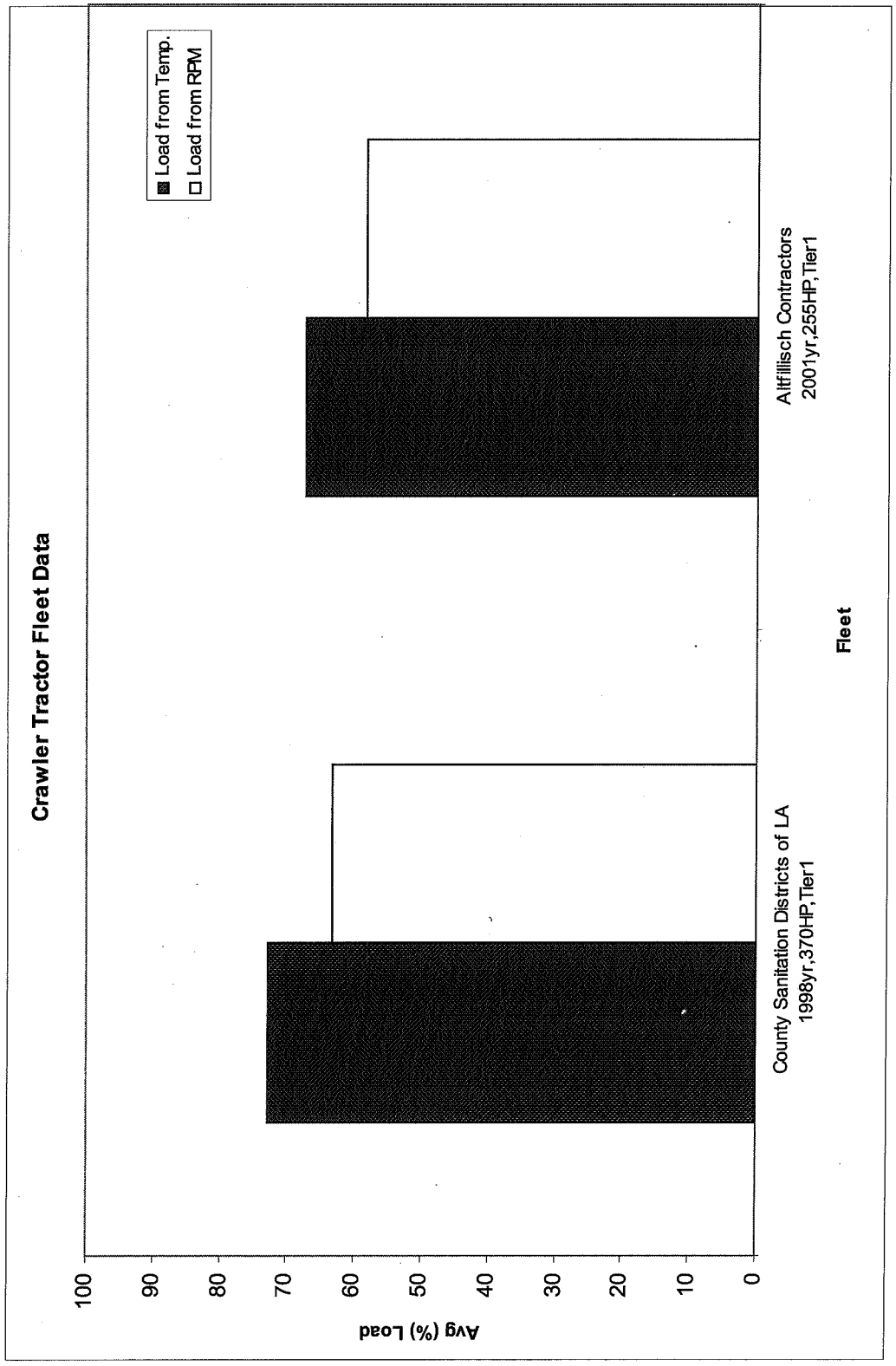


Figure 12. Crawler Tractor Load Activity per Fleet

Attachment D

Diesel Emission Factors (g/bhp-hr)

		(g/bhp-hr)	(g/bhp-hr^2)	(g/bhp-hr)	(g/bhp-hr^2)	(g/bhp-hr)	(g/bhp-hr^2)	(g/bhp-hr)	(g/bhp-hr^2)
HP	**Year**	**HC ZH**	**HC DR**	**CO ZH**	**CO DR**	**NOX ZH**	**NOX DR**	**PM ZH**	**PM DR**
50	1987	1.84	2.35E-04	5.00	5.13E-04	7.00	1.05E-04	0.76	5.89E-05
50	1998	1.80	2.30E-04	5.00	5.13E-04	6.90	1.04E-04	0.76	5.89E-05
50	2003	1.45	1.85E-04	4.10	4.20E-04	5.55	1.03E-04	0.60	4.65E-05
50	2004	0.64	9.80E-05	3.27	3.34E-04	5.10	9.33E-05	0.43	3.36E-05
50	2005	0.37	6.90E-05	3.00	3.05E-04	4.95	9.67E-05	0.38	2.93E-05
50	2007	0.24	5.45E-05	2.86	2.90E-04	4.88	9.83E-05	0.35	2.72E-05
50	2012	0.10	4.00E-05	2.72	2.76E-04	4.80	1.00E-04	0.16	1.22E-05
50	2040	0.10	4.00E-05	2.72	2.76E-04	2.90	6.04E-05	0.01	1.11E-06
120	1987	1.44	6.66E-05	4.80	1.27E-04	13.00	3.01E-04	0.84	6.11E-05
120	1997	0.99	4.58E-05	3.49	9.23E-05	8.75	2.02E-04	0.69	5.02E-05
120	2003	0.99	4.58E-05	3.49	9.23E-05	6.90	1.60E-04	0.69	5.02E-05
120	2004	0.46	3.33E-05	3.23	8.55E-05	5.64	1.03E-04	0.39	2.85E-05
120	2005	0.28	2.92E-05	3.14	8.33E-05	5.22	8.40E-05	0.29	2.12E-05
120	2007	0.19	2.71E-05	3.09	8.21E-05	5.01	7.45E-05	0.24	1.76E-05
120	2011	0.10	2.50E-05	3.05	8.10E-05	2.89	3.80E-05	0.20	1.45E-05
120	2012	0.09	2.31E-05	3.05	8.10E-05	2.53	3.33E-05	0.07	4.69E-06
120	2014	0.09	2.31E-05	3.05	8.10E-05	2.53	3.33E-05	0.01	9.33E-07
120	2040	0.07	1.74E-05	3.05	8.10E-05	1.40	1.84E-05	0.01	9.33E-07
175	1969	1.32	6.11E-05	4.40	1.16E-04	14.00	3.24E-04	0.77	5.60E-05
175	1971	1.10	5.09E-05	4.40	1.16E-04	13.00	3.01E-04	0.66	4.80E-05

175	1979	1.00	4.63E-05	4.40	1.16E-04	12.00	2.78E-04	0.55	4.00E-05
175	1984	0.94	4.35E-05	4.30	1.14E-04	11.00	2.54E-04	0.55	4.00E-05
175	1987	0.88	4.07E-05	4.20	1.11E-04	11.00	2.54E-04	0.55	4.00E-05
175	1996	0.68	3.15E-05	2.70	7.14E-05	8.17	1.89E-04	0.38	2.76E-05
175	2002	0.68	3.15E-05	2.70	7.14E-05	6.90	1.60E-04	0.38	2.76E-05
175	2003	0.33	2.79E-05	2.70	7.14E-05	5.26	9.64E-05	0.24	1.70E-05
175	2004	0.22	2.63E-05	2.70	7.14E-05	4.72	7.52E-05	0.19	1.35E-05
175	2006	0.16	2.57E-05	2.70	7.14E-05	4.44	6.46E-05	0.16	1.18E-05
175	2011	0.10	2.50E-05	2.70	7.14E-05	2.45	3.20E-05	0.14	1.00E-05
175	2014	0.09	2.17E-05	2.70	7.14E-05	2.27	2.96E-05	0.01	4.67E-07
175	2040	0.05	1.17E-05	2.70	7.14E-05	0.27	3.56E-06	0.01	4.67E-07
250	1969	1.32	6.11E-05	4.40	1.16E-04	14.00	3.24E-04	0.77	5.60E-05
250	1971	1.10	5.09E-05	4.40	1.16E-04	13.00	3.01E-04	0.66	4.80E-05
250	1979	1.00	4.63E-05	4.40	1.16E-04	12.00	2.78E-04	0.55	4.00E-05
250	1984	0.94	4.35E-05	4.30	1.14E-04	11.00	2.54E-04	0.55	4.00E-05
250	1987	0.88	4.07E-05	4.20	1.11E-04	11.00	2.54E-04	0.55	4.00E-05
250	1995	0.68	3.15E-05	2.70	7.14E-05	8.17	1.89E-04	0.38	2.76E-05
250	2002	0.32	1.48E-05	0.92	2.43E-05	6.25	1.45E-04	0.15	7.96E-06
250	2003	0.19	2.09E-05	0.92	2.43E-05	5.00	9.05E-05	0.12	6.51E-06
250	2004	0.14	2.30E-05	0.92	2.43E-05	4.58	7.23E-05	0.11	6.03E-06
250	2006	0.12	2.40E-05	0.92	2.43E-05	4.38	6.33E-05	0.11	5.79E-06
250	2010	0.10	2.50E-05	0.92	2.43E-05	2.45	3.18E-05	0.11	5.59E-06
250	2013	0.07	1.83E-05	0.92	2.43E-05	1.36	1.77E-05	0.01	4.55E-07

250	2040	0.05	1.17E-05	0.92	2.43E-05	0.27	3.56E-06	0.01	4.55E-07
500	1969	1.26	4.39E-05	4.20	8.32E-04	14.00	2.33E-04	0.74	3.93E-05
500	1971	1.05	3.66E-05	4.20	8.32E-04	13.00	2.16E-04	0.63	3.34E-05
500	1979	0.95	3.31E-05	4.20	8.32E-04	12.00	2.00E-04	0.53	2.81E-05
500	1984	0.90	3.14E-05	4.20	8.32E-04	11.00	1.83E-04	0.53	2.81E-05
500	1987	0.84	2.93E-05	4.10	8.12E-04	11.00	1.83E-04	0.53	2.81E-05
500	1995	0.68	2.37E-05	2.70	5.35E-05	8.17	1.36E-04	0.38	2.02E-05
500	2000	0.32	1.12E-05	0.92	1.82E-05	6.25	1.04E-04	0.15	7.96E-06
500	2001	0.19	1.95E-05	0.92	1.82E-05	4.95	7.34E-05	0.12	6.51E-06
500	2002	0.14	2.22E-05	0.92	1.82E-05	4.51	6.32E-05	0.11	6.03E-06
500	2004	0.12	2.36E-05	0.92	1.82E-05	4.29	5.81E-05	0.11	5.79E-06
500	2005	0.10	2.50E-05	0.92	1.82E-05	4.00	5.30E-05	0.11	5.55E-06
500	2010	0.10	2.50E-05	0.92	1.82E-05	2.45	3.18E-05	0.11	5.55E-06
500	2013	0.07	1.83E-05	0.92	1.82E-05	1.36	1.77E-05	0.01	4.55E-07
500	2040	0.05	1.17E-05	0.92	1.82E-05	0.27	3.56E-06	0.01	4.55E-07
750	1969	1.26	4.39E-05	4.20	8.32E-04	14.00	2.33E-04	0.74	3.93E-05
750	1971	1.05	3.66E-05	4.20	8.32E-04	13.00	2.16E-04	0.63	3.34E-05
750	1979	0.95	3.31E-05	4.20	8.32E-04	12.00	2.00E-04	0.53	2.81E-05
750	1984	0.90	3.14E-05	4.20	8.32E-04	11.00	1.83E-04	0.53	2.81E-05
750	1987	0.84	2.93E-05	4.10	8.12E-04	11.00	1.83E-04	0.53	2.81E-05
750	1995	0.68	2.37E-05	2.70	5.35E-05	8.17	1.36E-04	0.38	2.02E-05
750	2001	0.32	1.12E-05	0.92	1.82E-05	6.25	1.04E-04	0.15	7.96E-06
750	2002	0.19	1.95E-05	0.92	1.82E-05	4.95	7.34E-05	0.12	6.51E-06

750	2003	0.14	2.22E-05	0.92	1.82E-05	4.51	6.32E-05	0.11	6.03E-06
750	2005	0.12	2.36E-05	0.92	1.82E-05	4.29	5.81E-05	0.11	5.79E-06
750	2010	0.10	2.50E-05	0.92	1.82E-05	2.45	3.18E-05	0.11	5.55E-06
750	2013	0.07	1.83E-05	0.92	1.82E-05	1.36	1.77E-05	0.01	4.55E-07
750	2040	0.05	1.17E-05	0.92	1.82E-05	0.27	3.56E-06	0.01	4.55E-07
1000	1969	1.26	4.39E-05	4.20	8.32E-04	14.00	2.33E-04	0.74	3.93E-05
1000	1971	1.05	3.66E-05	4.20	8.32E-04	13.00	2.16E-04	0.63	3.34E-05
1000	1979	0.95	3.31E-05	4.20	8.32E-04	12.00	2.00E-04	0.53	2.81E-05
1000	1984	0.90	3.14E-05	4.20	8.32E-04	11.00	1.83E-04	0.53	2.81E-05
1000	1987	0.84	2.93E-05	4.10	8.12E-04	11.00	1.83E-04	0.53	2.81E-05
1000	1999	0.68	1.12E-05	2.70	5.35E-05	8.17	1.36E-04	0.38	2.02E-06
1000	2005	0.32	1.12E-05	0.92	1.82E-05	6.25	1.04E-04	0.15	7.96E-06
1000	2006	0.19	1.95E-05	0.92	1.82E-05	4.95	7.34E-05	0.12	6.51E-06
1000	2007	0.14	2.22E-05	0.92	1.82E-05	4.51	6.32E-05	0.11	6.03E-06
1000	2009	0.12	2.36E-05	0.92	1.82E-05	4.29	5.81E-05	0.11	5.79E-06
1000	2010	0.10	2.50E-05	0.92	1.82E-05	4.08	5.30E-05	0.11	5.55E-06
1000	2014	0.07	1.83E-05	0.92	1.82E-05	2.36	3.06E-05	0.06	2.78E-06
1000	2040	0.05	1.17E-05	0.92	1.82E-05	2.36	3.06E-05	0.02	1.11E-06
9999	1969	1.26	4.39E-05	4.20	8.32E-04	14.00	2.33E-04	0.74	3.93E-05
9999	1971	1.05	3.66E-05	4.20	8.32E-04	13.00	2.16E-04	0.63	3.34E-05
9999	1979	0.95	3.31E-05	4.20	8.32E-04	12.00	2.00E-04	0.53	2.81E-05
9999	1984	0.90	3.14E-05	4.20	8.32E-04	11.00	1.83E-04	0.53	2.81E-05
9999	1987	0.84	2.93E-05	4.10	8.12E-04	11.00	1.83E-04	0.53	2.81E-05

9999	1999	0.68	1.12E-05	2.70	5.35E-05	8.17	1.36E-04	0.38	2.02E-06
9999	2005	0.32	1.12E-05	0.92	1.82E-05	6.25	1.04E-04	0.15	7.96E-06
9999	2006	0.19	1.95E-05	0.92	1.82E-05	4.95	7.34E-05	0.12	6.51E-06
9999	2007	0.14	2.22E-05	0.92	1.82E-05	4.51	6.32E-05	0.11	6.03E-06
9999	2009	0.12	2.36E-05	0.92	1.82E-05	4.29	5.81E-05	0.11	5.79E-06
9999	2010	0.10	2.50E-05	0.92	1.82E-05	4.08	5.30E-05	0.11	5.55E-06
9999	2014	0.10	2.50E-05	0.92	1.82E-05	2.36	3.06E-05	0.06	2.78E-06
9999	2040	0.05	1.17E-05	0.92	1.82E-05	2.36	3.06E-05	0.02	1.11E-06

REFERENCES

AB 8 2X, 2009. Assembly Bill 8 2X, Chapter 6. An act to amend Section 11011 of the Government Code, to add Section 43018.2 to the Health and Safety Code, which directs ARB to amend Sections 2449.1 and 2449.2 of Title 13 of the California Code of Regulations. Approved by the Governor on February 20, 2009.

ARB, 2005. OFFROAD Modeling Change Technical Memo. Off-Road Exhaust Emissions Inventory Fuel Correction Factors., Accessed June 2010, Available at: http://www.arb.ca.gov/msei/offroad/techmemo/arb_offroad_fuels.pdf

ARB, 2007. Proposed Regulated for In-Use Off-road Diesel Vehicles, Technical Support Document, Appendix E: Emissions Inventory Methodology and Results., Accessed January 2010, Available at: http://www.arb.ca.gov/regact/2007/ordiesl07/tsdappe.pdf

ARB, 2008. Characterization of the Off-road Equipment Population, Eastern Research Group report, ARB Contract No. 04-315. Accessed June 2010 Available at: http://www.arb.ca.gov/research/apr/past/04-315.pdf

ARB, 2009a. In-Use Off-Road Diesel Vehicle Regulation Reduced Activity Records Submission; Available at: http://www.arb.ca.gov/msprog/ordiesel/documents/activityapp.pdf

ARB, 2009b. AB 8 2x Reduced activity reporting data.

ARB, 2010. Memo: Estimated Load Factors for the Showcase and Supplemental Environmental Projects (SEP) Equipment. (See Attachment C)

Baker Hughes, Accessed July 2010. Number and Location of Rotary Rigs in California. Available at: http://investor.shareholder.com/bhi/rig_counts/rc_index.cfm and http://gis.bakerhughesdirect.com/RigCounts/Attributes.aspx

Beacon Economics (Beacon), June 2010. Beaconomics: A quarter forecast for the U.S. and California from Beacon Economics. Available at: http://beaconecon.com/Beaconomics/index.php?DataSet=California|e03c_0&Region=California&Heading=California:%20Construction%20Employment

Bureau of Economic Analysis (BEA), Accessed June 2010. Regional Economic Accounts, Gross Domestic Product by State. Available at: http://bea.gov/regional/gsp/

Bureau of Labor Statistics (BLS), Accessed June 2010a. National, State and Metro Area Employment, Hours, & Earnings. Available at: http://www.bls.gov/sae/ and http://www.bls.gov/ces/

Bureau of Labor Statistics (BLS), Accessed June 2010b. Employment Projections: Occupation Employment by Industry. Available at: http://www.bls.gov/emp/ep_table_109.htm

Bureau of Transportation Statistics (BTS), Accessed June 2010a. Air Carrier Traffic Statistics. Available at: http://www.bts.gov/programs/airline_information/air_carrier_traffic_statistics/

Bureau of Transportation Statistics (BTS), Accessed June 2010b. Fuel Cost and Consumption. Available at: http://www.bts.gov/programs/airline_information/fuel_cost_and_consumption/

California State Board of Equalization (BOE), Accessed June 2010. Fuel Taxes Division Statistics & Reports. Available at: http://www.boe.ca.gov/sptaxprog/spftrpts.htm

Congressional Budget Office (CBO), January 2010. The Budget and Economic Outlook: 2010 to 2020. Available at: http://www.cbo.gov/ftpdocs/108xx/doc10871/Frontmatter.shtml

Department of Finance (DOF), 2009. Demographic Research Unit of California county-specific population estimates and projections. Available at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-2/2000-09/documents/E-2_Report.xls

DOORS, 2010. Fleet records summary for April 14, 2010.

Employment Development Department (EDD), Accessed July 2010. Quarterly Census of Employment and Wages. Available at: http://www.labormarketinfo.edd.ca.gov/cgi/dataanalysis/areaselection.asp?tablename=industry

Energy Information Administration (EIA), Accessed June 2010. Topics for Petroleum Consumption/Sales. Available at: http://tonto.eia.doe.gov/dnav/pet/pet_cons_top.asp

Equipment Data Associates (EDA), 2010. UCC-1 Filings data from Catapult Database.

Federal Aviation Administration (FAA), 2010. FAA Aerospace Forecast: Fiscal Years 2010-2030. Available at: http://www.faa.gov/data_research/aviation/aerospace_forecasts/2010-2030/

Power Systems Research, 1996. See CARB Mailout#: MSC 99-32, Available at: http://www.arb.ca.gov/msprog/mailouts/mouts_99.htm

Puri A. and R. Kleinhenz, 1994. A study to develop projected activity for non-road mobile categories in California, 1970-2020. Report prepared for the California Air Resources Board, Sacramento, CA, by California State University at Fullerton, CA, ARB Contract

No. 92-732. Available at: http://www.arb.ca.gov/research/abstracts/92-732.htm

San Pedro Bay Ports, November 2009. Rubber Tire Gantry Crane Load Factor Study, Prepared by Starcrest Consulting Group. Available at: http://www.polb.com/civica/filebank/blobdload.asp?BlobID=6915

TIAX, 2003. California Public Fleet Heavy-Duty Vehicle and Equipment Inventory. Final Report. Report to California Air Resources Board., Available at: http://www.arb.ca.gov/msprog/ordiesel/documents/documents.htm

University of California Anderson School of Management (UCLA), June 2010. The UCLA Anderson Forecast for the Nation and California.

University of the Pacific Eberhardt School of Business (UOP), July 2010. California & Metro Forecast.

U.S. Census Bureau, Accessed June 2010. Total Construction Spending. Available at: http://www.census.gov/const/www/totpage.html

U.S. EPA, April 2004a. Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA-420-P-04-005, Report No. NR-005C. Available at: http://www.epa.gov/otaq/nonrdmdl.htm

U.S. EPA, April 2004b, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression Ignition, EPA420-P-04-009, Report No. NR-009C. Available at: http://www.epa.gov/otaq/nonrdmdl.htm

APPENDIX E: PROPOSED MINOR AMENDMENTS TO THE OFF-ROAD AND LSI FLEET REGULATIONS

This appendix gives an in-depth description of the proposed minor amendments to the off-road and LSI fleet regulations.

A. Proposed Minor Modifications to the Off-road Regulation

The following sections describe, in detail, the proposed minor amendments to the off-road regulation.

The proposed minor amendments include:

- Replace the word "should" with "shall" wherever it appears in the regulation;
- Modify the captive attainment area fleet definition to address the proposed major modification to combine the PM and NOx fleet average and BACT requirements;
- Clarify the low use vehicle definition;
- Modify the flexibility engine provisions to simplify the reporting requirements for post-2007 flexibility engines and remove the requirement to account for such "flex" engines differently in the fleet average calculations;
- Clarify the alternative fuel regulatory language;
- Add additional incentives for electric vehicles;
- Include a provision to incentive the use of hybrid vehicles;
- Remove the hours in fleet average compliance option;
- Add language to the new fleet provisions to clarify what requirements must be met by new fleets;
- Simplify the adding vehicle provisions;
- Combine the final compliance requirements for all fleets, and clarify that after the final compliance date, the turnover and retrofit exemptions are still applicable;
- Modify the reporting deadlines for all fleets;
- Modify the labeling requirements for all vehicles;
- Clarify the Compliance Certification process;
- Revise the order of turnover language to avoid requiring fleets to distinguish between Tier 1s with a PM standard and those without;
- Clarify the turnover exemption for vehicles with early VDECS installations by adding additional descriptive language; and
- Modify the SOON NOx targets to be consistent with the revised fleet average targets.

1. Take out the word "should"

The regulation contains the word "should" in many places throughout the regulation. Staff believes the word "should" could incorrectly be interpreted to

mean that many provisions in the regulation are optional, rather than mandatory as intended. Therefore, staff is proposing to remove all instances of the word "should" throughout the regulation, and will replace this word with "shall".

2. Captive attainment area fleet definition

Currently in the regulation, a captive attainment area fleet (defined in section 2449(c)(6)) is exempt from all the NOx (i.e., turnover) requirements of the regulation and is instead subject only to the PM (i.e., retrofit) requirements. The regulation was structured this way to recognize that such fleets operate only in the areas of the State with the cleanest air (and hence with the least need for NOx reductions) but still ensure such fleets reduced their toxic diesel PM emissions. Now that staff is proposing to remove section 2449.2 (the PM portion of the regulation), staff is proposing to modify this definition to designate a captive attainment area fleets a small fleet, regardless of the total horsepower in the fleet. This will still allow such fleets to have reduced compliance costs but still make progress toward reducing their toxic diesel PM emissions.

3. Low-use vehicle definition

The off-road regulation implicitly contains two types of low-use vehicles – year-by-year low-use and permanent low-use (ARB, 2009a). Therefore, staff is proposing to explicitly identify the two types of low-use within the regulation by including language currently available in the guidance document listed above.

4. Modify post-2007 flexibility engine provision

Currently per section 2449(c)(43) of the regulation, if a fleet contains a flexibility (FLEX) engine certified prior to January 1, 2007, the fleet can ignore the certification value of the FLEX engine, and instead use the emissions charts located in Appendix A of the off-road regulation to determine the appropriate emission factor to use for that engine. However, for post-2007 FLEX engines, the fleet must use the emission standard to which the engine is certified. Such engines are required per Title 13 Section 2423(d)(5) to be clearly labeled as flex engines on the engine label as follows: "*THIS ENGINE COMPLIES WITH CALIFORNIA EMISSION REQUIREMENTS UNDER 13 CCR 2423(d). SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN FOR THE EQUIPMENT FLEXIBILITY PROVISIONS CITED MAY BE A VIOLATION OF STATE LAW SUBJECT TO CIVIL PENALTY*". However, they are not required to be labeled with the emission standard to which the engine is flexed.

While complying with the regulation's initial reporting requirements in 2009, many fleets had trouble determining what standard their post-2007 FLEX engines were flexed to. ARB staff attempted to assist such fleets and found in many cases that it was difficult or even impossible to determine what standard to which the engine was flexed. Even the engine certification executive order does not list the information, again simply noting that the listed engine family is a FLEX engine. As a result, fleets with post-2007 FLEX engines may spend an inordinate amount

of time trying to determine the standard, and – even after attempting to find the correct standard - may report the standard incorrectly.

Staff is proposing to modify the Post-2007 flexibility provisions to no longer require the reporting of the actual emission factor for these engines. Similarly to pre-2007 flex engines, a fleet would ignore that the engine had been "flexed", and would instead use the emissions charts located in Appendix A of the off-road regulation to determine the appropriate emission factor to use for that engine.

5. Alternative fuel provisions

Currently in section 2449(d)(1) of the regulation, electric vehicles can be incorporated in a fleet (using 0 for the PM and NOx emission factors) and help meet compliance with the regulation's requirements. However, for some fleets, adding electric vehicles into their off-road fleet will increase the fleet's total horsepower and could result in (1) bumping the fleet up into the next fleet size category, and/or (2) increasing the amount of vehicle turn over and retrofitting required under the BACT requirements. These consequences have discouraged some fleets from using electric vehicles, which was counter to the intent of this provision. Therefore, staff is proposing to remove electric vehicle horsepower from the fleet's total horsepower calculation, which will also result in removing this horsepower from all BACT calculations as well.

Additionally, section 2449(d)(1) allows fleets to replace, repower, and convert diesel vehicles to alternative fuel vehicles as compliance options in the regulation. However, as implementation of the regulation began, staff became aware of several inconsistencies within the alternative fuel provisions. Therefore, staff is also proposing to modify various provisions in this section to clarify or remove ambiguous parts of the language. Staff does not anticipate that these clarifications or modifications will change the intent or tighten the stringency of the provisions.

6. Incentivize hybrid off-road vehicles

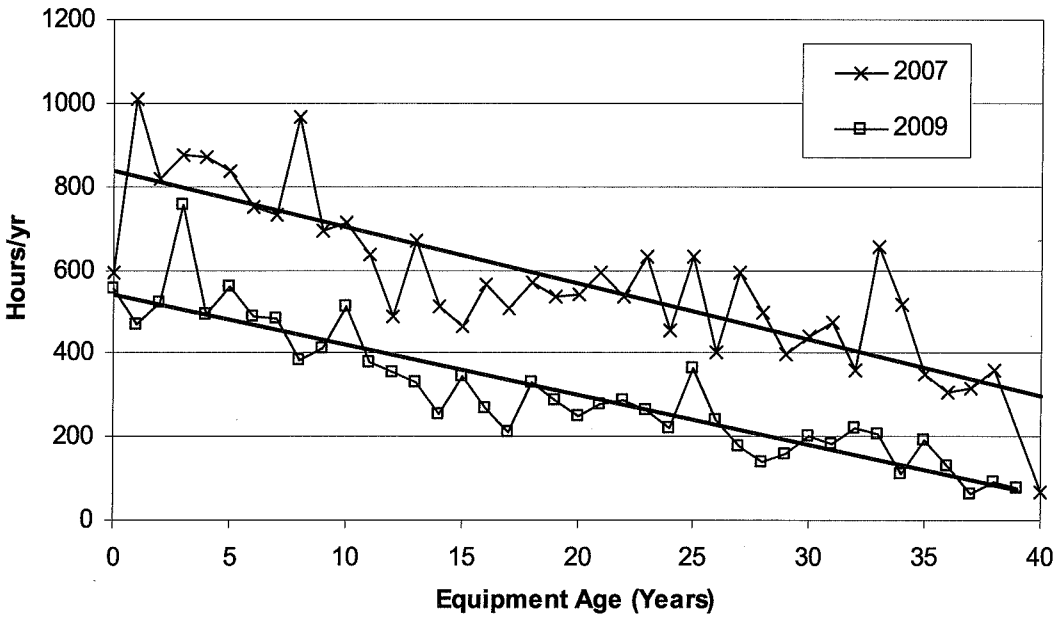
Hybrid electric-diesel off-road excavators and dozers are now available for purchase by California fleets. This technology shows promise in providing criteria pollutant and greenhouse gas emission reductions, while also achieving significant fuel economy benefits and fuel cost savings. Currently, there are only two manufacturers – Caterpillar and Komatsu – that offer hybrid equipment for sale in California; however, other manufacturers are expected to offer hybrid equipment over the next year. This technology offers an opportunity for lower emissions and fuel economy savings, but as the regulation is currently written, there is very little incentive for fleets to purchase these hybrid vehicles for compliance. Although these vehicles may have lower NOx and/or PM emission factors, a fleet that purchases hybrid off-road vehicles must still use the same emission factors as an equivalent tier diesel vehicle. Staff is proposing to incentivize the use of hybrid off-road vehicles by allowing fleets to use a lower

emission factor(s) for hybrid equipment used in a fleet. In order to use a lower emission factor(s), the equipment must have completed in-use emissions testing, and it must be shown through emissions testing that the emission factors of the hybrid vehicle are less than the emission factor(s) of an equivalent tier diesel vehicle. The fleet can then apply to the Executive Officer to use the lower emission factor(s).

7. Remove hours in fleet average provision

Many stakeholders have commented that they do not like the hours in fleet average option in section 2449(d)(2) because in order to use this provision, the fleet average calculated is increased by 18 percent. Stakeholders view this as a penalty that prevents them from utilizing the hours in fleet average provisions. The 18 percent increase was included in the regulation to account for the fact that newer vehicles operate more than older vehicles. Based on activity data submitted by fleets to ARB for the purpose of claiming AB 8 2X Reduced Activity Credit (AB 8 2X, 2009), staff still believes this 18 percent factor necessary; newer equipment is still being utilized more than older equipment (see Figure E-1 below). During the May and June 2010 workshops, staff polled workshop attendees regarding whether any fleets intended to utilize the hours in fleet average option as written, and no fleets indicated that they intended to do so.

Figure E-1: Average Vehicle Activity by Year in DOORS



Staff does not believe it is appropriate to remove the 18 percent factor; doing so would inadvertently decrease the stringency of the regulation and forego emission reductions. Therefore, since staff received feedback at the amendment workshops that this provision will not be used by fleets while the 18 percent

factor remains in place, to simplify the regulation, staff is proposing to remove this compliance option from the regulation.

8. New fleet requirements

Currently in the regulation (section 2449(d)(5)), if a fleet is new (i.e., either newly formed, or entering the state for the first time), it must be meeting the fleet average targets immediately upon forming, or entering the state. These requirements were developed to assure that 1) fleets cannot be formed with older Tier 0 equipment discarded by California fleets (i.e., would result in keeping older equipment within the state), and 2) that out-of-state fleets can only bring the newest, cleanest vehicles into the state. Additionally, by requiring new fleets to have cleaner equipment, it assures that in-state fleets already complying with the regulation would not be put at a competitive disadvantage to newly formed or out-of-state fleets (requires all fleets working in California to have invested in cleaner equipment). Although the intent of this provision is clear, currently it is ambiguous regarding whether or not a new fleet always has to meet the fleet average targets, or if the new fleet may, after having initially met the fleet average targets, meet the BACT requirements on other compliance dates after their first compliance date. Additionally, it does not specify what fleet targets (which compliance year, whether for large, medium, or small fleets) the fleet must meet. Staff is proposing to clarify exactly what fleet averages must be met, and when the fleet can start complying with the BACT requirements if they want to do so.

Staff is proposing upon purchasing vehicles or bringing vehicles into the state for the first time, a fleet must meet the following requirements:

- *Large or Medium fleets:* A new large or medium fleet must meet the fleet average target for the closest future *large fleet* compliance date upon initial formation or upon entrance into the state after the effective date of the proposed amendments.
- *Small fleet:* A new small fleet must meet the fleet average target for the closest future small fleet compliance date upon initial formation or upon entrance into the state after the effective date of the proposed amendments.

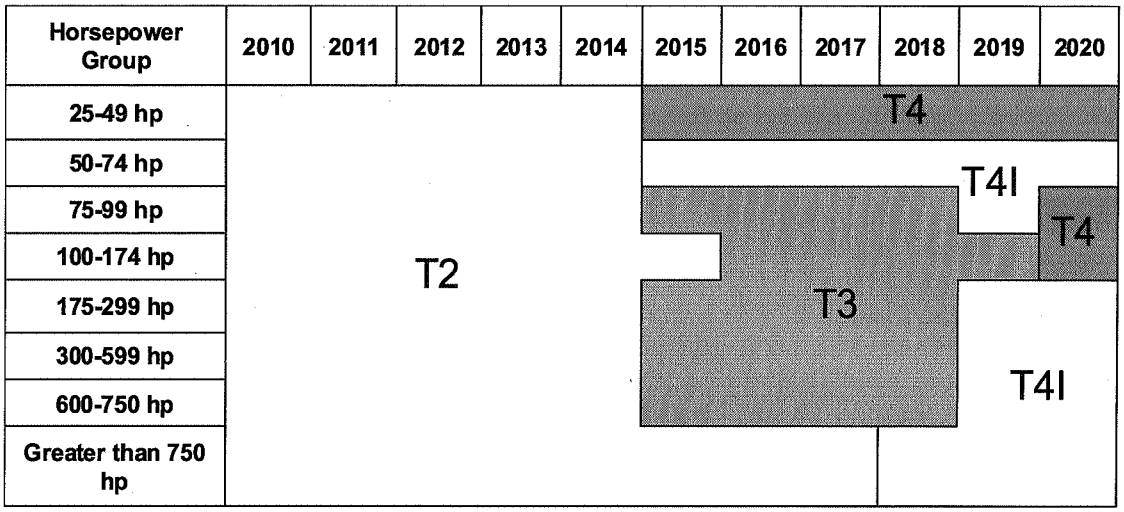
For any size fleet, the new fleet would have the choice of meeting either the fleet average target or the BACT requirements for subsequent compliance dates.

For example, if a medium fleet enters the state in June 2013, the fleet must be meeting the next future large fleet average target, which is January 1, 2014, immediately upon entering the state. After meeting this target, the fleet would have no other compliance requirements until the first medium fleet compliance date, which is January 1, 2017; for this compliance date, the fleet could meet either the fleet average target, or comply with the BACT requirements.

9. Adding vehicle requirements

The provisions in section 2449(d)(7) have requirements for adding vehicles that differ based on whether or not a fleet meets the fleet averages (i.e., is complying via the fleet average or BACT requirements). The chart below is an illustration of the adding vehicle provisions for fleets complying via the BACT requirements, and indicates the lowest tier vehicle that can be added in each year by a large or medium fleet. The requirements differ depending on the horsepower of the vehicle.

Figure E-2: Current Adding Vehicles Requirements



The adding vehicle requirements for small fleets or fleets meeting the fleet average targets are not shown, but have a similar level of complexity as that demonstrated by the chart above for large or medium fleets meeting BACT. Fleets have indicated that complying with this provision will be complicated and confusing if the provisions are not changed. Staff agree, believe fleets are likely to misunderstand the adding vehicle provisions if they are not simplified, and do not feel the complexity of this provision is necessary. Additionally, fleets have expressed uncertainty as to whether the adding vehicle requirements can or will be enforced prior to U.S. EPA granting authorization for ARB to enforce the performance requirements of the off-road regulation.

Staff is proposing to simplify this provision in the following ways:
Adding Vehicle Requirements - Amend this provision to require that:

- A ban on adding vehicles with Tier 0 engines to any fleet would begin only after:
  - The proposed amendments to the off-road regulation are certified by the Secretary of State; and
  - The Administrator of the U.S. EPA grants authorization to enforce the off-road regulation.
- Beginning March 1, 2011, large and medium fleets would be allowed to add only vehicles with Tier 2 or higher engines, except as follows. A

vehicle with a Tier 1 engine could still be added during this time, as long as all the following conditions are met:
  - The added vehicle with the Tier 1 engine must have been registered in DOORS before March 1, 2011;
  - The fleet adding the vehicle with the Tier 1 engine must be registered in DOORS; and
  - The fleet removing the vehicle with the Tier 1 engine must be registered in DOORS.
- Without exception, beginning January 1, 2013, large and medium fleets would be allowed to add only vehicles with Tier 2 or higher engines; beginning January 1, 2016, the restrictions would apply to small fleets; and
- Beginning January 1, 2018, large and medium fleets would be allowed to add only vehicles with Tier 3 or higher engines; beginning January 1, 2023, the restrictions would apply to small fleets.

These revised requirements will apply to all fleets regardless of compliance path, and to all horsepower categories, further simplifying this provision.

10. Compliance after the final target date

The current language regarding turnover exemptions is ambiguous as to whether or not these exemptions expire after 2020 (Compliance after the Final Target Date – section 2449(d)(10)). Additionally, with the delay in fleet requirements and the deletion of the PM portion of the regulation (section 2449.2), the dates and some of the requirements listed in this section are no longer applicable.

Staff is proposing to clarify in section 2449(d)(10), Compliance after the Final Compliance Date, that turnover and retrofit exemptions do not expire after the final compliance date. Additionally, staff is proposing to change the final compliance date for large and medium fleets to January 1, 2023 (from March 1, 2020), and for small fleets to January 1, 2028 (from March 1, 2026). Because staff is proposing to remove the PM requirements of the regulation, there will be no final PM compliance requirements. Therefore, staff is proposing that small fleets be required to meet the same final compliance requirements as large and medium fleets (i.e., they must meet the final fleet average); however, they will not need to meet those requirements until January 1, 2028, and there are no mandatory turnover requirements proposed for small fleets.

11. Modify the reporting dates

Staff is proposing to change the annual reporting dates in section 2449(g)(2) to make these dates more consisted with the new compliance deadlines. In the current regulation, all fleets must be in compliance by March 1 of each compliance year, and then report their fleet information to ARB by April, June, or August, depending on their fleet size. However, because staff is proposing to change the yearly compliance date from March 1 to January 1, staff is also

proposing to move the reporting date for all fleets to March 1. This means that instead of having large fleets report in April, medium fleets in June, and small fleets in August, all fleets would report on March 1 each year they are required to report.

Additionally, since the initial compliance requirements for all fleets have been delayed four years, staff is proposing to delay the annual reporting requirements as follows:

- Large fleets must report annually each year from 2010 to 2024;
- Medium fleets must report annually each year 2016 to 2024; and
- Small fleets must report annually each year from 2018 to 2029.

12. Modify labeling requirements

Staff has received feedback that the labeling provisions in the regulation (section 2449(f)(2)) would be easier to enforce if the EINs were required on both sides of the vehicle; currently only the right (starboard) side of the vehicle is required to be labeled. Therefore, staff is proposing to require that fleets label both sides of their affected vehicles.

Staff has also received feedback that the captive attainment area fleet provisions, which provide delayed requirements for vehicles that only operate in counties that meet federal air quality standards, will be difficult to enforce if vehicles that fall under this provision have labels that are identical to the labels of all other vehicles in the state. Therefore, staff is currently proposing to change the labeling requirements of these captive attainment area vehicles to require the EINs to be green with white letters, instead of red with white letters.

Fleets would be required to label both sides of the vehicle, and modify the labels for captive attainment area vehicles, by January 1, 2013, providing approximately two years to comply.

13. Compliance certification

Per section 2449(f)(2) of the regulation, fleets must submit, each compliance year, certification by the responsible official that the fleet information submitted to ARB is accurate, and that the fleet is in compliance with all regulatory requirements. Alternatively, the responsible official can designate a representative to sign on his or her behalf. This process is called Compliance Certification. This certification is commonly confused with the Certificate of Reported Compliance that ARB issues to the fleet once the Compliance Certification from the fleet is received by ARB. Many fleets have found this process confusing because "Certificate" and "Certification" are such similar words, and because Compliance Certification was not required during the initial reporting period, and will only be required going forward once the regulation's requirements are being enforced. Therefore, staff is proposing to change the name of the Compliance Certification process (that must be submitted by a fleet

each compliance year) to instead be called the "Responsible Official Affirmation of Reporting" process, which is not easily confused with "Certificate", and to add clarifying language regarding designating a representative that will take the place of a responsible official.

14. Order of turnover

When fulfilling the NOx BACT requirements, a fleet must turn over all vehicles without a PM standard (i.e., Tier 0 and Tier 1 "uncontrolled" vehicles) before the turnover of higher tiered vehicles can be counted toward the BACT requirements (section 2449.1(a)(2)(A)3.). Many fleets are not aware that Tier 1 engines between 50 and 175 hp are considered "Tier 1 uncontrolled" engines, and therefore would also not be aware that turning over a Tier 1 vehicle with 200 horsepower would not provide credit towards the requirements if a Tier 1 vehicle with 150 horsepower remained in the fleet. Staff is concerned that once the regulation is in effect, many fleets may inadvertently find themselves out of compliance because they kept a Tier 1 "uncontrolled" vehicle in their fleet and therefore were not able to take credit for turning over other Tier 1 vehicles. To simplify this provision, staff is proposing to revise this language to require fleets to turn over all Tier 0 and Tier 1 vehicles first, before the turnover of other higher tiered vehicles can be counted toward the BACT requirements in the fleet.

15. Turnover exemption for vehicles with early VDECS installations

Section 2449.1(a)(2)(A)4. allows a fleet to exempt up to 15 percent of its horsepower from later turnover requirements if it retrofits the vehicles with the highest level PM verified diesel emission control system (VDECS) by March 1, 2011. This provision was adopted to encourage early retrofitting. Several questions on the applicability of this exemption have arisen that staff believe should be addressed and the language clarified as shown below. The delay of all turnover and retrofit requirements also provides an opportunity to encourage additional early VDECS installations by extending the deadline for fleets to receive this credit.

Staff is proposing to add language to this section to extend the deadline for this provision from March 1, 2011 to January 1, 2013, and to clarify:

1. If a fleet has more than 15 percent of its vehicle retrofit before January 1, 2013, the fleet may choose any of those vehicles to be counted under this exemption, as long as the 15 percent cap is not exceeded; and
2. Specify that a fleet must keep the VDECS on the vehicle in order to maintain the exemption.

16. Recalibrating the SOON NOx targets

The NOx targets used in the program to achieve supplemental NOx reductions in the South Coast AQMD (the SOON program) in section 2449.3 begin in 2011,

and were set up to be more stringent than the fleet average targets for the off-road regulation. However, since staff is proposing to delay the regulation start date by four years and to modify the NOx fleet average targets, the SOON targets need to be adjusted accordingly to remain consistent. The current SOON NOx targets are shown in Table E-1 below.

Table E-1: Current SOON NOx Targets

Compliance Date: March 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2011	5.6	6.2	6.7	6.0	5.4	5.1	5.3	6.4
2014	4.9	5.1	5.2	4.7	2.8	2.7	2.7	4.2
2017	4.2	4.1	3.8	3.4	1.5	1.5	1.5	3.2
2020	3.5	3.2	2.4	2.2	0.9	0.9	0.9	2.6
2023	3.5	3.2	2.4	2.2	0.9	0.9	0.9	2.6

Staff is proposing to make no change to the 2011 SOON NOx target, but would make the remaining SOON targets more consistent with the new fleet average targets proposed by staff and shown in Appendix A of this staff report. The proposed SOON targets in Table E-2 below have increased in the earlier years, and decreased in the later years of the regulation.

Table E-2: Proposed SOON NOx Targets

Compliance Date: January 1 of Year	25-49 hp	50-74 hp	75-99 hp	100-174 hp	175-299 hp	300-599 hp	600-750 hp	>750 hp
2011	5.6	6.2	6.7	6.0	5.4	5.1	5.3	6.4
2014	5.8	6.5	7.1	6.4	3.9	3.7	3.7	5.3
2017	5.0	5.4	5.5	4.9	2.2	2.2	2.2	4.3
2020	4.1	4.2	3.4	3.1	1.4	1.3	1.4	3.4
2023	3.3	3.0	1.4	1.3	0.7	0.7	0.7	2.7

B. Proposed Minor Modifications to the LSI Fleet Regulation

The following sections describe in more detail the proposed minor amendments to the LSI fleet regulation.

1. Add an "Agricultural Operations" definition

The LSI fleet regulation does not define "Agricultural Operations", only "Agricultural Crop Preparation Services." The latter definition is a subset of the former and does not provide sufficient information. It also doesn't discuss how equipment used in both agricultural operations and non-agricultural operations should be treated. Staff proposes to add an Agricultural Operations definition, along with modifications to the FAEL definition, to clarify that: (1) LSI equipment used in agricultural operations is not subject to the FAEL standards, (2) nursery

and forestry operations are considered agricultural operations, and (3) more than half of the annual operating hours of a mixed use piece of equipment must be in agricultural operations for the vehicle to be considered engaged in agricultural operations.

2. Clarify the "Airport Ground Support Equipment" definition

The LSI fleet regulation defines "Airport Ground Support Equipment" or "GSE" as any large spark-ignition engine or electric-powered equipment contained in the 24 categories of equipment included in section B.3 of Appendix 2 of the South Coast Ground Support Equipment Memorandum of Understanding, dated November 27, 2002. Two of these categories are "carts" and "other," which, for the purposes of electric-powered equipment, can be interpreted very broadly. The intent of the GSE definition is to allow operators to include electric equipment in their FAEL standards calculations only as long as the equipment performs the work equivalent of an LSI engine-powered piece of equipment. Staff proposes to add clarifying language to the definition to reflect this intent.

3. Clarify the "Baseline Inventory" definition

The LSI fleet regulation requires operators to conduct a baseline inventory. The Baseline Inventory definition states that this inventory should reflect all equipment owned at the time of the inventory. The intent of the regulation was that the baseline inventory should reflect all operated equipment subject to the FAEL standards. Staff proposes to modify the Baseline Inventory definition to reflect this intent.

4. Add a "Boneyard" definition

Boneyards, which are repositories for surplus or end of service LSI equipment, contain entire fleets of retired equipment awaiting scrap or reuse by other entities. The LSI fleet regulation does not have a mechanism for dealing with decommissioned fleets. The ARB intends for these fleets to be excluded from FAEL standards calculations. Staff proposes to add a "boneyard" definition and modify the FAEL definition to exclude boneyard fleets.

5. Modify the "Fleet Average Emission Level" definition

There are two issues that the ARB wishes to address in this definition. First, the definition states that electric-powered equipment of less than 19kW shall be allowed to be included in the FAEL calculation if the operator can demonstrate it performs the work equivalent of LSI equipment. By definition, LSI engines have a power of 19kW or greater, so the intent of this language was that electric vehicles with a power rating of less than 19kW would have to demonstrate that they performed the work equivalent of the same category of LSI equipment prior to being allowed into FAEL standard calculations. However, electric forklifts and

GSE that do the work of a typical forklift or piece of GSE typically are rated at less than 19kW.

Second, the definition does not describe how experimental equipment, boneyard equipment, retired equipment, and in-field or agricultural operations equipment should be treated in FAEL standard calculations. ARB committed, during the LSI fleet regulation rulemaking, to exempt in field agricultural forklifts. It is also ARB's intent that boneyard, experimental, and retired equipment be excluded from FAEL standard calculations.

Staff proposes to modify the definition to exclude agricultural operations, boneyard, experimental, and retired equipment from the FAEL standards calculations. Staff further proposes to allow electric equipment of less than 19 kW to be included in FAEL standards calculations as long as the equipment performs, with similar efficiency, the same function as an LSI engine-powered piece of equipment subject to the standards. Finally, staff proposes to clarify that the default emission rate for uncontrolled LSI equipment is 12.0 g/bhp-hr HC+NOx.

6. Add an "In-field Equipment" definition

As mentioned above, the ARB committed to exempt agricultural forklifts used primarily in field, but this commitment was never codified. The ARB is now proposing to modify the fleet average emission level definition to exclude in-field LSI equipment, but must define "in-field." Staff proposes to add a definition for "in-field equipment."

7. Clarify the "Operator" definition

This definition states that "operator" includes a person whose usual and customary business is the rental or leasing of LSI engine equipment for any equipment not solely possessed or used for rental or leasing. The intent of the regulation was to allow dealers some de minimis level of use of their rental and used equipment fleet vehicles without triggering the FAEL standard requirements. As it currently stands, a dealer could become an operator if they use any four vehicles, regardless of duration of usage, for their own purposes. Staff proposes to modify the "operator" definition to stipulate a de minimis usage level that reflects this intent.

8. Add a "Retired Equipment" definition

Operators may retire LSI equipment as part of their compliance strategy. This retired equipment often remains on site awaiting sale or scrap. Through Mail Out #MSC 10-08, the ARB has established procedures for designating equipment as retired, but needs to include a retired equipment definition in the text of the regulation. Staff proposes to add a "retired equipment" definition.

9. Modify the record-keeping requirements

The LSI fleet regulation requires operators to record identifying and emissions information for each piece of LSI equipment in their fleet. It also requires them to obtain product delivery tickets or a like surrogate, if obtainable, stipulating that the fuel they are using meets motor vehicle grade propane specifications. The ARB added this second requirement in an attempt to force operators to put pressure on their fuel suppliers to provide uncontaminated and low-olefin (propene) content motor vehicle grade fuel. However, operators have been unable to obtain this documentation from their fuel suppliers. Staff proposes to remove the fuel quality record-keeping requirement. Staff also proposes to clarify the ARB's intent that the record-keeping requirement apply to each piece of LSI equipment.

C. References

ARB, 2009a. California Air Resources Board. *In-Use Off-Road Diesel Vehicle Regulation Frequently Asked Questions: Low-Use Provisions.* California Air Resources Board, April, 2009. http://www.arb.ca.gov/msprog/ordiesel/faq/faqlowuse.pdf

Appendix F: Cost Methodology

This appendix explains the cost methodology used to estimate the costs of the proposed amendments to the off-road regulation. Section A below explains why the compliance costs for the current off-road regulation are different than those presented in the original staff report (ARB, 2007a). Section B outlines the cost methodology, and Section C lists references used.

A. Updated Current Regulatory Costs

The current regulation costs presented (in Chapter VII of this document) are different than those estimated in the original staff report (ARB, 2007a) for several reasons, including:

- The current regulation costs presented in Chapter VII are in 2010 dollars; the original staff report cost estimates were presented in 2006 dollars.
- The current regulation costs are the costs associated with vehicle turnover and retrofitting only; the original staff report estimates included additional costs for reporting, labeling, and retrofit operational and maintenance costs. It is reasonable to leave out the reporting and labeling costs because all fleets must report and label their vehicles, even under the proposed amended regulation; hence, it was not necessary to recalculate these costs for the purposes of comparing the current regulatory costs with the proposed amended regulation costs or for comparing regulation amendment proposals. Staff did not include retrofit operational and maintenance costs because these costs, when calculated, were insignificant compared to the overall compliance costs for the statewide fleet.
- The current regulation costs in Chapter VII take into account the amendments made to the regulation since its initial approval in 2007. These amendments include the Assembly Bill (AB) 8 2X amendments, and the delay of enforcement of the March 1, 2010, compliance date which have resulted in a cost savings for many fleets. Because the regulation has already been amended to give economic relief to affected fleets, staff believed it was appropriate to recalculate the costs of the regulation, as it currently exists, and not how it was originally adopted.
- The cost estimates for both the current regulation and the proposed amended regulation in this staff report were calculated using the most recent inventory of off-road vehicles, which includes fewer vehicles than previously estimated. The original staff report costs were calculated using an estimated statewide vehicle inventory. However, because more accurate reported data from the Diesel Off-road On-line Reporting System (DOORS) now exists, staff believes it is more appropriate to estimate statewide costs based on this updated inventory data.

For the many reasons stated above, it was more appropriate to recalculate the statewide costs of the regulation, as it currently exists, than to compare the proposed amended regulatory costs to the original costs presented in the 2007 staff report.

B. Updated Cost Methodology

As stated in Chapter VII, the methodology used to calculate the costs in this staff report were similar to the methodology used when originally estimating the costs for the off-road regulation. For a full description of the original cost methodology, please see Chapter XI of the original Technical Support Document (TSD) for the off-road regulation (ARB, 2007b). The subsections below provide a summary of the updated cost methodology, as well as the retrofit and vehicle costs used in the modeling.

1. Statewide Costs

The original methodology relied on the compliance modeling for 200 sample fleets, and required these costs to be scaled to reflect statewide costs. However, the updated methodology used to calculate costs for this report used the Off-road Simulation Model (OSM) to model the compliance paths of approximately 8,800 real fleets reported to DOORS (DOORS, 2010). For each fleet in DOORS, OSM calculated the costs the fleet would normally spend without the regulation in place. These costs are referred to as a fleet's baseline costs, and depend upon a fleet's average age and natural turnover rate. Once the baseline cost for a fleet was determined, a compliance cost was then calculated, based on a fleet's anticipated compliance path. The difference between a fleet's baseline cost, and a fleet's compliance cost is the cost attributed to the off-road regulation. For more information on OSM, please see Appendix D.

Once these costs were calculated for each fleet, they were summed to provide staff with the overall compliance costs for each year over the life of the regulation (for those fleets in DOORS). To determine the cost in 2010 dollars, the cost for each year was multiplied by the net present value (NPV)[1] factor.

Although the fleets in DOORS represent a majority of the fleets affected by the regulation, there are still some fleets that have not reported to DOORS (and are therefore not in compliance with the off-road regulation). To account for these noncompliant fleets (estimated to be 10 percent of the statewide fleet), the costs for each year were multiplied by a 1.1 noncompliance factor.

2. Compliance Costs

The compliance path for each real fleet included the option of retrofitting or accelerated turnover (to new or used vehicles). Although repowering a vehicle with a new engine is a viable compliance option, it is not applicable to all vehicle types and horsepower categories and is expected to be a relatively rare compliance choice. Therefore, to simplify the analysis, staff did not include repowers as a compliance option in OSM.

[1] NPV = 1/(1+r)^n, where r = the annual interest rate, and n = the number of years in the future. An annual five percent real interest rate is the basis of all economic impacts, assuming seven percent nominal interest rate and two percent inflation rate.

a) *Vehicle costs*

The new and used vehicle costs were determined from for-sale prices of vehicles of various types. Prices were plotted by vehicle age and curve fit on a dollar per horsepower ($/hp) basis to represent the typical price for each vehicle type. For a majority of the vehicle types in the off-road inventory, this analysis had already been performed; these numbers are available in Appendix J of the original TSD of the off-road regulation (ARB, 2007b), and were used in this analysis. However, for various types of GSE vehicles, prices were compiled from used vehicles for sale on several websites, including Machinerytrader.com and Tradequip.com. The $/hp values used for GSE vehicles is included in Attachment 1.

b) *Retrofit costs*

Staff contacted several retrofit manufactures to collect current retrofit costs. These costs were used in OSM, and are shown below in Table F-1 (Aleixo, 2010, Halloran, 2010, Machado, 2010, Swenson, 2010).

Table F-1: Retrofit Costs

Horsepower Range	Retrofit Cost
Less than 50 hp	$16,750
50 hp – 125 hp	$17,588
125 hp – 175 hp	$19,733
175 hp – 300 hp	$24,796
300 hp – 400 hp	$28,763
400 hp and Greater	$52,333

c) *Additional costs*

When the costs for the original regulation were calculated, staff included a 'transportation cost' of $10/hp to account for the potential price impact on changes in demand for clean and dirty vehicles (ARB, 2007b). This cost was also included in OSM, and was added to the price of every vehicle (new or used) purchased for compliance.

An additional cost that was also included in the original regulation costs was the Tier 4 premium. This cost was to account for the increase in cost for Tier 4 vehicles because of the exhaust aftertreatment technology expected to be used in those engines. The Tier 4 premium costs were estimated to be similar to the cost of a retrofit device, and are shown below in Table F-2.

Table F-2: Tier 4 Premium Costs

Horsepower Range	Retrofit Cost
Less than 50 hp	$8,000
50 hp – 175 hp	$12,000
175 hp – 400 hp	$18,000
400 hp and Greater	$30,000

C. References

Aeroservicios, 2010. Vehicle information from Aeroservicios. Last accessed October 25, 2010. www.aeroservicios.com/system/

AeroTech, 2010. Vehicle information from JBT Areotech. Last accessed October 25, 2010. http://www.jbtaerotech.com/

Aleixo, 2010. Personal communication between Joe Aleixo of DCL International Inc., and Cory Parmer, ARB; June 1, 2010.

ARB, 2003b. California Air Resources Board. *Carl Moyer Program Guidelines.* California Air Resources Board, September 2003. http://www.arb.ca.gov/msprog/moyer/guidelines/2003moyerguide.pdf

ARB, 2007a. California Air Resources Board. *Staff Report: Initial Statement of Reasons for Proposed Rulemaking; Regulation for In-Use Off-Road Diesel Vehicles*. California Air Resources Board, April 2007. http://www.arb.ca.gov/regact/2007/ordiesl07/isor.pdf

ARB, 2007b. California Air Resources Board. *Technical Support Document: Regulation for In-Use Off-Road Diesel Vehicles*. California Air Resources Board, April 2007. http://www.arb.ca.gov/regact/2007/ordiesl07/TSD.pdf

DOORS, 2010. Diesel Off-road On-line Reporting System. https://secure.arb.ca.gov/ssldoors/doors_reporting/reporting.php

EEA, 1995. Memorandum from Sandy Webb of EEA to Bill Albee, FAA, and Rich Wilcox, EPA, entitled: *Technical Data to Support FAA's Advisory Circular on Reducing Emissions from Commercial Aviation.* September 25, 1995.

Halloran, 2010. Personal communication between James Halloran of Caterpillar, Inc., and Cory Parmer, ARB; June 21, 2010.

Machado, 2010. Personal communication between Crystal Machado of HUSS Inc., and Cory Parmer, ARB; June 12, 2010.

MachineryTrader, 2010. Vehicle prices from Machinery Trader. Last accessed October 25, 2010. http://www.machinerytrader.com/

Mercury, 2010. Personal communication between Debbie Taylor of Mercury GSE and Stan Armstrong, ARB, August 9, 2010.

Swenson, 2010. Personal communication between Tom Swenson of Cleaire Advanced Emissions Controls, LLC., and Cory Parmer, ARB; June 1, 2010.

SunMachinery, 2010. Drilling rig prices from Sun Machinery. Last accessed on October 25, 2010. http://www.sunmachinery.com/

Sunnda, 2010. Workover rig vehicle information from Sunnda Corporation. Last accessed October 25, 2010. www.sunnda.com/

Tradequip, 2010. Vehicle prices from Tradequip International. Last accessed on October 25, 2010. www.tradequip.com/

Attachment 1 – GSE Vehicle Costs

New Vehicle Types Added

The table below identifies the new[2] vehicle types for which the costs were included in OSM. If not enough cost data could be found, the costs for a similar vehicle type were used, and are noted in Table F1-1 below.

Table F1-1: Vehicle Types with Updated Costs

Vehicle Type
Aerial Lifts
Forklifts
Other General Industrial Equipment (used "Other Construction" costs)
Other Material Handling Equipment (used "Other Construction" costs)
Sweepers/Scrubbers
Drill Rig (Mobile)
Workover Rig (Mobile)
A/C Tug Narrow Body
A/C Tug Wide Body
Baggage Tug
Belt Loader
Bobtail (used "Skid Steer Loader" costs)
Cargo Loader
Cargo Tractor (used "Tractor/Loader/Backhoe" costs)
Forklift (GSE) (used "Forklift" costs)
Lift (GSE) (used "Aerial Lift" costs)
Other GSE (used "Other Construction" costs)
Passenger Stand (used "Aerial Lift" costs)

Estimated Vehicle Costs

The costs used for estimating new and used vehicle prices are shown in the Table F1-2 below (Aeroservicios, 2010; AeroTech, 2010; EEA, 1995; MachineryTrader, 2010; Mercury, 2010; SunMachinery, 2010; Sunnda, 2010; Tradequip, 2010).

[2] Not included in the cost estimates for the original regulation (ARB, 2007b).

Table F1-2: Vehicle $/hp Cost by Vehicle Type (Ages 0 to 85)

Vehicle Type	Vehicle Age (Years)												
	0	1	2	3	4	5	6	7	8	9	10	11	12
Aerial Lifts	2368	1951	1608	1325	1092	900	741	611	504	415	342	282	232
Forklifts	641	599	559	522	487	455	425	397	370	346	323	301	281
Sweepers/Scrubbers	442	413	386	361	337	315	294	275	257	240	224	209	196
Drill Rig (Mobile)	1766	1568	1392	1236	1098	975	865	768	682	606	538	478	424
Workover Rig (Mobile)	1035	950	872	800	734	674	618	567	521	478	438	402	369
A/C Tug Narrow Body	975	914	857	803	753	705	661	620	581	545	510	479	449
A/C Tug Wide Body	975	914	857	803	753	705	661	620	581	545	510	479	449
Baggage Tug	1016	904	804	716	637	566	504	448	399	355	316	281	250
Belt Loader	551	516	483	452	423	397	371	348	326	305	286	267	250
Cargo Loader	1051	1007	966	926	888	851	816	782	750	719	689	661	633

Vehicle Type	Vehicle Age (Years)												
	13	14	15	16	17	18	19	20	21	22	23	24	25
Aerial Lifts	191	158	130	107	88	73	60	49	41	34	28	23	19
Forklifts	263	245	229	214	200	186	174	163	152	142	132	124	115
Sweepers/Scrubbers	183	171	160	149	139	130	122	114	106	99	93	87	81
Drill Rig (Mobile)	377	334	297	264	234	208	184	164	145	129	115	102	90
Workover Rig (Mobile)	339	311	285	262	240	220	202	186	170	156	144	132	121
A/C Tug Narrow Body	420	394	369	346	325	304	285	267	251	235	220	206	193
A/C Tug Wide Body	420	394	369	346	325	304	285	267	251	235	220	206	193
Baggage Tug	222	198	176	157	139	124	110	98	87	78	69	61	55
Belt Loader	234	220	206	193	180	169	158	148	139	130	122	114	107
Cargo Loader	607	582	558	535	513	492	471	452	433	415	398	382	366

Vehicle Type	Vehicle Age (Years)												
	26	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
Aerial Lifts	15	13	11	9	7	6	5	4	3	3	2	2	2
Forklifts	108	101	94	88	82	76	71	67	62	58	54	51	47
Sweepers/Scrubbers	76	71	66	62	58	54	50	47	44	41	38	36	33
Drill Rig (Mobile)	80	71	63	56	50	44	39	35	31	28	24	22	19
Workover Rig (Mobile)	111	102	93	86	79	72	66	61	56	51	47	43	40
A/C Tug Narrow Body	181	170	159	149	140	131	123	115	108	101	95	89	83
A/C Tug Wide Body	181	170	159	149	140	131	123	115	108	101	95	89	83
Baggage Tug	49	43	39	34	30	27	24	21	19	17	15	13	12
Belt Loader	100	93	88	82	77	72	67	63	59	55	52	48	45
Cargo Loader	351	336	322	309	296	284	272	261	250	240	230	220	211

Vehicle Type	Vehicle Age (Years)												
	39	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**
Aerial Lifts	1	1	1	1	1	1	1	1	1	1	1	1	1
Forklifts	44	41	38	36	34	31	29	27	26	24	22	21	19
Sweepers/Scrubbers	31	29	27	26	24	22	21	19	18	17	16	15	14
Drill Rig (Mobile)	17	15	13	12	11	9	8	7	7	6	5	5	4
Workover Rig (Mobile)	36	33	31	28	26	24	22	20	18	17	15	14	13
A/C Tug Narrow Body	78	73	69	64	60	57	53	50	47	44	41	38	36
A/C Tug Wide Body	78	73	69	64	60	57	53	50	47	44	41	38	36
Baggage Tug	11	9	8	7	7	6	5	5	4	4	3	3	3
Belt Loader	42	40	37	35	33	31	29	27	25	24	22	21	19
Cargo Loader	203	194	186	179	171	164	157	151	145	139	133	127	122

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Vehicle Type	Vehicle Age (Years)												
	52	53	54	55	56	57	58	59	60	61	62	63	64
Aerial Lifts	1	1	1	1	1	1	1	1	1	1	1	1	1
Forklifts	18	17	16	15	14	13	12	11	10	10	9	9	8
Sweepers/Scrubbers	13	12	11	11	10	9	9	8	8	7	7	6	6
Drill Rig (Mobile)	4	3	3	3	2	2	2	2	1	1	1	1	1
Workover Rig (Mobile)	12	11	10	9	8	8	7	7	6	5	5	5	4
A/C Tug Narrow Body	34	32	30	28	26	24	23	21	20	19	18	17	16
A/C Tug Wide Body	34	32	30	28	26	24	23	21	20	19	18	17	16
Baggage Tug	2	2	2	2	1	1	1	1	1	1	1	1	1
Belt Loader	18	17	16	15	14	13	12	11	11	10	9	9	8
Cargo Loader	117	112	108	103	99	95	91	87	84	80	77	74	71

Vehicle Type	Vehicle Age (Years)												
	65	66	67	68	69	70	71	72	73	74	75	76	77
Aerial Lifts	1	1	1	1	1	1	1	1	1	1	1	1	1
Forklifts	7	7	6	6	6	5	5	5	4	4	4	3	3
Sweepers/Scrubbers	5	5	5	4	4	4	4	3	3	3	3	3	2
Drill Rig (Mobile)	1	1	1	1	1	1	1	1	1	1	1	1	1
Workover Rig (Mobile)	4	4	3	3	3	3	2	2	2	2	2	2	1
A/C Tug Narrow Body	15	14	13	12	11	11	10	9	9	8	8	7	7
A/C Tug Wide Body	15	14	13	12	11	11	10	9	9	8	8	7	7
Baggage Tug	1	1	1	1	1	1	1	1	1	1	1	1	1
Belt Loader	8	7	7	6	6	6	5	5	5	4	4	4	3
Cargo Loader	68	65	62	60	57	55	53	50	48	46	44	43	41

Vehicle Type	Vehicle Age (Years)							
	78	79	80	81	82	83	84	85
Aerial Lifts	1	1	1	1	1	1	1	1
Forklifts	3	3	3	2	2	2	2	2
Sweepers/Scrubbers	2	2	2	2	2	2	1	1
Drill Rig (Mobile)	1	1	1	1	1	1	1	1
Workover Rig (Mobile)	1	1	1	1	1	1	1	1
A/C Tug Narrow Body	6	6	6	5	5	5	4	4
A/C Tug Wide Body	6	6	6	5	5	5	4	4
Baggage Tug	1	1	1	1	1	1	1	1
Belt Loader	3	3	3	3	3	2	2	2
Cargo Loader	39	37	36	34	33	32	30	29

APPENDIX G: HEALTH BENEFITS AND METHODOLOGY

APPENDIX G1: HEALTH BENEFITS ASSOCIATED WITH REDUCTIONS IN DIESEL PM EMISSIONS FROM OFF-ROAD DIESEL VEHICLES

APPENDIX G2: METHODOLOGY FOR ESTIMATING AMBIENT CONCENTRATIONS OF PARTICULATE MATTER FROM DIESEL-FUELED ENGINE EMISSIONS

APPENDIX G.1: HEALTH BENEFITS ASSOCIATED WITH REDUCTIONS IN DIESEL PM EMISSIONS FROM OFF-ROAD DIESEL VEHICLES

I. Overview

The estimation of premature death related to PM2.5 exposure presented below is based on a peer-reviewed methodology developed by the U.S. Environmental Protection Agency (U.S. EPA, 2010) and an incidents-per-ton (IPT) methodology (ARB, 2006). Staff estimates that approximately 1,900 tons of PM2.5 and 34,000 tons of NO_X emitted from off-road diesel vehicles will be reduced through implementation of this regulation in the years 2010-2029. The reduction of premature deaths associated with emission reductions of both primary PM and secondary PM (produced in the atmosphere from the precursor NO_X) are presented in Table 1.

Table 1: Estimate of Premature Deaths Avoided Associated with Emission Reductions from Implementation of the Off-Road Vehicle Regulation (2010-2029)*

Pollutant	# of Cases 95% C.I. (Lower Bound)	# of Cases (Mean)	# of Cases 95% C.I. (Upper Bound)
PM	190	250	310
NOx	170	220	270
Total	360	470	570

* Health effects from primary and secondary PM are labeled PM and NO_X, respectively.

Details of the methodology are described below. Sections II through VII describe how the health impact estimation methodology was developed, including development of the IPT factor and its application for the Off-Road Rule.

II. Incidence-per-ton Factors

ARB used a methodology known as the incidence-per-ton (IPT) to quantify the health benefits of regulatory controls to reduce PM2.5. This method, which was peer reviewed in 2006 (ARB, 2006), yields results similar to those of a more sophisticated modeling analysis, but can be used more efficiently. It is similar in concept to the methodology developed by the U.S. EPA for similar estimations (Fann et al., 2009). Details on the methodology used to calculate these estimates can be found in Appendix A of the Emission Reduction Plan for Ports and Goods Movement in California, as documented in the Emission Reduction Plan for Ports and Goods Movement (ARB, 2006).

The basis of the IPT methodology is the approximately linear relationship which holds between changes in emissions and estimated changes in health outcomes. This is a consequence of the following observations:

(1) Across the range of ambient PM2.5 concentrations encountered in California, modeled changes in premature mortality are approximately proportional to changes in ambient pollutant concentrations.
(2) For primary pollutants such as diesel particulate matter, changes in ambient concentrations are approximately proportional to changes in emissions.
(3) For secondary pollutants such as ammonium nitrate aerosol, a linear relationship may be used as a first-order approximation to the relationship between ambient concentration and emissions of NO_X. There may be cases where the relationship between emission of NO_X and ammonium nitrate aerosol is greater than or less than linear.

Therefore, premature death is approximately proportional to emissions, and can be estimated by multiplying emissions by a scaling factor, the IPT factor. IPT factors are derived by calculating the premature death incidence associated with a PM2.5 source in an air basin, and dividing by the emissions of that PM2.5 source. The methodology for estimation of premature death incidence is described in Section III. The emission inventories for NO_X were developed for 2008, adjusted to account for changes due to the recession, updates to the ocean going vessels, trucks/buses, locomotives, and construction equipment models. Separate IPT factors are used for each air basin and for each pollutant. Since the total incidence of heath effects is proportional to population, the result is adjusted by the ratio of the population in the target year to the population in the base year for which the IPT factors were developed.

III. Mortality Incidence

Background

For estimating the health benefits of emission reductions brought about by implementation of this regulation, ARB applied the methodology used by U.S. EPA in the 2010 Quantitative Health Risk Assessment that was developed to estimate premature deaths associated with PM2.5 exposure. In this assessment of health benefits, ARB calculated estimates for premature cardiopulmonary death. ARB is emphasizing cardiopulmonary deaths because they are the most frequent causes of death, and category of deaths most strongly related to PM2.5 exposure (U.S. EPA, 2010).

Calculation of the premature death incidence associated with PM2.5 exposure requires baseline incidence rates, population data, ambient concentration of PM2.5, and a concentration-response function relating changes in PM2.5 exposure to changes in mortality incidence. These data are available in a spreadsheet as part of the rulemaking package. Calculations were made based

on both primary and secondary PM2.5 exposure. The sources and derivation of these parameters are described in sections IV – VII.

Estimating population exposure to PM2.5

Estimation of the PM2.5 exposure is a several step process, involving estimation of the annual-average concentration at each PM2.5 monitor in the state, and interpolation of concentrations between monitors to estimate exposure for each census tract. Since diesel engines emit particles directly (primary particles), as well as gases that convert to PM2.5 through atmospheric chemical reactions (secondary particles), exposure estimates are made for both, in order to capture the full impact of diesel engines on premature death.

Population-weighted exposure to primary and secondary PM2.5 was estimated based on monitor-specific concentrations. Even with an extensive air quality monitoring network, the mortality quantification method requires estimation of exposure between monitors across a geographic area. ARB uses a standard spatial interpolation method known as inverse distance-squared weighting which was peer reviewed in 2007 (Shepard, 1968; Goodin and McRae, 1979). This method yields reasonable accuracy in estimating pollutant concentrations near monitoring stations, although when distance from the monitoring station increases, the uncertainty in the interpolated concentration also increases. This method gives more accurate estimates of concentration in areas with a large number of monitors with good spatial coverage and low variability in concentration. When data are abundant, most simple interpolation techniques give similar results (Jarvis et al., 2001). When data are sparse, however, the assumption made about the underlying variation in PM2.5 concentration, along with the choice of interpolation method and its parameters can be critical to avoid misleading results.

Aggregating results to county, air basin and state

To aggregate results from census tracts to larger geographical subdivisions such as counties or air basins, we used a GIS technique called areal interpolation. Areal interpolation is a procedure for translating spatial data from one set of geographical subdivisions to another when the boundaries do not exactly overlap. Numerous variants of the technique exist, but for the purpose of this analysis the simplest form, which uses area of polygon intersection, was employed (Goodchild and Lam, 1980; Fotheringham and Rogerson, 1994).

The precision of areal interpolation based on area of intersection depends on the relative size of the geographical subdivisions, and the homogeneity of the spatial distribution of the quantity being apportioned. In urban areas, where census tracts are small and population is distributed more evenly, areal interpolation to larger subdivisions such as air basins yields relatively precise estimates. In rural areas where the population is distributed unevenly over large census tracts, estimates are less precise.

IV. Population at the Census Tract Level

Age-resolved population data at the census tract level, for the 2000 Census, were obtained from the United States Census Bureau (U.S. Census Bureau). These were projected to 2006-2008 using age-resolved county population projections from the California Department of Finance (CDOF).

Age-specific growth factors for each county, for each year, were computed from the CDOF projections by dividing each county population for the target year by the county population for the year 2000. Since each census tract lies entirely in a county, these growth factors were applied to each census tract in the county, each age group separately. Population was projected for ten-year age groups 25-34 through 75-84, and for age 85 and older.

This method of projection reflects growth in overall county population, but does not model changes in population distribution within counties, such as expansion of urban areas into surrounding rural land.

V. Baseline Cardiopulmonary Mortality Incidence Rate

Baseline incidence rates vary by age bracket. Incidence was estimated separately for ten-year age groups 25-34 through 75-84, and age 85 and older.

Baseline cardiopulmonary mortality incidence rates were estimated at the county level from individual death records for the year 2005, obtained from the California Department of Public Health (CDPH). Cardiopulmonary mortality was defined as ICD9 codes 161-187 and 192-214.

The county of residence of the decedent was generally not recorded. However, the Federal Information Processing Standards (FIPS) city code and the ZIP code were usually recorded. The FIPS city code unambiguously identifies the county, but was sometimes invalid, unrecorded, or recorded as "unknown". When the FIPS code was not available it was sometimes possible to identify the county from the ZIP code, but ZIP codes can overlap multiple counties. In cases where 90% or more of the area of the decedent's zip code lay entirely within a county, the death was assigned to that county. A handful of records included invalid dates. The breakdown of records was as follows:

County identified by FIPS code	231,181	96.6%
County identified by ZIP code	4,196	1.8%
Unidentified or invalid	3,851	1.6%

Because the county could not be determined for 1.6% of the records, the incidence is slightly underestimated. No adjustment was made to compensate for excluded records.

In some cases the cardiopulmonary incidence was extremely low, because some counties only have a population of a few thousand, and the population is further subdivided into age groups. In such cases the variability of the incidence is high. However, since this represents a very small fraction of California's population the effect on statewide mortality estimates is negligible. Large counties show little year-to-year variability.

Baseline mortality rates are subject to other sources of uncertainty. For example, the baseline incidence level is treated as uniform throughout the county of interest. In addition, baseline incidence rates can change over time as lifestyles, health care, income, and other factors evolve.

VI. Annual Diesel PM Concentrations

Annual diesel PM concentrations were estimated indirectly from annual average NO_X concentrations by applying a conversion factor, α, of 0.022. Derivation of the conversion factor is described in Appendix G.2. Annual average NO_X concentrations for 2006-2008 were retrieved from ARB's air quality database (ARB ADAM).

Because there is statistical uncertainty in α, this uncertainty carries through in the mortality estimates from diesel PM. The overall uncertainty in the mortality incidence associated with diesel PM exposure was estimated by taking into account both the variability in α and the uncertainty in the β coefficient of the concentration-response function (described in Section III). Since this is very difficult to estimate analytically, parametric bootstrapping was used to obtain uncertainty estimates.

Parametric bootstrapping (Efron and Tibshirani, 1993) is a technique for estimating statistical properties of a complicated function of parameters with uncertain values. Probability distributions are assumed for the parameters, random samples are drawn from those distributions, and the function is calculated for each choice of parameters. The statistical properties of interest, in this case the confidence interval, can then be estimated from the values the function takes over the random sample.

In this case, α and β were assumed to have normal (Gaussian) distributions. The conversion factor α was assumed to have a mean of 0.022 and standard deviation of 0.05 as described in section VII. The mean of the β coefficient was taken to be 0.01293, and the standard deviation was back-calculated from the 0.95 confidence interval given in Appendix C of (U.S. EPA, 2009) as (0.01587 – 0.01007) / (1.96 × 2) = 0.001480.

Using the R statistical programming environment (CRAN), 100,000 sets of values for α (one for each NO_X monitor) and values for β were randomly generated. The

corresponding cardiopulmonary incidence for each choice of parameters was then computed. Since the sample exhibited a fairly symmetrical distribution, we computed the 0.025 and 0.975 quantiles of the sample to estimate the confidence interval.

VII. Annual PM2.5 ammonium nitrate concentrations

In addition to directly emitted PM, diesel exhaust contains NO_X, which is the precursor to nitrates, secondary diesel-related PM formed in the atmosphere. Secondary PM can lead to additional health impacts beyond those associated with directly emitted diesel PM. To quantify such impacts, staff developed annual average ammonium nitrate concentrations for 2006-2008. The concentrations were computed from ambient nitrate ion concentrations, using PM10 data combined from two sources: the regular air quality monitoring network and the IMPROVE visibility network (IMPROVE Visibility Network).

The ARB and air pollution control districts operate a network of PM10 monitors around the state, mostly in urban areas (ARB AQMN). PM10 samples are collected as 24-hour filter samples, once every six days, using size-selective inlet (SSI) sampler. Samples from some monitors are further analyzed to determine the concentration of nitrate and other constituents. During 2006-2008, nitrate data were available from 45 monitors. Since nitrate particles form a fine aerosol, essentially all of the nitrate mass falls into the PM2.5 fraction, so the PM10 nitrate concentration may be regarded as equivalent to PM2.5 nitrate concentration. SSI data were retrieved from ARB's ADAM air quality database (ARB ADAM).

In addition to urban PM10 nitrate monitoring, the national IMPROVE visibility network operated 18 PM2.5 nitrate monitors, mainly in national parks and other remote locations (IMPROVE Visibility Network). These instruments collect one sample every three days. The IMPROVE samplers are more efficient than the SSI samplers, and tend to recover a higher fraction of ambient ammonium nitrate than the SSI samplers. However, since the IMPROVE samplers are located at remote locations where PM2.5 concentrations are close to natural background levels, the effect of instrument bias is considered negligible, and the data were treated as equivalent to the SSI data. IMPROVE data were retrieved from the project web site (IMPROVE Visibility Network).

Daily samples were aggregated by monitor to obtain annual averages. In order to avoid potential seasonal bias due to missed samples, the samples were aggregated into quarterly means, and the four quarterly means were averaged to obtain annual means. For a quarterly average to be considered valid, the data were required to be at least 75% complete. For a year to be considered valid, all four valid quarters were required.

To convert from nitrate ion concentration to ammonium nitrate (NH_4NO_3) concentration, the annual averages were multiplied by the ratio of the molecular weight of ammonium nitrate to that of the nitrate ion, 1.29.

References

ARB ADAM. Air Quality Database web site. Available at: http://www.arb.ca.gov/adam/

ARB AQMN. Air Quality Monitoring Network web site. Available at: http://www.arb.ca.gov/aqd/aqmoninca.htm

CDOF. California Department of Finance population projection web site. Available at: http://www.dof.ca.gov/research/demographic/reports/view.php

CDPH. California Department of Public Health statistics web site. Available at: http://www.cdph.ca.gov/data/statistics/Pages/default.aspx

CRAN . The Comprehensive R Archive Network. Available at: http://cran.r-project.org/.

Efron E, Tibshirani R. 1993. An Introduction to the Bootstrap. Chapman and Hall. New York.

Fann N, Fulcher CM, Hubbell BJ. 2009. The influence of location, source, and emission type in estimates of the human health benefits of reducing a ton of air pollution Air Quality. Atmosphere & Health. 2:169-176.

Fotheringham S, Rogerson P, editors. 1994. Spatial Analysis and GIS. London. Taylor and Francis.

Goodchild M, Lam N. 1980. Areal interpolation: a variant of the traditional spatial problem. Geo-processing, 1: 297-312.

Goodin, WR, McRae, GJ, Seinfeld JH. 1979. A Comparison of Interpolation Methods for Sparse Data: Application to Wind and Concentration Fields. J Applied Meteor. 18:761-771.

IMPROVE Visibility Network web site. Available at: http://vista.cira.colostate.edu/improve/Overview/Overview.htm

Jarvis, CH Stuart, N. 2001. A comparison among strategies for interpolating maximum and minimum daily air temperatures. Part !!: The interaction between number of guiding variables and the type of interpolation method. J. Appl. Metero. 40, 1075-1084.

Shepard D. 1968. A two-dimensional interpolation function for irregularly-spaced data. Proceedings of the 1968 ACM National Conference. Pp. 517–524.

US Census Bureau. American Fact Finder web site. Available at: http://factfinder.census.gov/home/saff/main.html?_lang=en

U.S. EPA. 2009. Integrated Science Assessment for PM (Final Report). Available at: http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_2007_isa.html

U.S. EPA. 2010. Quantitative Health Risk Assessment for Particulate Matter Available at: http://www.epa.gov/ttn/naaqs/standards/pm/data/PM_RA_FINAL_June_2010.pdf

APPENDIX G.2: METHODOLOGY FOR ESTIMATING AMBIENT CONCENTRATIONS OF PARTICULATE MATTER FROM DIESEL-FUELED ENGINE EMISSIONS

Introduction

This appendix outlines a method to estimate annual average concentrations of diesel particulate matter (DPM) over large spatial scales. It consists of a simple variation of receptor modeling, which uses measurements of ambient chemical concentrations to infer source contributions, known as the tracer species method.[1] A basic assumption in this method is that the ambient concentration of a tracer species, *C*, may be used alone to infer the ambient concentration of a pollutant from a specific source, *S*:

$$S = \alpha C, \qquad (1)$$

where α is a scaling factor that is assumed to be independent of geographical location. In the estimation of DPM, we take *C* to be the annual-average ambient concentration of NO_x and *S* to be the annual-average ambient concentration of DPM less than 2.5 μm in diameter (DPM2.5). The factor α relates the concentration of PM2.5 produced by diesel-fueled engine emissions to the concentration of NO_x produced by all sources (NO_x is not a unique tracer for diesel emissions). In the following section, we demonstrate that estimates for α based on the emission inventory (EI) and on source apportionment (SA) studies agree within calculated uncertainties. We approximate the distribution of α values over counties by a Gaussian distribution with mean 0.023 and standard deviation 0.006 for the year 2000. Using data for 2008, we estimate a mean of 0.022 and standard deviation of 0.0005. The 2008 values are appropriate for estimating health impacts based on recent NO_x data. A single value for α and associated dispersion may be used to infer DPM concentrations from measurements of ambient NO_x concentrations in all air basins.

Background

The primary interest of the California Air Resources Board in the estimation of ambient DPM concentrations is for assessment of premature deaths. For this purpose, annual-average ambient concentrations of DPM are needed. These values are used to calculate lifetime average daily doses[2]; multiplication of the average daily inhalation dose over 70 years with a cancer potency factor gives inhalation cancer risk estimates. In previous estimates[3] of diesel particulate matter less than 10 μm in diameter (DPM10) concentrations, the Air Resources Board (1998) used a method based on ambient total PM10 concentrations. For this approach, one of two factors, rural or urban - which were determined from a combination of chemical mass balance source apportionment studies (CMB) and emission inventory estimates (EI) - was used to scale ambient PM10

measurement values to obtain estimates of DPM10 concentrations. Air basins that had DPM10 to total PM10 emissions (emission inventory estimates) greater or less than the base case had these DPM10 estimates scaled by another factor (that was determined from the EI): the ratio of air basin to base case value of the relative DPM10 to total PM10 emissions. Application of this method, therefore, depends on several elements, the most important of which are: 1) measurements of ambient PM10 concentrations, 2) previous source apportionment work in specific air basins (base cases), and 3) emission inventory estimates. These components are also the primary weaknesses of the method: 1) PM10 contains predominantly crustal material, and the fraction associated with diesel PM is very small - at most approximately 6.5%; 2) early CMB studies may not be as accurate as more recent organic marker species-based CMB methods; and 3) early emission inventory estimates may not be as accurate in accounting for all source emissions as more recent models.

We believe the use of scaled ambient NO_x concentrations is more direct than the PM10 method to estimate DPM concentrations for several reasons, foremost among these are the close linkage[4] of diesel-engine emitted NO_x to total emitted NO_x – about half of total NO_x emissions are from diesel sources – and the relatively good correlation of ambient with recent emission inventory estimates for α. In addition, NO_x emissions in California are predominantly from mobile sources, with diesel vehicle emissions accounting for approximately half the on-road mobile contribution and greater than 60% of the off-road contribution. The limited variation in different air basins of the diesel engine emissions contribution to total NO_x is a reflection of the similarity of on- and off-road fleet composition and activity. In this respect, California likely differs from other regions of the country in the scarcity of important point stationary sources (such as power plants and refineries). Contributions from such point sources would introduce proximity dependencies and preclude the use of a simple NO_x-scaling methodology to approximate DPM.

Methods

In this section, we develop estimates for the scaling factor α, the ratio of ambient DPM to total ambient NO_x concentrations. First, we compare the ratio of ambient concentrations $(DPM/NO_x)_{SA}$ from several source apportionment (SA) studies done in the late 1990's with the ratio of annual emissions $(DPM/NO_x)_{EI}$ from the calendar year 2000 emission inventory (EI). Currently, the source apportionment studies are considered the best available methods for determining ambient DPM concentrations (at selected monitoring sites); agreement between the SA and EI estimates of α is used to support the use of a single α value for the whole state of California. Second, based on this favorable comparison, we use the distribution of county emission inventory estimates for the $(DPM/NO_x)_{EI}$ to determine an average and standard deviation for α for a baseline year 2008.

In the following section, we estimate the ratio of DPM to NO_x concentrations in ambient air for two year-long and several short-term source apportionment modeling studies with co-located NO_x measurements. These studies utilize specific organic chemical species, or molecular markers, in chemical mass balance (CMB) apportionment of PM, which is considered to be essential for the accurate separation of gasoline from diesel-fueled engine emissions. Even with such molecular markers, however, CMB modeling relies on several important, though typically unverifiable, assumptions. First, all chemical species used in the CMB mass balance equations must be conserved during transport from source to receptor site. That is, these species in the particle phase must not be either depleted through volatilization or chemical reaction or increased through atmospheric reactions of precursor species. Second, all major sources that contribute chemical species used in CMB apportionment must be chemically characterized and included in the model, and the source profiles constructed must be sufficiently different from one another that problems of collinearity are not encountered. Recent work has investigated how well these assumptions are fulfilled in practice.[5] In these studies, several challenges in application of the CMB method have been determined: emissions from vehicles exhibit significant profile-to-profile variability, which causes difficulties in construction of a single source profile; molecular markers undergo significant oxidation across a range of experimental conditions, which indicates that similar aging effects may affect apportionment studies; CMB analysis is very sensitive to source profile selection; and well defined source profiles may not exist for some emission categories. Another source of uncertainty in the apportionment of PM to diesel emission sources in all these studies is in the off-road diesel source contribution. These sources are captured by CMB modeling only to the extent the emissions are similar in chemical composition to those of on-road diesel trucks, for which source profiles are available. In light of the emission inventory estimate that approximately half the diesel contribution to PM and NO_x is from off-road sources, this poorly understood aspect of SA modeling warrants further qualifications in all CMB estimates of DPM.

The first PM source apportionment work considered in this document was a year-long effort conducted as part of the Children's Health Study (CHS 1995), in which James Schauer carried out organic chemical PM CMB studies for eleven sites in the South Coast Air Basin.[6,7] Hence, eleven annual average values for DPM10 and NO_x concentrations are available from this work. Four of the sites are centrally located, while the rest are in more or less outlying areas. The second considered SA study was carried out as part of the California Regional Particulate Air Quality Study (CRPAQS 2000) by Desert Research Institute (DRI) in the San Joaquin Valley.[8] From this work, seven estimates of annual average DPM2.5 and associated NO_x are available. Most of these sites are in urban areas (with the exception of Bethel Island). Although J. Chow of DRI used a different methodology to measure elemental and organic carbon (IMPROVE method) than used by J. Schauer for CHS (NIOSH method), DRI utilized similar specific organic chemical markers for combustion sources. In addition to these long-term

measurements, side-by-side, organic marker CMB modeling was done by E. Fujita and J. Schauer at two sites for one week each in Southern California in 1999 as part of the Diesel-Gasoline Particulate Matter Split Study (DGPM 2000).[9,10,11]

An unexpected result from the Diesel-Gasoline Particulate Split Study is that apportionment of PM2.5 depends on the specific carbon measurement method utilized (to determine relative organic/elemental carbon). Such differences in apportionment are currently not incorporated into uncertainty estimates. We also note that the DGPM study raised several important, but still unresolved, questions in the interpretation of CMB modeling results. Specifically, SA estimates may be very sensitive to the choice of source profiles used; e.g. the characteristics of the "average" driving cycle, categories of vehicles, composition of the fleet (e.g. inclusion of high emitter categories such as gasoline "smoker" vehicles) and, information about average high emitter organic species emissions. These aspects bear directly upon SA attribution estimates in a poorly understood manner. Results from several recent short-term apportionment studies that do not utilize CMB modeling are also included below; these studies provide further evidence for a wide range of DPM estimates. Based on a favorable comparison of SA and EI results, we develop an estimate of the DPM/ NO_x ratio based on the EI.

Results

Source apportionment of PM collected in the South Coast Air Basin was done by J. Schauer as part of the Children's Health Study (CHS) in 1995. The sampling sites are described in the CHS Final Report and represent eleven communities in the South Coast Air Basin; these include four urban sites (Mira Loma, North Long Beach, Riverside, Upland), two sites in a mountainous region (Alpine and Lake Arrowhead), one desert site (Lancaster), three rural coastal sites (Atascadero, Lompoc, and Santa Maria), and one rural inland site (Lake Elsinore). NO_x measurements and filter samples (organic chemical marker measurements) were taken at the same locations. Although each filter PM sample was collected over a two week interval, filters from each site were composited into three seasonal time periods. Each composited sample was analyzed for organic marker compounds and utilized in chemical mass balance source apportionment modeling. We concentrate on using annual average results from the apportionment study, and show seasonal trends below. Figure 1 shows site-to-site variation of source apportionment estimates of the ratio (annual average DPM10 concentration)/(annual average total NO_x concentration) from the CHS (1995). A straight average over all eleven sites of the ratio DPM10/NO_x, gives the mean value as 0.030 (0.010), where here and in the following text the value in parentheses denotes the standard deviation. An alternative estimate based on regression of DPM10 concentrations against ambient NO_x concentrations (over eleven sites) gives 0.027 (0.001); see Fig. 2. In this, and all following regressions, the intercept is set to zero, which makes the regression less

sensitive to scatter and is physically meaningful, as one expects that diesel emissions tend to zero with total NO_x emissions.

As expected, the dispersion in α is much larger over individual measurements of DPM/NO_x than it is for the regression coefficient. It is unclear which choice of error is best for use in personal exposure estimates that use population weighting. The site-specific DPM/NO_x values, Fig. 1, are best estimates for local DPM/NO_x ratios, though specific meteorology and lack of population weighting may emphasize unrepresentative values. Similarly, DPM/NO_x ratios obtained from linear regression (with zero intercept) are highly influenced by data with large NO_x and/or DPM values. Because individual measurements for the ratio DPM/NO_x retain site-specific variability in concentrations, we believe the statistics from individual measurements are better estimates than regression coefficients for DPM exposure-related work. We take the standard deviation of the distribution of DPM/NO_x values as the measure of uncertainty in α for SA studies.

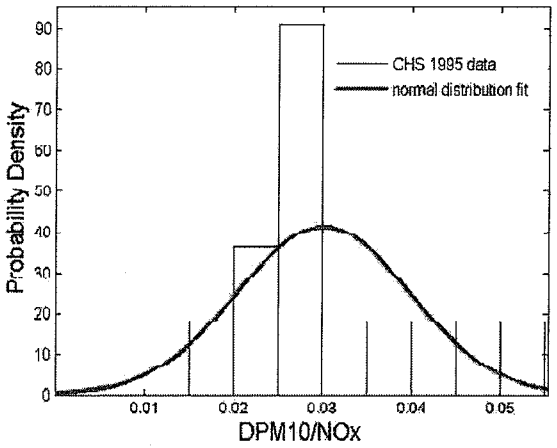


Figure 1

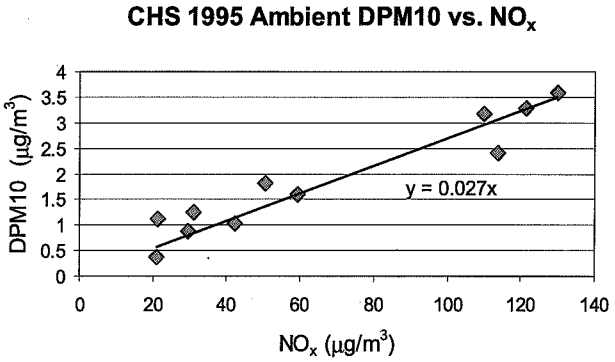


Figure 2

Figure 3 shows DPM10 vs. NO_x plots of the CHS data for each of the three composited seasons (January – April; May – October; November – December). The slope exhibits a clear seasonal dependence with largest value in summer and smallest in winter. This variation can not be explained completely by EI estimates (summer, winter), which show much less seasonal variability, and indicates further sources of uncertainty in the use of short timescales for scaling NO_x.

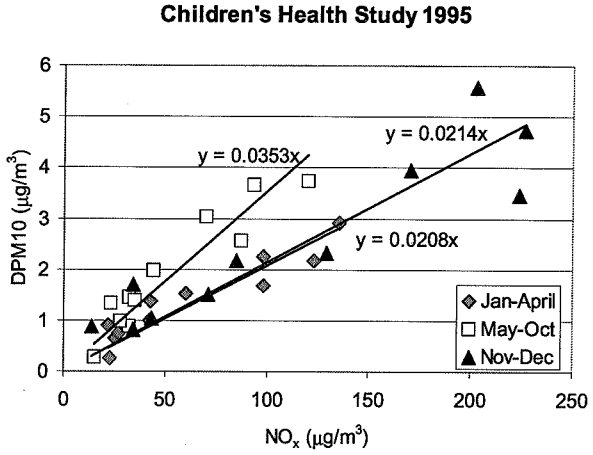


Figure 3

The other year-long SA estimate for α is from CRPAQS (DRI, 2000) for the San Joaquin Valley (SJV). As in the CHS, this study also utilizes organic chemical species CMB for apportionment, though it departs in many details of application, which affect apportionment results. Several aspects which bear directly on the results are usage of different carbon analysis methods (the National Institute for Occupational Safety and Health (NIOSH) method in CHS and the Interagency Monitoring of Protected Visual Environments (IMPROVE) protocol, also known as thermal/optical reflectance (TOR), in CRPAQS), different chemical markers and source profiles (see refs. 6-8). A straight average of the ratios of SA DPM2.5 to NO_x concentrations for seven sites in the SJV gives a value of 0.018 (0.008). Figure 4 shows a regression of SA ambient DPM against NO_x, which gives a slope of 0.016 (0.004). As for the previous SA work, we take the standard deviation (0.008) from the distribution of DPM/NO_x values as an indicator of the variability in ambient ratios.

We note that the relative variability of DPM/NO_x in both studies is very large: the coefficient of variation (standard deviation/average) ≈ 0.5. We believe this large uncertainty in SA estimates best captures local variation of source composition, mixing, chemical reactions and other factors. Hence, this order of uncertainty is expected in any estimate of DPM based on ambient NO_x concentrations.
A recent short-term SA modeling study investigated the sources of uncertainties in the relative contributions of diesel and gasoline vehicle emissions to PM2.5 in the South Coast (2001) – the Gasoline/Diesel PM Split Study.[9,10,11] In this work, James Schauer (University of Wisconsin, Madison) and Eric Fujita (Desert Research Institute) collected samples side-by-side for sources (57 light duty gasoline and 34 heavy duty diesel vehicles) and ambient air (two sites Los Angeles, N. Main, and Azusa), and carried out independent chemical and SA data analyses. The DRI study did not directly apportion PM2.5 to diesel sources; instead, apportionment of total carbon and elemental carbon were determined.

To estimate corresponding DPM2.5 concentrations, we scale reported diesel EC values by a factor determined from DRI's diesel source profile (DPM2.5 = 1.36 DEC2.5, where DEC2.5 denotes elemental carbon in PM2.5 apportioned to diesel engine emissions). The resulting SA results show a lack of agreement between DPM2.5 estimates: apportionment of PM to diesel emission sources by the two groups differ by approximately a factor of two; see Figures 5 and 6. Estimates for DPM2.5/NO_x are: 0.010 (0.003) for Schauer and 0.023 (0.004) for Fujita. Because ambient and vehicle emission samples were collected side-by-side, these results indicate that the disparity in DPM estimates is driven by differences in source apportionment methodology, which includes differences in carbon measurement methods (NIOSH vs. IMPROVE), organic marker chemical species, and source profiles for vehicles. Without *a priori* information about which method is more accurate, we believe both estimates should be weighted equally, giving DPM/NO_x = .017 (.009).

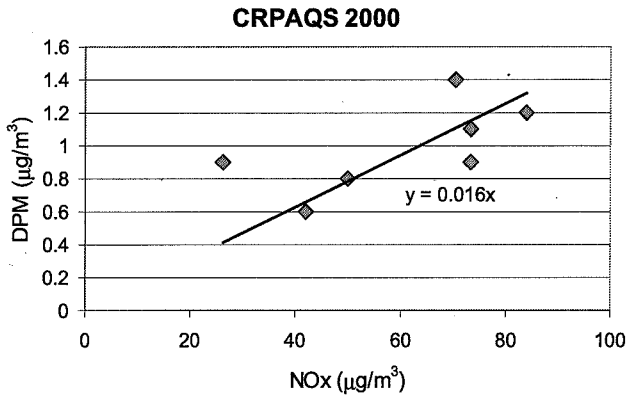


Figure 4

Two recent studies that used simpler methods to apportion PM2.5 to diesel sources were done by Livermore National Laboratory (LLNL) in 2007 and ARB's Monitoring and Laboratory Division (MLD) in 2003. LLNL utilized fossil carbon measurements, based on Carbon 14, and MLD utilized n-octadecane as a diesel tracer. In these studies, DPM concentrations were estimated to be on the order of 1 µg/m^3; these values would presumably support a lower DPM/NO_x ratio of .01 (with a likely relative uncertainty of 50%). More specifically, LLNL determined the average fossil elemental carbon (FEC) at Wilmington as approximately 1.05 µg/m^3 (based on the limited data), and the average FEC at Roseville as approximately 0.65 µg/m^3. Assuming that all FEC is from diesel emissions and that OC emissions from diesels are small in comparison, these values may be considered upper bound DPM concentrations. MLD's study yielded estimates of DPM for Wilmington as 1.2 µg/m^3 and Sacramento as 0.8 µg/m^3, and the statewide average as 1.0 µg/m^3. These values, however, differ by over a factor of two from the recent MATES III organic marker CMB estimate of >3 µg/m^3 in 2004-2005 (in Wilmington). Therefore, while these two independent estimates

provide support for the lower end of DPM/NO_x ratio, considerable uncertainty remains in their interpretation.

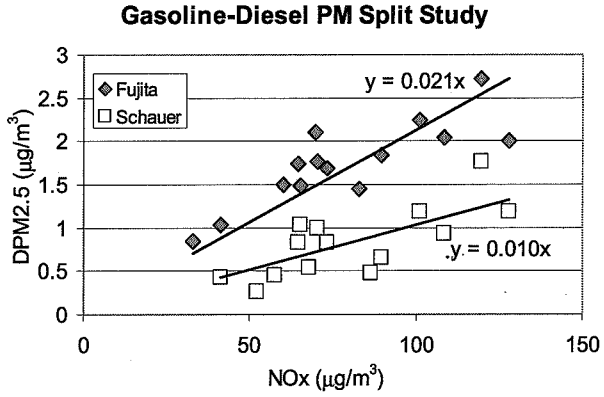


Figure 5

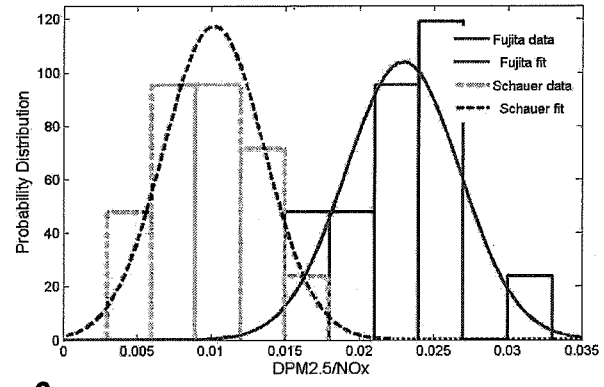


Figure 6

A comparison of the above SA estimates with the emission inventory can not be made directly, as emission inventory estimates are for whole counties while SA estimates are specific to monitoring sites and implicitly take into account meteorology, chemistry and deposition. Hence we compare average values for DPM/ NO_x from the previous SA studies with EI estimates of DPM to total NO_x emission ratios. For this purpose, the EI estimates for DPM and total NO_x emission rates for individual counties are utilized.[12] These estimates may be visualized as tons of pollutants emitted each day into a well-mixed box covering each county, with removal rates of DPM and NO_x proportionately the same. The assumption of approximately equal removal rates is difficult to verify, given that the rates are caused by a variety of processes: deposition, chemical reactions, and flow into and out of air basins. Further, while the atmospheric lifetimes for DPM and NO_x are typically very different (greater and less than a few days, respectively), which would bias the ratio of DPM/ NO_x toward higher values, the mean residence time of an air parcel in a coastal air basin is typically less than a day, which would dominate the reaction and deposition rates and effectively

make the rate of removal for NO_x and PM the same. In the following, we assume this dominance of air parcel residence time on removal rates, and take the removal rates for NO_x and DPM as equal.

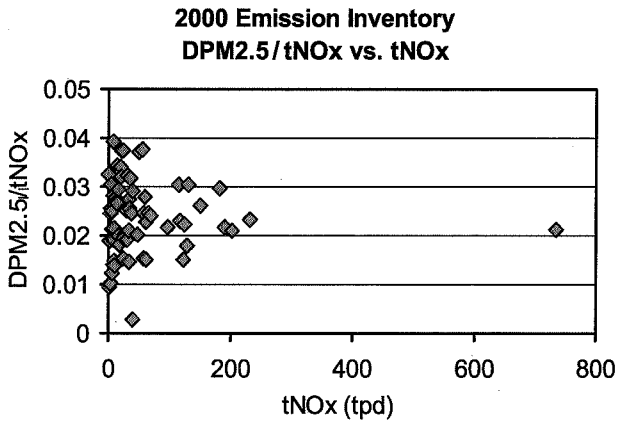


Figure 7

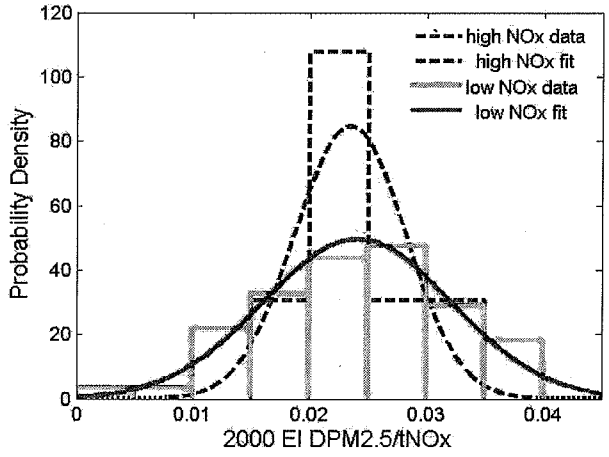


Figure 8

To compare the above source apportionment estimates of DPM/NO_x with emission inventory estimates, we utilize ARB emission inventory estimates for the year 2000 (the SA studies were conducted in 1995 CHS in SoCAB, 2000 CRPAQS in SJV, and 2001 GDPM in SoCAB). The emission inventory estimates incorporate spatial and temporal averaging over large scales and therefore may be used to estimate average ambient DPM/NO_x ratios directly (in the following figures for the emission inventory, we abbreviate total NO_x by tNO_x). A plot of $(DPM/tNO_x)_c$ against $tNO_{x\,c}$ for all counties in California is shown in Fig. 7. This scatter plot shows that the county-wide ratios DPM/tNO_x are clustered about an average and that the dispersion depends on the average annual tNO_x emission rate. The plot also shows that a separation of high-NO_x from lower-NO_x emission counties occurs with a division around an annual average of 80 tons per day.

(High-NO_x counties are listed in the next section of this document.) In California, NO_x inventories are dominated by on-road and off-road mobile sources; overall, diesel engine emissions contribute approximately half of the on-road NO_x emissions and greater than 60% of the off-road mobile emissions. To better capture exposure-related estimates of DPM/tNO_x, each county value is weighted by its population; weighted histograms are approximated by normal distributions. Figure 8 shows histograms for the ratio of DPM/tNO_x over high- and low-NO_x emission counties. The mean and standard deviation for these distributions are: 0.023 (0.003) for the high-NO_x counties and 0.023 (0.006) for the low-NO_x counties. Hence, population weighted distributions for α in high and low-NO_x counties may be described by normal distributions with same mean value and a dispersion that depends on NO_x emissions characteristics. To develop a single California-wide approximation, we take the (larger) dispersion for the ratio of DPM/tNO_x in low-NO_x counties as measure of the variability that is encountered locally within air basins.

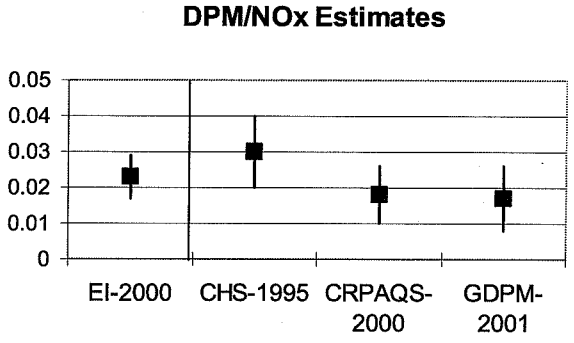


Figure 9

The above estimates of the ratio DPM/tNO_x from the 2000 EI population-weighted and SA studies compare well, given the relatively large uncertainties: 2000 EI county average 0.023 (0.006); and SA: 1995 CHS 0.030 (0.010), 2000 CRPAQS 0.018 (0.008), and 2001 GDPM 0.017 (.009). Figure 9 shows a plot of these estimates. This overall agreement in α values motivates adoption of a single scaling factor for the whole state of California for years close to 2000: the average from the 2000 EI estimates, α = 0.023 (0.006).

Conclusions

Based on the relatively good agreement between SA and EI estimates for the scaling factor α - the ratio of DPM to total NO_x - for years close to 2000, we propose the use of a single value of 0.023 for α in estimating the population-weighted annual average ambient DPM concentration in California. The resultant DPM estimates from this approach depend upon the network of ambient NO_x measurements from the ARB monitoring sites. In the following, we outline a

method to calculate such averages. First, the annual average DPM concentration at each monitoring site is estimated as the product of annual average NO_x concentration value and α. The uncertainty associated with this DPM estimate is the product of the annual average NO_x measurement value and the low- NO_x county standard deviation, .006. The following twelve counties are considered high-NO_x emission counties (annual average NO_x > .80 tons per day): Los Angeles, San Bernardino, Kern, San Diego, Orange, Riverside, Alameda, Fresno, Santa Clara, Contra Costa, San Joaquin, and Sacramento. The remaining 46 counties are considered low-NO_x emission counties. From this set of spatially discrete DPM concentration estimates a smooth DPM concentration surface may be constructed using kriging or other interpolation methods. In remote areas without monitoring sites, the smoothing method may be modified to incorporate a minimum concentration, which would reflect a nonzero background value (or such areas may be removed, if the population is sufficiently small). Second, census data for California is used to approximate a population density surface (population fraction per unit area) and the (pointwise) product of the population density and DPM concentration surfaces is taken. This product may be integrated over any region and divided by the fraction of California population within that region to give a population-weighted average DPM concentration; in particular, integration of the product may be performed over the state to give an average population-weighted ambient DPM concentration. Once ambient diesel PM concentrations have been estimated for a baseline year (2000), linear rollback techniques may be used to project concentrations for future years.

A comparison of DPM concentration estimates for the year 2000 using the proposed NO_x-scaling method with the projections from the previous PM10-scaling method[3] is given in Table 1. The overall agreement between DPM concentration estimates for the six highest population air basins is very good. More specifically, the six highest population air basins contain over 90% of the population of California and contribute greater than 96% of the population weighted DPM concentration; in each of these air basins, the difference between the proposed and the previous DPM concentrations is less than 20% of the previous estimate. It should be noted that the previous estimates use a baseline year 1990 and are projected forward by a decade based on linear rollback, and so do not constitute the best approximation for year 2000. Greater variation of agreement between proposed and previous methods is found for lower population air basins. Many factors contribute to this variability, several of which are: the larger dispersion in the DPM to NO_x ratio (.006), uncertainty in application of PM10 scaling method to regions less similar to the SJV, and greater influence of localized emission sources. Altogether, the proposed, population-weighted DPM concentration for California is increased by 11% over the previous estimate. This high level of agreement between the population-weighted DPM estimates gives confidence that the proposed method is consistent with the previous technique and represents a viable approach to estimate DPM exposure.

A final application of the NO_x-scaling approach is to estimate α for a more recent year - 2008 (to be used as a baseline for health impact studies). An analysis of an updated ARB 2008 emissions inventory, similar to that carried out for 2000, yields the value $\alpha = 0.022$ (0.005). This result is based on an unweighted fitting of the distribution of county DPM2.5/NO_x ratios to a normal distribution; see Fig. 10. [Emissions from ocean going vessels were down-weighted by an adjustment factor, 0.10 in the South Coast and 0.25 in other areas, to reflect their decreased contribution to inland areas. [14]] As expected, because of the relatively slow turnover of diesel engines, the mean and standard deviations are similar to those for 2000. The low- and high-NO_x counties, exhibit the same α values: $\alpha = 0.022$ with (0.006) for low-NO_x counties and (0.003) for high-NO_x emission counties (the demarcation between low- and high-NOx counties was taken as 60 tpd NO_x). It is expected that α will slowly vary with year due to improvements in technology and turnover of emission sources, though large changes may be expected based on preferential DPM control measures. Such divergences will necessitate reexamination of estimates for α; although time intervals for such reviews can not be prescribed, revisions in α are necessary when the difference in estimates approaches the uncertainty (dispersion).

A rough comparison of this 2008 EI estimate may be made with measurements from recently completed field work – the Harbor Community Monitoring Study (HCMS).[13] This program was conducted in 2007 to characterize the spatial variations in concentrations of toxic air contaminants (TACs) and their co-pollutants within the communities of Wilmington, West Long Beach, and San

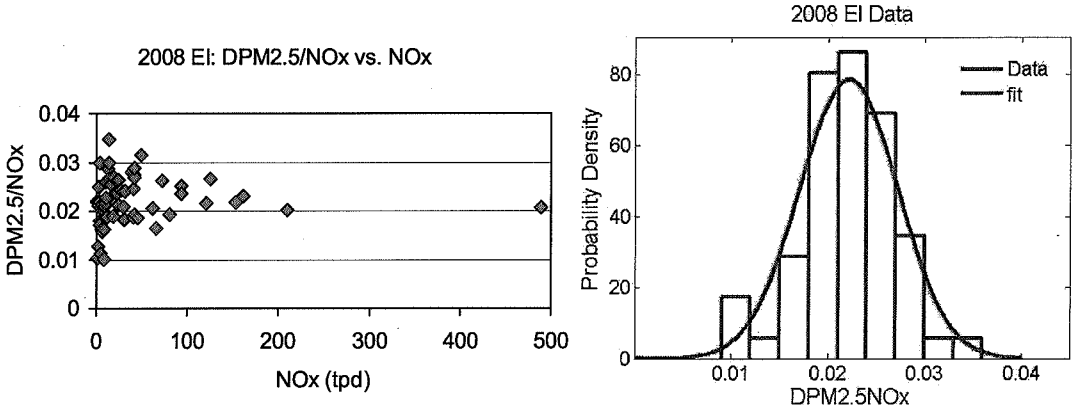


Figure 10

Pedro in California's South Coast Air Basin. These communities were chosen because of the close proximity of residents to many emission sources, which include the Ports of Los Angeles and Long Beach, petroleum refineries, intermodal rail facilities and the greatest concentration of diesel traffic in the Los Angeles metropolitan area. To avoid sites heavily impacted by near sources, we concentrate on neighborhood sites from the saturation monitoring network operated by the Desert Research Institute (denoted LWIN, WCOL, WGUL, WLAK, WMAR, WMCD and WMCF in the report). This study consisted of 7-day

time-integrated sampling for four consecutive weeks in four seasons. NO_x was measured with Ogawa passive samplers and PM2.5 was collected on 7-day integrated Teflon and quartz filters with Airmetrics MiniVol samplers. Organic carbon (OC) and elemental carbon (EC) were analyzed by thermal optical reflectance (TOR) method using the IMPROVE (Interagency Monitoring of Protected Visual Environments) temperature/oxygen cycle (IMPROVE TOR). Several caveats should be noted in the interpretation of this data. First, the high density of emission sources in the HCMS area may produce ambient NO_x and DPM concentrations that are different from those in the greater region, and hence, less well described by EI estimates. Second, source apportionment was not carried out for this study; instead, the tracer used for diesel-engine PM emissions is elementary carbon (EC) from PM2.5, which is predominantly but not exclusively from diesel emissions. Under these limitations, DPM2.5 was estimated from EC concentrations as 65% of the total carbon from diesel engine emissions (DTC): EC=0.65 DTC. This conversion is adopted because the carbon fraction of EC in heavy-duty diesel truck emissions during city suburban driving has been measured as approximately 0.65 (City Suburban Heavy Vehicle Route dynamometer cycle, ref. 10) and the general agreement between TC collected on quartz filters and PM2.5 mass collected on Teflon filters for diesel emissions in dynamometer testing (Gasoline/Diesel PM Split Study).[9,10] A full consideration of various methods to estimate DPM using EC, and possibly other co-pollutants, was not attempted; such an investigation would yield a confidence interval for DPM estimates, and possibly provide a better case for comparison. A different scaling method was adopted by DRI in the Final Report for the HCMS saturation study.[11] In their work, ambient diesel particulate carbon (DPC) concentrations for each site (for a given season) were taken as directly proportional to measured EC concentrations, where the proportionality constant was determined from the slope of the correlation between total carbon and EC at the near road sampling locations. These slopes varied between 1.5 and 2.2. Diesel particulate matter was then estimated as the sum of the elemental carbon and organic matter portions of DPM:

$$DPM = EC + 1.46\ (DPC - EC), \qquad (2)$$

where 1.46 is the ratio of diesel particulate organic matter to DPC from the Gasoline/Diesel PM Split dynamometer testing of diesel trucks by DRI. A third estimate of DPM may be obtained from a method used in the Multiple Air Toxics Exposure Study III (MATES III) - a monitoring and evaluation study conducted in the South Coast Air Basin (Basin) from April 2004 to March 2005. In this study, a scaling factor for EC of 1.72 was developed based on the 2005 emission inventory ratio of diesel particulate to elemental carbon emissions. Application of these three DPM estimation methods to measurements from the neighborhood sites yields the following average values for the ratio of DPM concentration to NOx concentration: 0.038 (0.005), 0.025 (0.004), and 0.028 (0.004), for the DRI, EC/0.65, and MATES III methods, respectively. These results show that all sites exhibited similar DPM to NO_x ratios and that the largest source of uncertainty is

in the choice of scaling factors for EC (and total carbon). The largest value of DPM/NO_x was obtained using DRI's methodology, which may be regarded as an estimate of the "upper-bound ambient concentration" of DPM.[12] In light of the caveats and simple EC-scaling, these estimates agree relatively well with the 2008 EI estimate of 0.022 (.005) and provide further support for use of a NO_x-scaling methodology (with associated uncertainty interval) to estimate DPM in California.

In summary, the proposed method to estimate ambient DPM concentrations has distinct advantages over the previous PM10 method as well as several important limitations. The primary strengths of the method include the significant connection between DPM and NO_x, simple application, estimates of uncertainty intervals, and ability to capture sub-county variations in DPM concentrations. In addition to these strengths, the approach is tied directly to the ARB emission inventory, and links bottom-up EI estimates with top-down SA estimates. Several limitations and caveats also bear on applications of the method. The limitations include all assumptions sufficient for application of EI estimates to ambient air, such as well-mixed air parcels on county-wide scales, proportional removal rates for NO_x and DPM (including air basin outflow), proportionally time-uniform emission rates for all NO_x and DPM sources, etc. Verification of these assumptions is in general not possible; instead, agreement between EI and SA estimates is taken as best available evidence for support. The uncertainty intervals produced by the estimation method are based on variations between low-NO_x counties and reflect differences in relative emission sources (primarily diesel vs. non-diesel mobile sources). As such, the uncertainty describes the confidence in α to accurately describe local NO_x emission sources. For areas outside California, in which the NO_x emission inventory has a significant contribution from non-mobile sources (e.g. power plants or refineries), the value of α is likely to be different from that for California and vary with source proximity. Further work is needed in strengthening the understanding of the contribution of various emission sources to ambient concentrations of both gases and particles. In this respect, source apportionment work that utilizes organic marker species is the probably best available approach; ideally, highly time-resolved studies would allow better characterization and support for single species scaling estimates, such as the NO_x-scaling method. Finally, off-road diesel sources, which are a large source of uncertainty in current CMB modeling, need to be included explicitly in future source apportionment studies.

References

1 Henry R., Lewis C., Hopke P., and Williamson H., *Review of Receptor Model Fundamentals* (1984) Atmospheric Environment 18, 1507-1515.

2 *Air Toxics Hot Spots Program Risk Assessment Guidelines, Appendix D Risk Assessment Procedures to Evaluate Particulate Emissions from Diesel-Fueled Engines, 2003,* Office of Environmental Health Hazard Assessment.

3 *Estimate of Ambient PM10 Concentrations from Directly Emitted Emissions from Diesel Engines, Appendix III, Part A, Exposure Assessment from Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant* (1998). Report to the California Air Resources Board.

4 Marmur A., Unal A., Mulholland J.A., and Russell A., *Optimization-Based Source Apportionment of PM2.5 Incorporating Gas-to-Particle Ratios* (2005) Environmental Science and Technology 39, 3245-3254.

5 Robinson, A., Adams, P., and Donahue, N., Final Report: Source-Apportionment of Primary Organic Carbon in the Eastern United States Combining Receptor-Models, Chemical Transport Models, and Laboratory Oxidation Experiments (USEPA National Center for Environmental Research, 2007). The report and links to associated papers are available at: http://cfpub.epa.gov/ncer_abstracts/INDEX.cfm/fuseaction/display.abstractDetail/abstract/7503/report/F.

6 Manchester J., Schauer J., and Cass G. *Determination of the Elemental Carbon, Organic Compounds and Source Contributions to Atmospheric Particles During the Southern California Children's Health Study: Part B; The Distribution of Particle-Phase Organic Compounds in the Atmosphere and Source Contributions to Atmospheric Particulate Matter Concentrations During the Southern California Children's Health Study, 1995.* Final Report for California Air Resources Board.

7 Manchester-Neesvig J. B., Schauer J. J., and Cass G. R., *The Distribution of Particle-Phase Organic Compounds in the Atmosphere and their Use for Source Apportionment during the Southern California Children's Health Study* (2003) Journal of the Air and Waste Management Association. 53, 1065-1079.

8 Chow J., Chen L.W., Lowenthal D., Doraiswamy P., Park K., Kohl S., Trimble D., and Watson J. *California Regional PM10/PM2.5 Air Quality Study (CRPAQS): Initial Data Analysis of Field Program Measurements, Final Report, 2005* for the California Air Resources Board.

9 The DOE Gasoline/Diesel PM Split Study, Presentations by D. Lawson, E. Fujita and J. Schauer, California Air Resources Board Seminars webpage; and DOE/NREL Gasoline/Diesel PM Split Study webpage.

10 Fujita E., Campbell D., Arnott W.P., Chow J., and Zelinska B., *Evaluations of the Chemical Mass Balance Method for Determining Contributions of Gasoline and Diesel Exhaust to Ambient Carbonaceous Aerosols* (2007) Journal of the Air and Waste Management Association. 57, 721-740.

11 Lough G. and Schauer J., *Sensitivity of Source Apportionment of Urban Particulate Matter to Uncertainty in Motor Vehicle Emissions Profiles* (2007) Journal of the Air and Waste Management Association. 57, 1200-1213.

12 California Air Resources Board, 2007 Emission Inventory, Planning and Technical Support Division (extraction data 7/2008).

13 California Air Resources Board – Harbor Communities Monitoring Study website (http://www.arb.ca.gov/research/mobile/hcm/hcm.htm).

14 California Air Resources Board – Goods Movement Emission Reduction Plan, Appendix A (page A-52): (http://www.arb.ca.gov/planning/gmerp/gmerp.htm).

APPENDIX H: LIST OF ACRONYMS

AGC --- Associated General Contractors of America

ARB --- Air Resources Board

ATCM --- Airborne Toxic Control Measures

BACT --- Best Available Control Technology

BC --- Black Carbon

CAA --- Federal Clean Air Act

CCR --- California Code of Regulations

CO_2-eq --- Carbon Dioxide Equivalents

CPCFA --- California Air Pollution Control Financing Authority

DOF --- Department of Finance

DOORS --- Diesel Off-Road On-Line Reporting System

EIN --- Equipment Identification Number

FAEL --- Fleet Average Emission Level

GDP --- Gross Domestic Product

GHG --- Green House Gas

GSE --- Ground Support Equipment

GWP --- Global Warming Potential

HC --- Hydrocarbon

HP --- Horsepower

HP-Hours ---Horsepower Hours

HEALTH & SAF. CODE --- California Health and Safety Code

IPCC --- Intergovernmental Panel on Climate Change

KW --- Kilowatt

LHU --- Limited Hours of Use

LSI --- Large Spark Ignition

MMT --- Million Metric Tons

NAAQS --- National Ambient Air Quality Standards

NO_X --- Oxides of Nitrogen

OAL --- Office of Administrative Law

ORIAG --- Off-Road Implementation Advisory Group

OSM --- Off-road Simulation Model

PLACE --- Providing Loan Assistance to California Equipment

PM --- Particulate Matter

PM2.5 --- Fine Particulate Matter

SIP --- State Implementation Plan

TAC --- Toxic Air Contaminants

TPD --- Tons Per Day

TSD --- Technical Support Document

UCLA --- University of California, Los Angeles

UL --- Underwriters Laboratories

UOP --- University of the Pacific

U.S. EPA --- United States Environmental Protection Agency

VDECS --- Verified Diesel Emission Control System