



**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

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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
MMTCO ₂ -e	Million Metric Tons Carbon Dioxide-Equivalents
NAAQS	National Ambient Air Quality Standard
NO _x	Oxides of Nitrogen
PM	Particulate Matter
PM _{2.5}	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 (PM_{2.5}) 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:

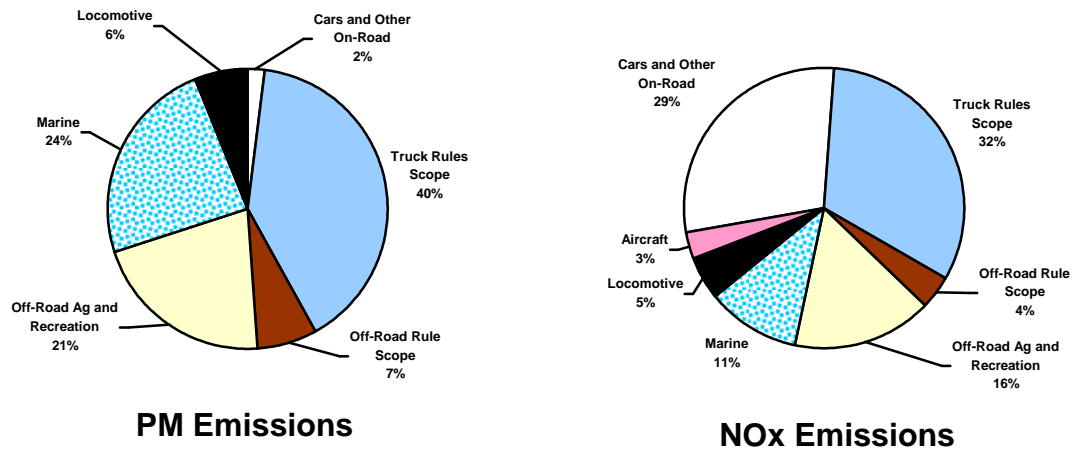
- Continue progress toward cleaner air
- Maintain public health benefits
- Meet State Implementation (SIP) commitments
- Provide incentives to achieve greenhouse gas reductions
- Improve cost effectiveness
- Lower peak year costs
- Consider cumulative impact of both regulations
- Provide most economic 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.

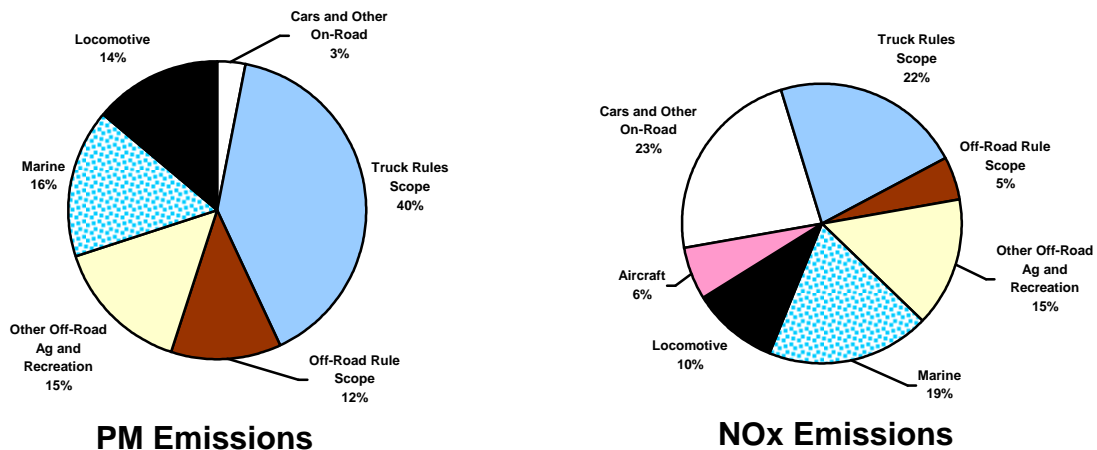
A similar assessment was made for off-road vehicles and can be found in the Initial Statement of Reasons for Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and Off-Road Large Spark Ignition Engine Fleet Requirements (ARB, 2010b). In that assessment, staff found that the 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 (PM_{2.5}) and near-source exposure to diesel PM.

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



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



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 PM_{2.5} 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 PM_{2.5} 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 PM_{2.5} occur at levels well below the Federal air quality standard for PM_{2.5}. The U.S. EPA estimates that about 63,000 to 80,000 premature deaths each year in the U.S. are related to PM_{2.5}. ARB staff used the EPA methodology to estimate that long-term exposure to PM_{2.5} 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.

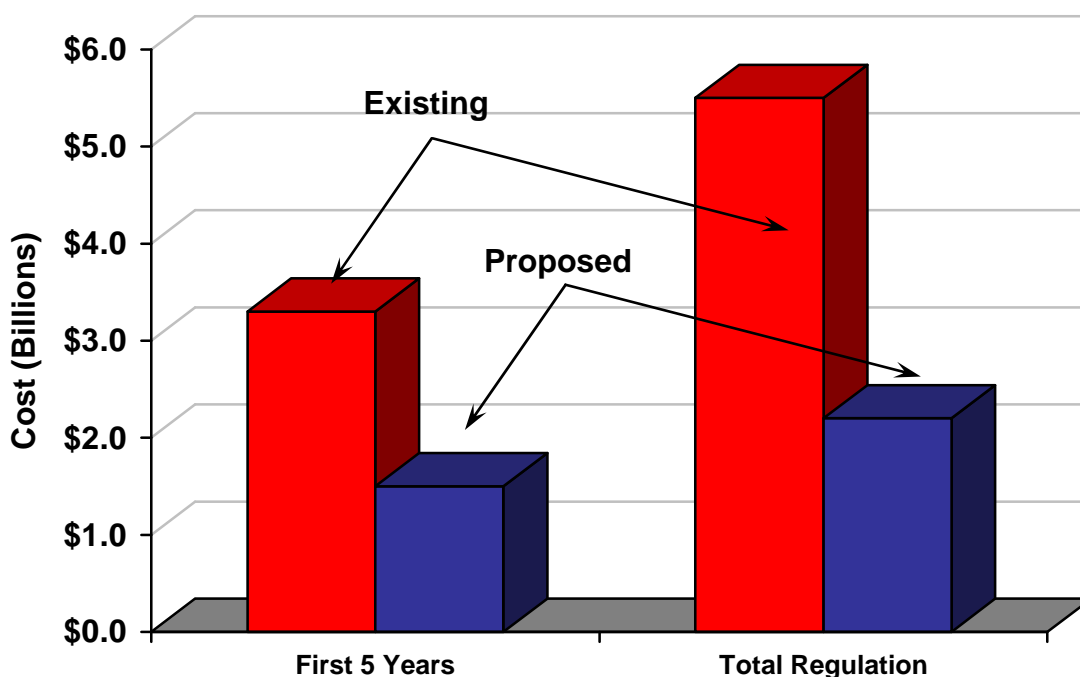
The Drayage Truck regulation would eliminate the 2014 requirement to modernize all trucks visiting ports or intermodal rail yards to 2007 model year engines or newer, and would instead align this requirement with the Truck and Bus regulation. Drayage trucks with PM filters would now comply until 2020 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 PM_{2.5} 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 (VDECS¹ 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 (PM_{2.5}) 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

- | |
|---|
| <ol style="list-style-type: none">1. Continue progress toward cleaner air2. Maintain public health benefits3. Meet SIP commitments4. Incentivize greenhouse gas reductions5. Improve cost effectiveness6. Lower peak year costs7. Consider cumulative impact of both regulations8. Provide most relief to fleets hardest hit by recession9. Ensure emission reductions as economy recovers10. 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 (PM_{2.5}) 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-state 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 PM_{2.5} and ozone, to localized health risk associated with exposure to diesel PM, and to premature deaths associated with exposure to PM_{2.5}. 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

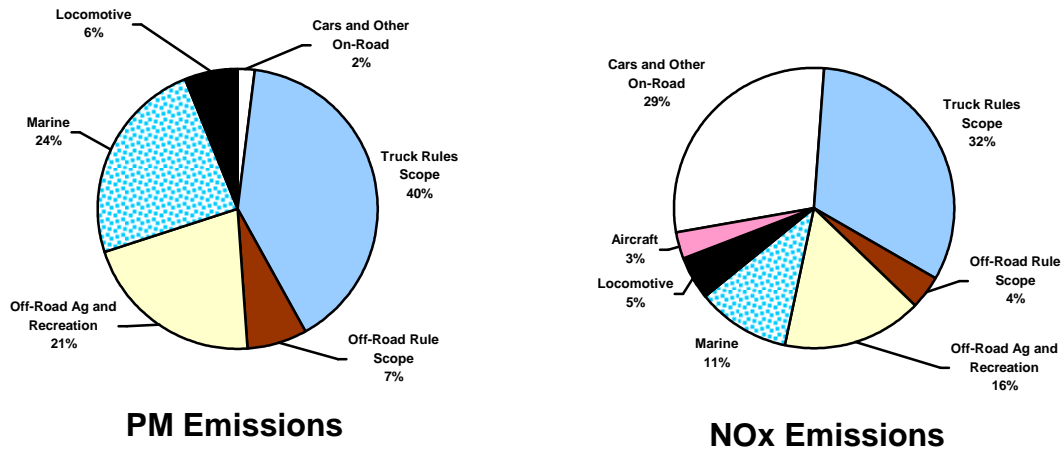
Truck emission rates are a function of cumulative mileage on the vehicle - an emissions process called deterioration. The cumulative mileage estimated on the vehicle can be measured with the vehicle odometer. Our previous analyses assumed that the odometer reading is the sum of estimated year by year 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

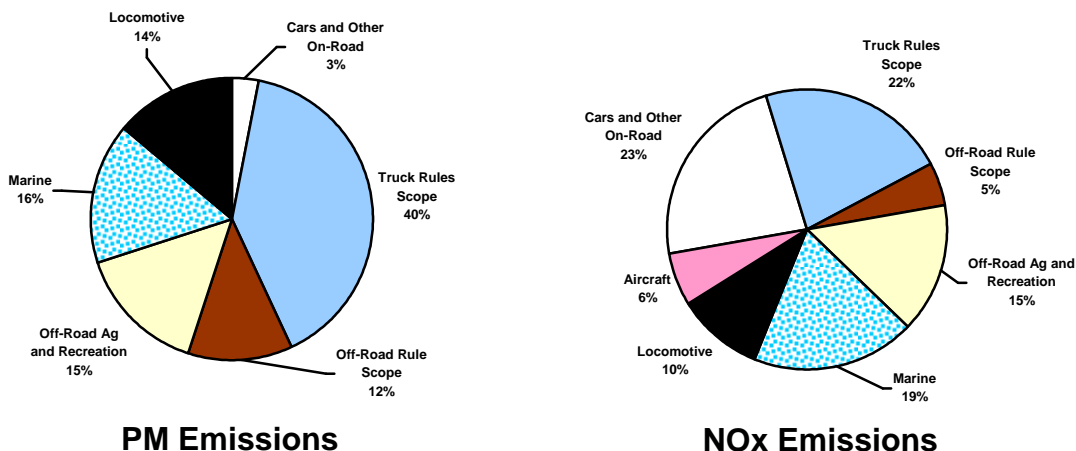
As can be seen below in Figure II-1, in 2010, even after considering the impacts of the recession, emissions from trucks that are subject to both the Truck and Bus regulation and Drayage Truck regulation are the single largest statewide contributor to mobile source emissions, representing 40 percent 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)**



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)**



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 PM_{2.5}.

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 PM_{2.5} 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 PM_{2.5} and the 8-hour ozone standard.

Figure II-3: California Nonattainment Areas for PM_{2.5}

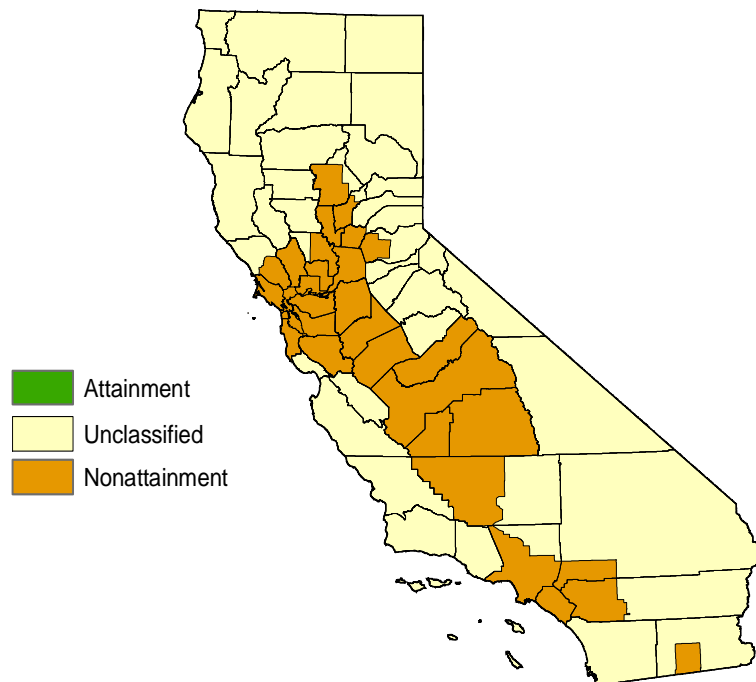
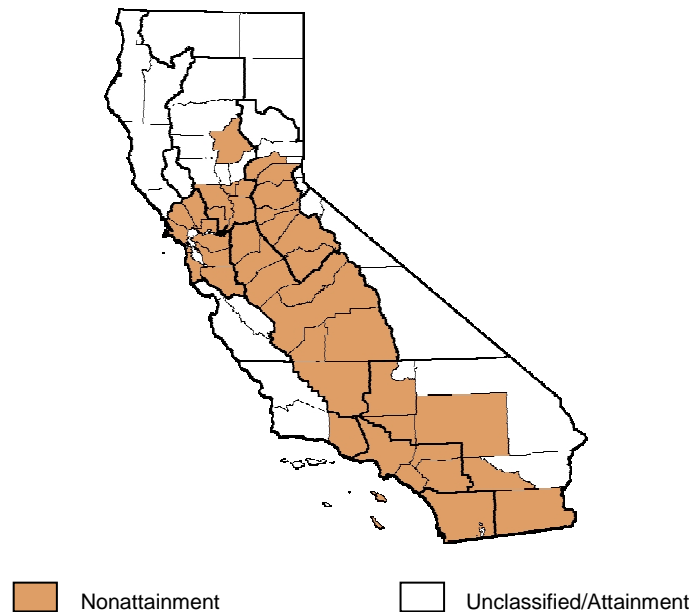


Figure II-4: California Nonattainment Areas for Ozone



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 PM_{2.5} 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 PM_{2.5} standard in the South Coast and the San Joaquin Valley Air Basins, NO_x emissions must be reduced by approximately 50 percent. Even greater reductions of NO_x, 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 PM_{2.5} 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 NO_x), the margin is calculated, by air basin, in NO_x equivalent emissions, since both pollutants contribute to ambient levels of PM_{2.5} 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 PM_{2.5} 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 NO_x 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 PM_{2.5} exposure in humans, animals, and cells, the U.S. EPA concluded that long-term exposure to PM_{2.5} exposure is causally associated with premature mortality, and that premature deaths caused by PM_{2.5} 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 PM_{2.5} 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 PM_{2.5} 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 PM_{2.5} and premature death. These include the use of more recent measured PM_{2.5} 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 PM_{2.5}. 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 PM_{2.5} 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

<i>Compliance Deadline, as of January 1</i>	<i>Minimum Percent of Total Fleet Complying with BACT</i>
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 and 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

<i>Engine Model Year</i>	<i>Existing Regulation</i>	<i>Proposed Amendments</i>
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

Engine Year	January 1 of Compliance Year												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1992	No Action												
1994													
1998													
1999													
2000	No Action												
2001													
2003													
2003													
2006	No Action												
2006													

* The fleet could upgrade to 2007 – 2009 model year, and then upgrade in 2010 engine by 2023

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

Engine Year	January 1 of Compliance Year												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1992	30%	2007 Engine											
1994		PM Filter											
1998		PM Filter											
1999													
2000	30%	2008 Engine											
2001		PM Filter									2010 Engine*		
2003		PM Filter											
2003	No Action	30%	PM Filter										
2006			PM Filter										
2006			PM Filter										
* The fleet could upgrade to 2007 – 2009 model year, and then upgrade in 2010 engine by 2023													

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 it 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

Engine Year	January 1 of Compliance Year												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1992	2007 Engine												
1994	2008 Engine												
1998	No Action												
1999													
2000													
2001													
2003	2010 Engine*												
2003	PM Filter												
2006	PM Filter												
2006	PM Filter												

* The fleet could upgrade to 2007 – 2009 model year, and then upgrade in 2010 engine by 2023

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 NO_x 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

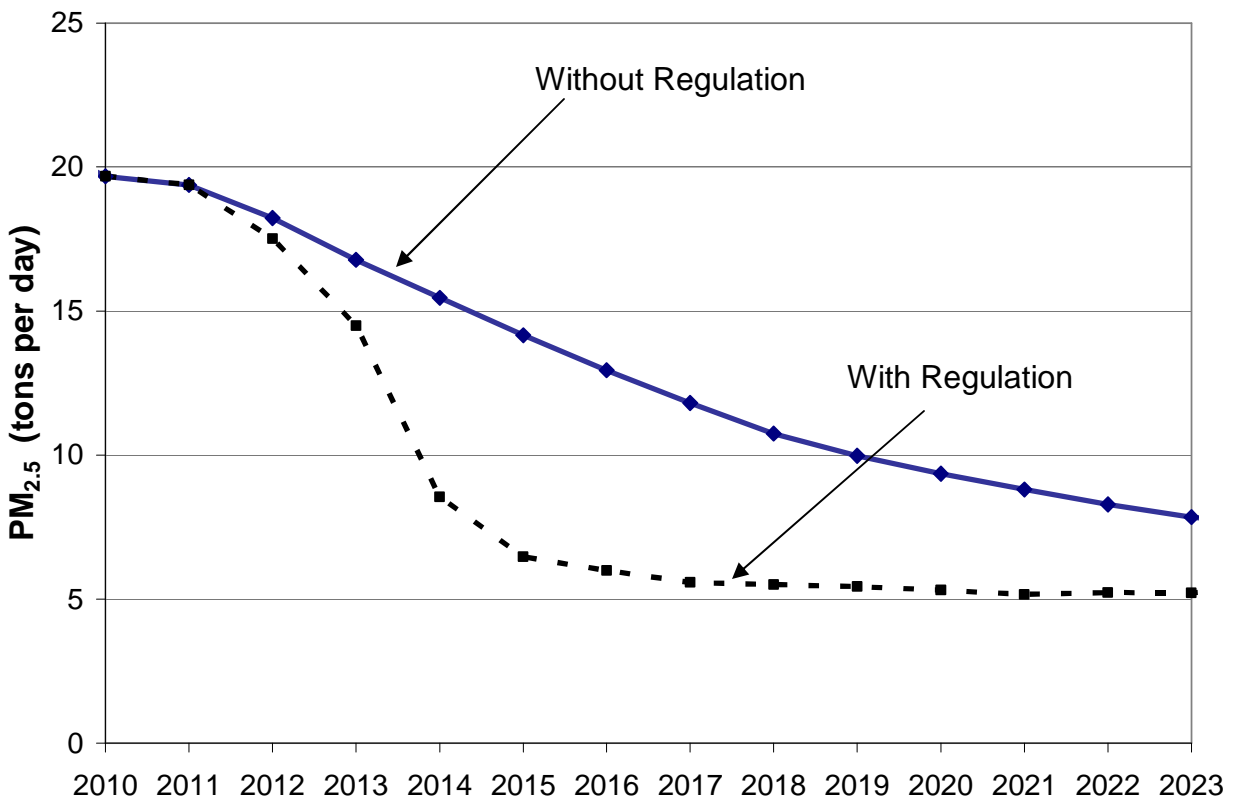
Staff anticipates the proposed amendments to the Truck and Bus regulation and the Drayage Truck regulation would reduce diesel PM emissions by 50 percent from baseline levels in 2014 and ensure that by 2020 practically all trucks operating in California will be equipped with a diesel PM filter. The revised 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 NO_x and PM Emissions

Year	NO _x 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.

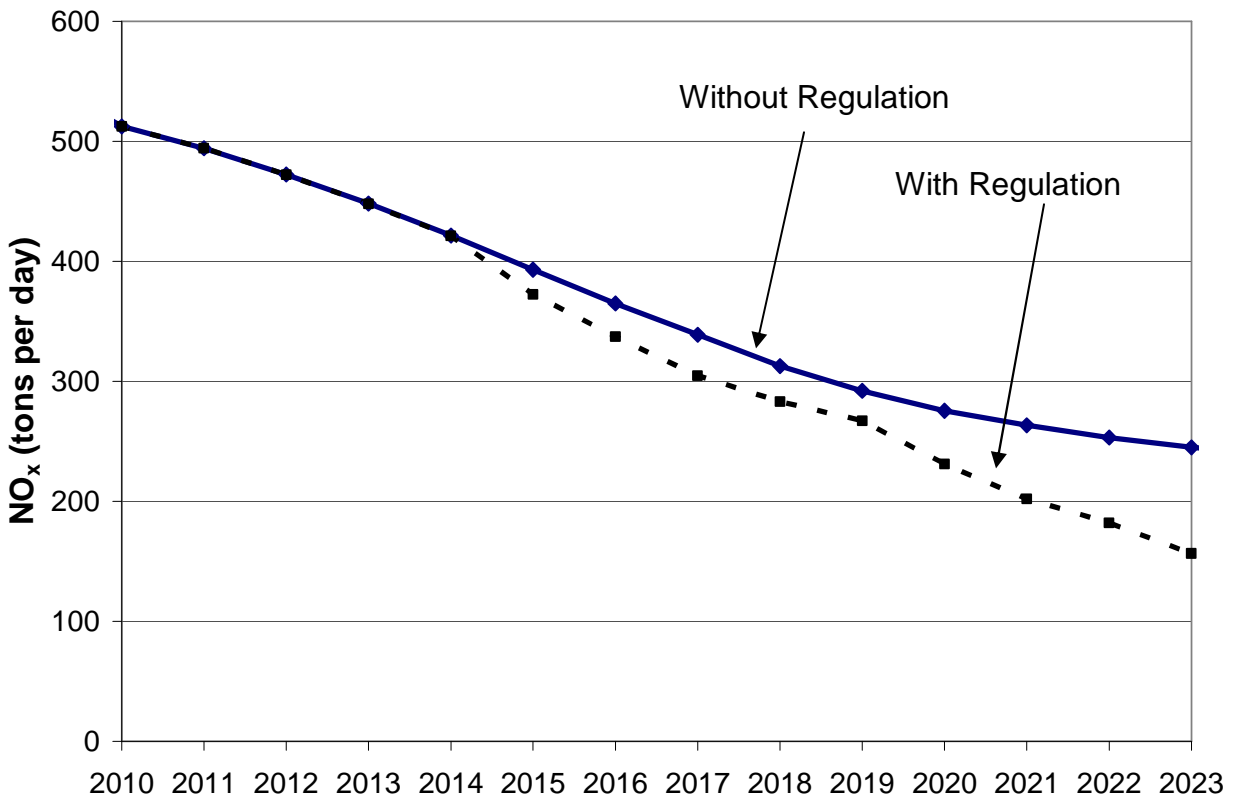
Figure VI-1: Statewide Truck and Bus PM Emissions*



*** 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 NO_x emissions in 2023, and an overall 15 percent reduction in statewide NO_x 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 NO_x 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 existing regulation, but would not achieve as much NO_x 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 NO_x 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 PM_{2.5} and NO_x 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 NO_x and PM_{2.5} 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

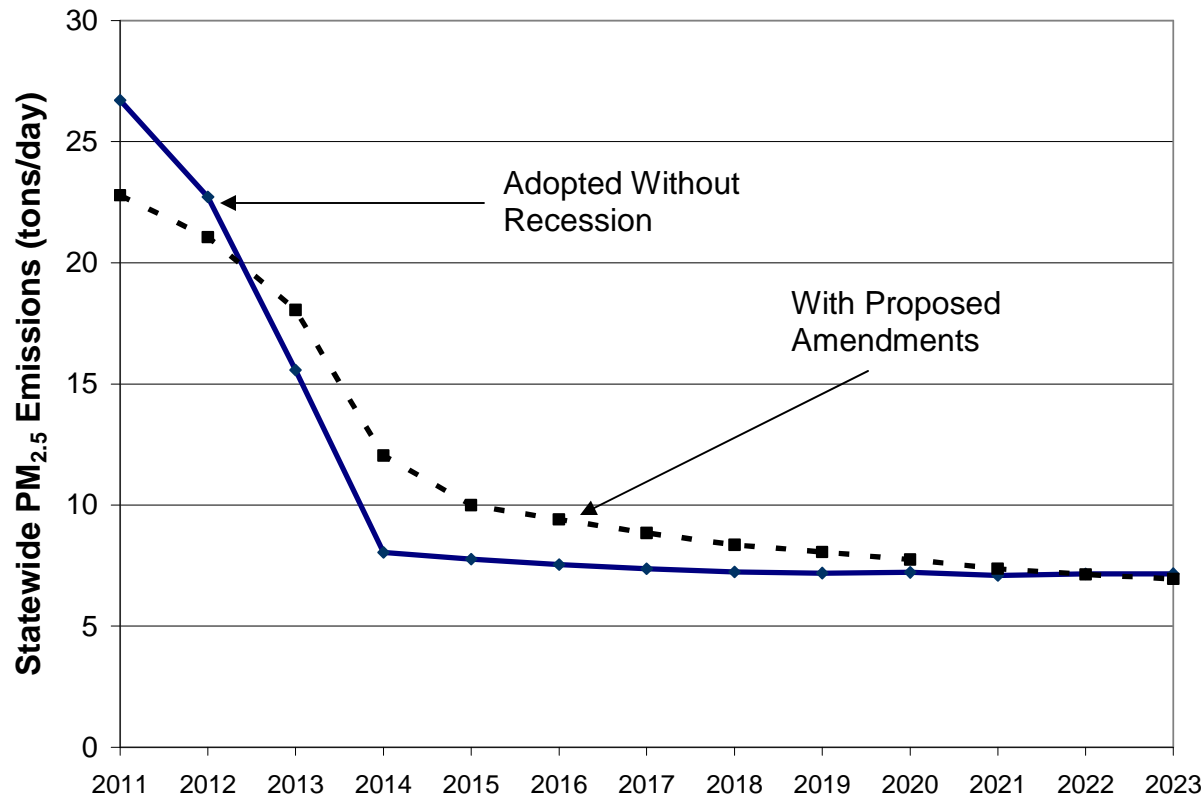
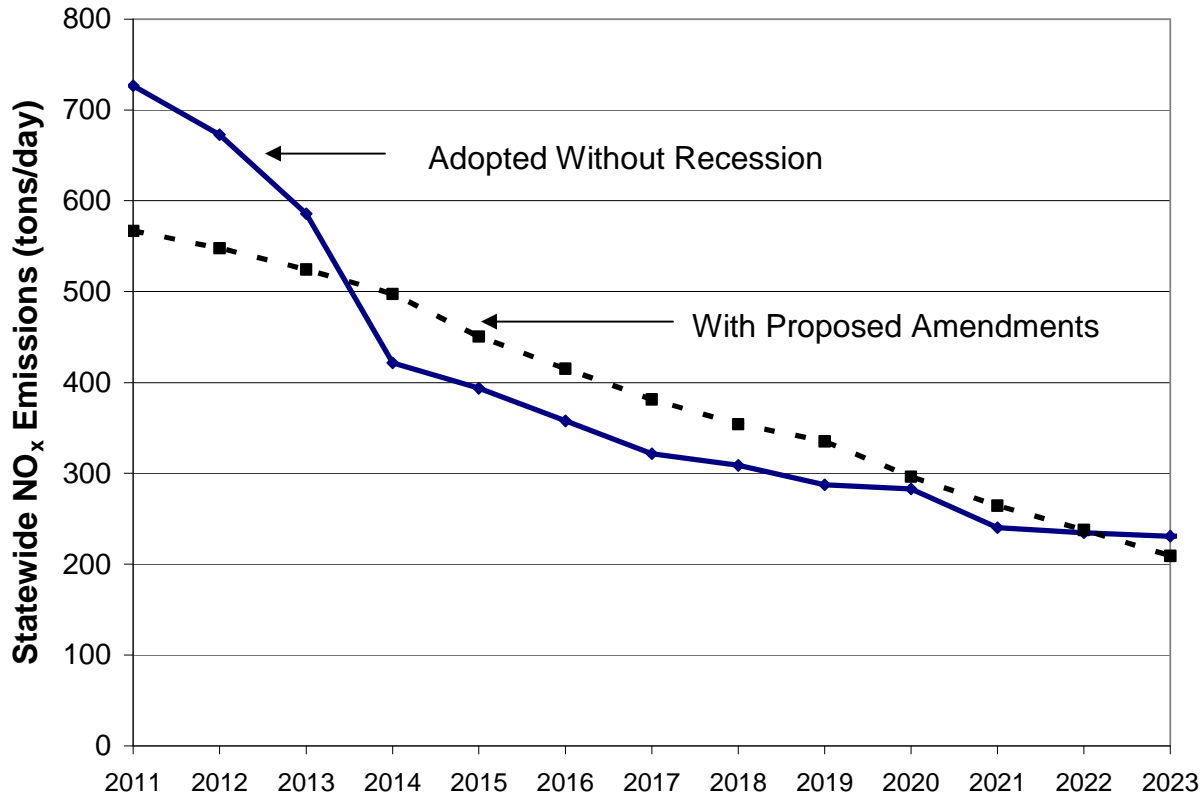


Figure VI-4: Year by Year Comparison of Truck and Bus and Off-Road NO_x Emissions after Regulation is Applied: Current Rule Without Recession vs. Amended Rule with Recession



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 NO_x 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, 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.

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 PM_{2.5} emissions, the BC content is greatest for diesel exhaust. Fifty percent of PM_{2.5} emissions from on-road diesel exhaust consists of BC, while 40 percent of PM_{2.5} 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 GWP_{100-yr} and 2000 GWP_{20-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 (MMT_{CO₂-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 _{CO₂-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, NO_x, 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%

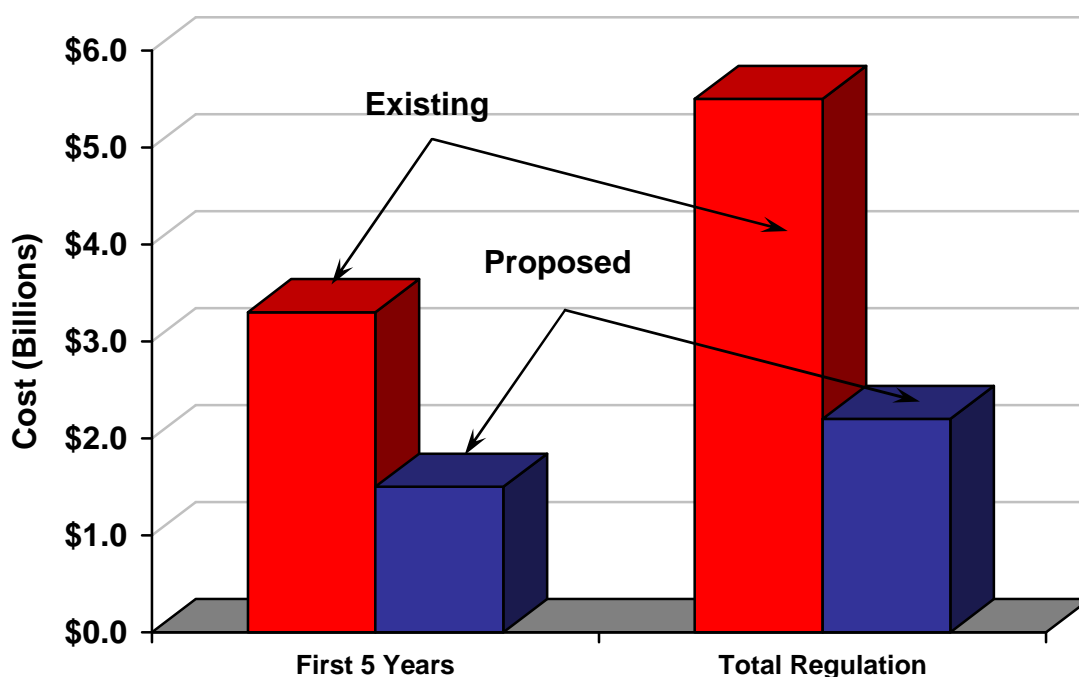
As is shown in Table VII-1, prior to 2015, the existing regulation would require 28 percent of the vehicles to be replaced early, compared to the proposed amendments that would not require any vehicle to be replaced early. Both the existing regulation and proposed amendments would require retrofit PM 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 than 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 compliance 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

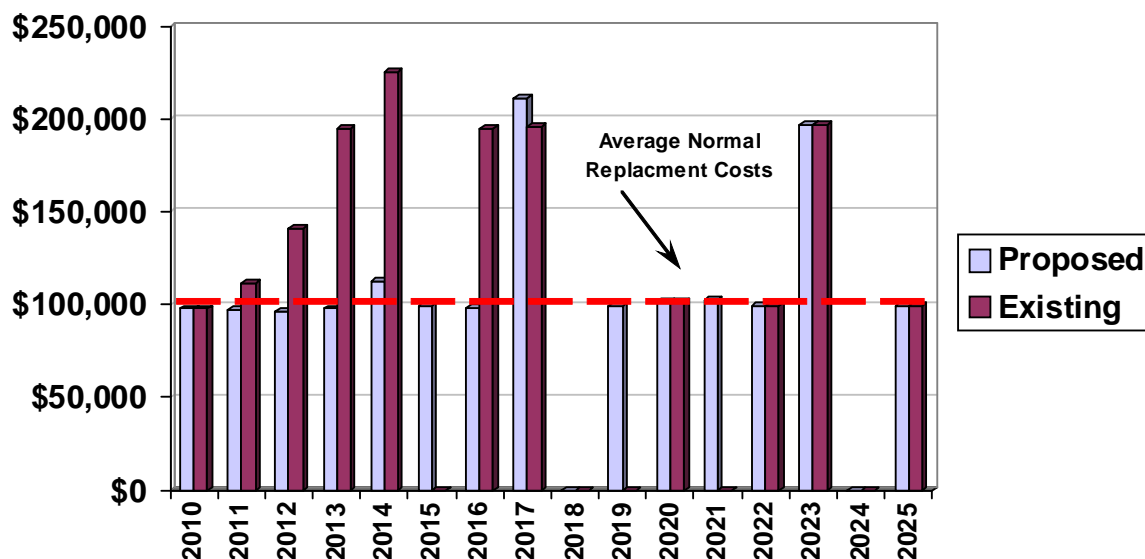
The following company is an actual moving fleet with 14 trucks, seven of which are heavier trucks (more than 26,000 pounds GVWR) and the others are lighter trucks (less than 26,001 pounds GVWR). The engine model years for the trucks range from 1996 to 2007. The fleet has downsized 30 percent since 2006 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

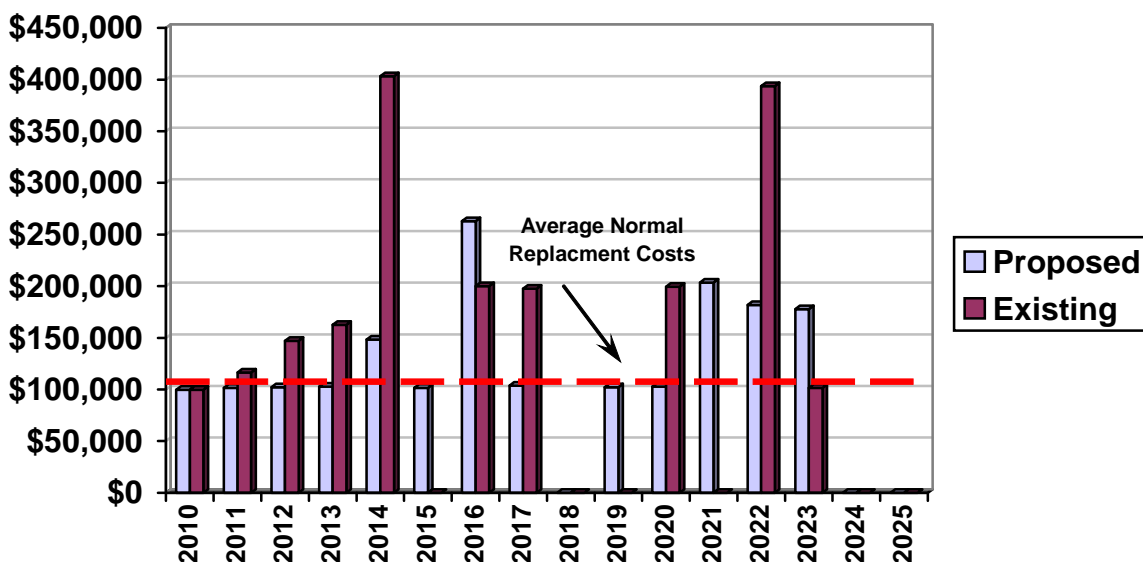
Staff also evaluated the impact of the proposed amendments for an actual concrete company. The concrete company has 18 trucks with engine model years ranging from 1994 to 2007, all of which are heavier trucks with a GVWR greater than 26,000 pounds. The company has annual revenues above \$3,000,000. The 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



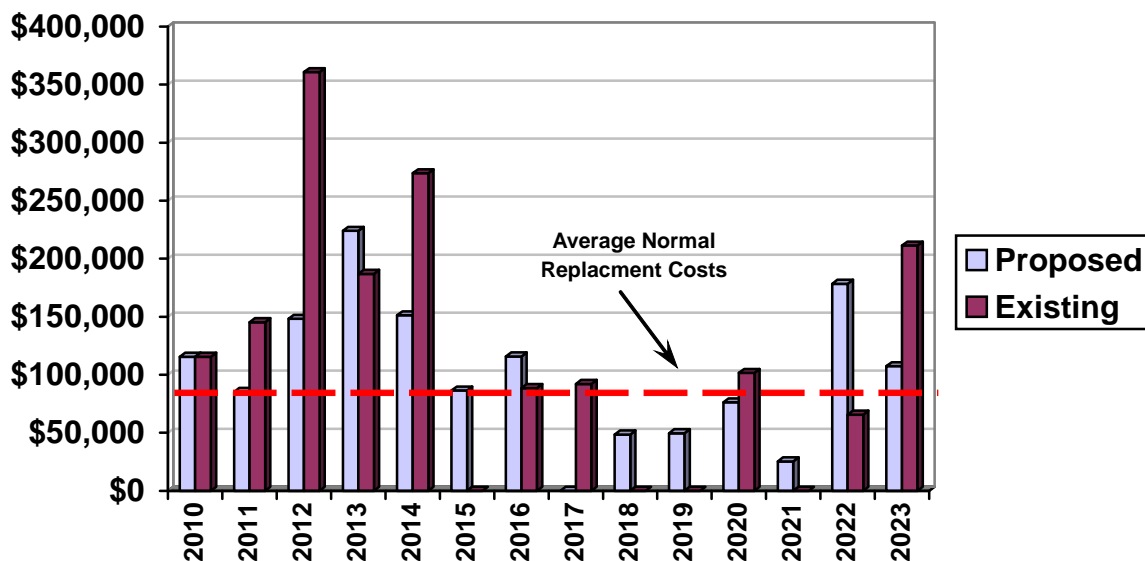
c) Transportation Company

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 planned 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 NO_x emissions reductions originally expected to be needed to meet the 2014 PM_{2.5} 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 NO_x 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 NO_x reductions are no longer required by 2014, the structure set up to give fleets flexibility to meet NO_x 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 indicator 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.

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