California Environmental Protection Agency

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

AMENDMENTS TO THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

Stationary Source Division
Emissions Assessment 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 REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

To be considered by the Air Resources Board on September 22-23, 2011, at:

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State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENT OF THE REGULATION FOR MOBILE CARGO HANDLING EQUIPMENT AT PORTS AND INTERMODAL RAIL YARDS

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TABLE OF CONTENTS

Contents | Page

Executive Summary ES-1

I. Introduction I-1
- A. Overview I-1
- B. Description of Cargo Handling Equipment I-1
- C. Regulatory Authority I-2
- D. Summary of the Current Regulation I-3
- E. Implementation Status I-5
- F. Need for the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards I-7
- G. ARB Staff Actions and Process to Develop the Proposed Amendments I-8

II. Need for Amendments II-1
- A. Retrofit Requirements II-1
- B. Operational Practices II-3
- C. Emission Standards II-8
- D. Compliance Requirements II-9
- E. Need to Clarify the Current Regulation II-11
- F. Other Issues II-11

III. Proposed Amendments III-1
- A. Summary of the Proposed Amendments to the Regulation III-1
- B. Discussion of the Proposed Amendments to the Regulation III-2

IV. Air Emissions and Health Impacts from Proposed Amendments IV-1
- A. Emissions from Cargo Handling Equipment IV-1
- B. Emission Impacts from the Proposed Amendments IV-6
- C. Public Health Impacts from the Proposed Amendments IV-11

V. Economic Impacts from Proposed Amendments V-1
- A. Summary of Statewide Economic Impacts V-1
- B. Legal Requirements V-2
- C. Methodology V-2
- D. Costs and Savings Estimated to Result From Proposed Amendments V-3
- E. Estimated Costs to Businesses V-15
- F. Potential Costs to Local, State, and Federal Agencies V-19
- G. Analysis of Alternatives V-19

VI. CEQA Environmental Impacts Analysis VI-1
- A. Legal Requirements VI-1

TABLE OF CONTENTS (cont.)

B. Reasonably Foreseeable Environmental Impact of Methods of Compliance VI-2
C. Reasonably Foreseeable Mitigation Measures VI-3
D. Reasonably Foreseeable Alternative Means of Compliance with the Proposed Amendments VI-6
E. Summary VI-8

APPENDICES

Appendix A: Proposed Regulation Order: Title 13, Proposed Amendments to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards
Appendix B: Emissions Inventory Methodology
Appendix C: Cost Analysis - Basis for Calculations
Appendix D: VDECS Available for Installation on Cargo Handling Equipment
Appendix E: List of Acronyms and Abbreviations

TABLE OF CONTENTS (cont.)

TABLES AND FIGURES

Contents Page

Tables

Table ES-1: Key Requirements of CHE Regulation ES-3
Table ES-2: Method of Compliance with Current CHE Regulation ES-4
Table ES-3: Summary of Verified Diesel Emission Control Strategies ES-5
Table I-1: Key Requirements of CHE Regulation I-4
Table I-2: Status of Implementation of Current CHE Regulation (as of June 2011) I-5
Table I-3: Methods Used to Comply with the Current CHE Regulation..... I-6
Table I-4: Summary of Verified Diesel Emission Control Strategies I-6
Table I-5: Workshop/Workgroup and Public Outreach Meetings I-8
Table II-1: Maximum Opacity Limits Based on the "Simple Rule" II-7
Table IV-1: Equipment Population for Baseline Inventory IV-1
Table IV-2: Estimated Statewide 2006 Cargo Handling Equipment Emissions IV-2
Table IV-3: Estimated 2006 Cargo Handling Equipment Emissions by District (tons per day) IV-3
Table IV-4: Cargo Handling Equipment Engines Projected Year 2014 and 2020 Baseline Emission Estimates (Without the CHE Regulation) IV-4
Table IV-5: Emissions Inventory Statewide (tons per day) IV-8
Table IV-6: Emissions Inventory for South Coast Air Basin (tons per day) IV-8
Table IV-7: Emissions Inventory for San Francisco Air Basin (tons per day) IV-8
Table IV-8: Statewide Emission Reductions Attributable to the Existing CHE Regulation and Reductions Attributable to the Proposed Amendments IV-9
Table IV-9: Total PM Emissions Reductions and NO_x Emissions Increases Due to Proposed Amendments IV-10
Table IV-10: Comparison of Port of Humboldt Bay Emissions Inventory: Subject to CHE Regulation Compared to Subject to Off-Road In-Use Equipment Regulation IV-11
Table V-1: Costs or Savings Associated With Proposed Amendments over Years 2011 through 2020 in 2011 Dollars V-1
Table V-2: Savings from Delayed Expenditure Due to Additional Two Years of "No VDECS Available" Amendment V-4
Table V-3: Savings from Delayed Expenditure Due to Low-Use Amendment.....V-5
Table V-4: Cost Savings for Small Port Equipment Exemption V-7
Table V-5: Opacity Test Training Costs V-9
Table V-6: Opacity Test Training Cost for Two Mechanics at 140 Facilities V-9
Table V-7: Initial Statewide Costs for Mechanic Training and Opacity Meters V-9
Table V-8: Statewide Costs for Terminal Mechanics to Conduct Opacity Tests V-10

TABLE OF CONTENTS (cont.)

Contents Page

Table V-9: Cost for Consultants to Conduct Opacity Tests V-11
Table V-10: Savings Due to Equipment Transfer V-12
Table V-11: Cost for VDECS Retrofits for FEL Alternative PM Engines.....V-14
Table V-12: Summary of Annual Costs/(Savings) Resulting from Proposed Amendments (Present Value).....V-15
Table V-13: Estimated Costs and Savings for Typical Businesses in 2011 Dollars Over 2011 to 2020 Time Period.....V-17
Table V-14: Estimated Costs and Savings for Typical Small Businesses in 2011 Dollars Over 2011 to 2020 Time Period.....V-18
Table V-15: Estimated Cost and Savings for Local Agencies in 2011 Dollars Over the 2011 to 2020 Time Period V-19
Table VI-1: Statewide Emissions Reductions Attributable to the Existing CHE Regulation and Reductions Attributable to the Proposed Amendments VI-3

Figures

Figure ES-1: Equipment Types and Number of Equipment Retrofitted with DECS (as of June 2011)..... ES-5
Figure I-1: Equipment Types and Number of Equipment Retrofitted with DECS (as of June 2011) I-7
Figure II-1: Opacity and Measured Engine-Out PM Correlation II-6
Figure IV-1 Economic Recovery Scenarios.....IV-5
Figure IV-2 Growth Factors for California Ports.....IV-6
Figure IV-3: Projected Statewide PM Emission Estimates from CHE IV-7
Figure IV-4: Projected Statewide NO_x Emission Estimates from CHE IV-7

EXECUTIVE SUMMARY

The California Air Resources Board (ARB or Board) staff is proposing amendments to the *Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards* (CHE Regulation or regulation).[1] The primary purposes of the proposed amendments are to provide additional flexibility to owners/operators in an effort to reduce compliance costs, maintain the anticipated emissions reduction benefits of the regulation, and clarify several provisions in the regulation. These amendments were designed to ensure the continued reduction of diesel particulate matter (PM) and oxides of nitrogen (NO_x) emissions from mobile cargo handling equipment (CHE) that operate at ports and intermodal rail yards in California. California's ports and intermodal rail yards operate in, or near, densely populated areas, exposing residents to unhealthy levels of air pollution. As such, the proposed amendments to the regulation will continue to protect the public's health while providing CHE owners/operators with additional flexibility to comply with the regulation in a cost-effective manner.

The proposed amendments to the CHE regulation address several areas including: retrofit requirements, operational requirements, emission standards, compliance requirements, definitions, and other clarifying language. A description of each amendment is presented later in this section.

The emissions reductions originally anticipated from the implementation of the regulation continue to be ARB's goal and are still projected to be met. However, when compared to the emission reductions anticipated in the original rule, there is a potential for small increases in diesel PM emissions in 2012 through 2014 and NO_x emissions in 2012 through 2016. Overall, diesel PM emission reductions will be greater under the proposed amendments than under the original rule. However, NO_x emission reductions will be slightly less. At the Port of Humboldt Bay, diesel PM and NO_x emission reductions will be slightly less than under the original rule. ARB staff estimates that by 2020, diesel PM emissions from CHE at ports and intermodal rail yards will have been reduced by nearly 90 percent and NO_x emissions by approximately 75 percent relative to the 2006 baseline, including the impacts of the amendments.

In developing the proposed 2011 amendments to the CHE regulation, ARB staff conducted three public workshops and worked closely with stakeholders, including CHE owners/operators, CHE original equipment manufacturers, CHE dealers, diesel emissions control strategy manufacturers, environmental groups, and other interested parties. ARB staff also hosted a one-day technical meeting to discuss issues associated with exhaust emission control strategies (retrofits) installed on new and in-use engines and the use of on-road engines in yard trucks. CHE owners/operators, CHE original equipment manufacturers, diesel emissions control strategy manufacturers, and other interested parties participated in the meeting. ARB staff travelled to Eureka, California to meet with representatives of the Port of Humboldt Bay

[1] Title 13, California Code of Regulations, section 2479.

and the local air district. Staff toured the port area, discussed the issues facing the port, and collected information on emissions sources and receptor locations.

BACKGROUND

Why did the ARB adopt the CHE Regulation?

In 1998, following the ARB's identification of diesel PM as a toxic air contaminant (TAC), California embarked on an ambitious strategy to reduce emissions from diesel-fueled engines. The Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan), adopted by the Board in October 2000, outlined steps to reduce diesel emissions and associated potential cancer risks by 85 percent by 2020. (ARB, 2000) Diesel PM is a primary contributor to adverse health impacts in California. It is estimated that nearly 80 percent of the statewide potential cancer risks from exposure to TACs comes from exposure to diesel PM. Exposure to fine PM (PM2.5) has been linked to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths. (USEPA, 2009) Diesel PM is a major component of PM2.5, and as such is a contributor to the statewide burden of adverse health impacts related to PM2.5 exposure. CHE are a significant source of diesel PM.

What are the types of equipment affected by the CHE Regulation and how many are there in the State?

The current regulation applies to mobile equipment with compression-ignition engines that handle cargo at ports and intermodal rail yards. Cargo arrives and/or departs by ship, truck, or train, and can include liquid, bulk (break bulk and dry bulk material), and containers. Bulk cargo handling usually requires equipment such as loaders, dozers, cranes, forklifts, and sweepers. Container cargo handling, which is the most common type of cargo at ports and intermodal rail yards, requires equipment such as yard trucks, rubber-tired gantry (RTG) cranes, top picks, side picks, forklifts, and reach stackers. Staff estimates there are about 4,400 mobile CHE vehicles at California's ports and intermodal rail yards in the updated 2006 baseline inventory.

The most common type of CHE is a yard truck, comprising approximately 55 percent of all CHE in the 2006 baseline year. Yard trucks are also known as yard goats, utility tractor rigs, hustlers, yard hostlers, and yard tractors. Yard trucks are very similar to heavy-duty on-road truck tractors, but the majority has historically been equipped with off-road engines. In this report, the CHE are often referred to as either yard truck or non-yard truck equipment.

When was the CHE Regulation adopted and what does it require?

The CHE Regulation was considered and approved by the Board on December 8, 2005 (title 13, California Code of Regulations, section 2479) and became effective on December 31, 2006. This regulation is one of many steps that ARB is taking to reduce

diesel PM emissions and the associated health risk in communities near ports and intermodal rail yards. The ultimate goal of the CHE Regulation is to reduce diesel PM emissions from CHE by 85 percent or more through the application of Level 3 VDECS or replacement to Tier 4 engine technology. A summary of the key requirements of the CHE Regulation is provided in Table ES-1.

Table ES-1: Key Requirements of CHE Regulation

	Requirement of CHE Regulation
Yard Trucks	New Yard Trucks • Equip with either a certified on-road engine meeting the current model year standards or a certified final Tier 4 off-road diesel engine.
	In-Use Yard Trucks • Meet BACT performance standards primarily through accelerated turnover of older yard trucks to those equipped with cleaner, certified on-road or off-road engines.
Non-Yard Truck Equipment	New Non-Yard Truck Equipment • Equip with a certified on-road engine meeting the current model year standards or certified Tier 4 off-road diesel engine. • If neither is available, the engine must be certified to the highest level off-road diesel engine standards and the highest level available verified diesel emission control strategy (VDECS) must be installed within one year or within six months of the VDECS becoming available, whichever is later.
	In-Use Non-yard Truck Equipment • Equipment are required to meet BACT, which includes replacement to cleaner on-road or off-road engines and/or the use of retrofits. • For owners/operators that elect to use retrofits, a second compliance step, which would require replacement to Tier 4 off-road engines or installation of a Level 3 VDECS (85 percent diesel PM reduction), may be required, depending on the equipment category and level of VDECS applied.
Compliance Schedule	• Compliance with the regulation is phased in beginning in 2007 based on the age of the engine, whether or not it is equipped with VDECS, and the size of the fleets. • Compliance date for the in-use performance standards can be extended if: o an engine is within one year of retirement o no VDECS are available for non-yard truck equipment o an experimental diesel PM emission control strategy is used for non-yard truck equipment o there are delivery delays
Recordkeeping	• Owners/operators are required to maintain records for all CHE • Submit a compliance plan • Perform annual reporting

What is the implementation status of the CHE Regulation and how are owners/operators complying?

Implementation of the CHE regulation began in 2007 and is reducing diesel PM emissions and associated health risk in communities near ports and intermodal rail

yards.[2] The data from the regulation's reporting requirements indicates that as of June 2011, 60 percent of yard trucks and nearly 45 percent of non-yard truck equipment have taken action to meet the phase-in compliance schedule in the current regulation. This represents over 2,400 pieces of CHE, or over 50 percent of the in-use inventory. The above percentages indicate that the implementation of the regulation is on schedule. Overall, the two methods used most frequently to comply with the current regulation are equipment retirement and equipment replacement. In Table ES-2 below, it can be seen that nearly 60 percent of the equipment were retired and 36 percent were replaced with compliant equipment.

Table ES-2: Method of Compliance with Current CHE Regulation

Method of Compliance	Percent of Compliant Equipment
Retired from Service	58%
Replaced with Compliant Engine	36%
Retrofitted with VDECS	6%

Staff had anticipated wider use of VDECS through the retrofit compliance options as this is typically considered less costly. However, with the economic downturn and subsequent decline in port and intermodal rail yard activity, many owners/operators have chosen to retire older equipment, finding that this compliance path was often less costly as the equipment was not needed. Approximately 75 extensions have been granted for non-yard truck equipment for which no VDECS were available.

What VDECS have been verified for CHE and what equipment has been retrofitted?

VDECS are an essential component of the compliance strategies that can be utilized by CHE owners/operators to achieve emission reductions. Installing VDECS is a less costly compliance strategy than equipment or engine replacement. VDECS work across a broad spectrum of CHE types and functions. Table ES-3 provides a summary of the number of VDECS that are currently available to CHE owners/operators. All of

[2] While the ARB has the authority to implement and enforce the recordkeeping, reporting, and new engine requirements of the CHE Regulation per California State law, an authorization from the United States Environmental Protection Agency (U.S. EPA) is required in order for ARB to enforce the retrofit component of the regulation. (USEPA, 1990) In January 2007, the ARB submitted a waiver and authorization request to the U.S. EPA, pursuant to section 209(e)(2) of the federal Clean Air Act. On January 25, 2011, the U.S. EPA initiated a public comment period on ARB's authorization request. This comment period ended March 17, 2011. As of this publication, the U.S. EPA has not yet made a decision on the request. Nevertheless, as evidenced, by the level of compliance shown in the response, many port terminal and rail yard operators have elected, to date, to comply voluntarily with the regulation's implementation schedule.

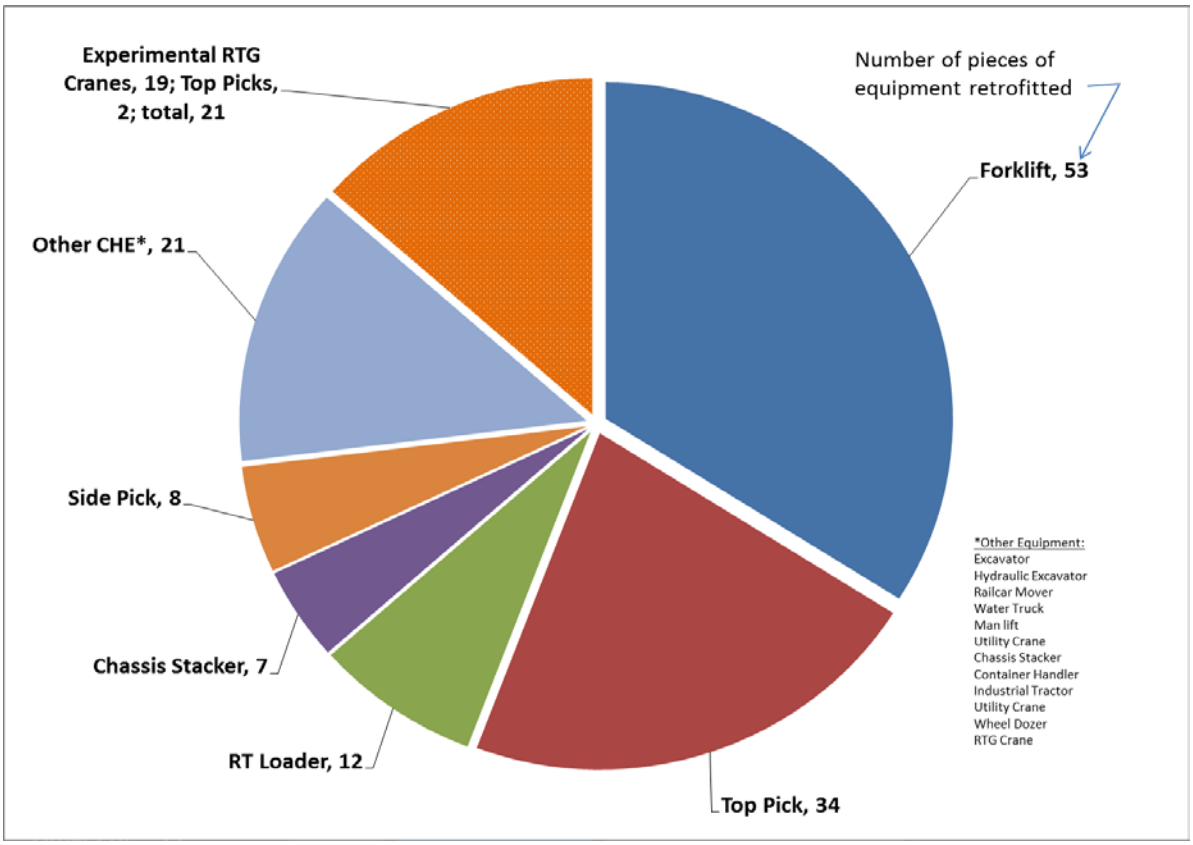
these devices have one or more operational restrictions including engine model year, equipment type, engine horsepower, or operational characteristics of the engine.

Table ES-3: Summary of Verified Diesel Emission Control Strategies

Level of Control	Percent of Diesel PM Control	Number of Verified Devices
3	85 or greater	9
2	50 or greater	1
1	25 to 50	4

Based on information reported to date, there have been over 150 CHE retrofits installed on non-yard truck equipment including 21 CHE retrofits using experimental control technologies. The types of CHE and number of pieces of equipment that these VDECS are retrofitted on are shown in Figure ES-1 below. Experimental control technologies include diesel particulate filters targeting specific equipment types, mainly RTG cranes, and engine-rebuild kits. The most common types of equipment that have been retrofitted are forklifts, top picks, and loaders, comprising approximately 65 percent of all retrofits. However, as shown in the "Other" equipment category, VDECS have been installed on a wide variety of CHE.

Figure ES-1: Equipment Types and Number of Equipment Retrofitted with DECS (as of June 2011)



Diesel emissions control systems continue to be verified and ARB anticipates that there will be more VDECS options available to CHE owners/operators in the future. This should provide CHE owners/operators with additional lower-cost compliance options for their consideration when assessing compliance options.

How have fluctuations in the state's economy impacted CHE operating at California's ports and intermodal rail yards?

Due to its geographic location and major ports and railways, California is a global gateway for goods movement. In terms of world-wide annual container throughput, California's ports of Los Angeles and Long Beach rank 16th and 18th in 2009, respectively. However, the recent downturn in trade and general goods movement have caused ports and intermodal rail yards to experience decline or limited growth over the past four years.

The economic impacts on California's ports and intermodal rail yards directly impact CHE activities. From 2007 through 2009, there was a 24 percent decline in container throughput at the ports of Los Angeles, Long Beach, and Oakland. Throughput of bulk materials also declined from 2007 through 2009. The ports of Los Angeles, Long Beach, Humboldt, Sacramento, and Stockton had a 20 percent decline in the tonnage of bulk material handled by these ports.

Recent increases in container traffic are an indication that California's economy has begun to recover from the downturn. The three major ports in California have seen an 18 percent increase in container traffic when comparing 2010 to 2009 traffic. That recovery is still developing, and the State's ports and intermodal rail yards have not experienced the full benefits of that recovery.

ARB staff does not believe that major adjustments to the compliance schedules in the regulation are needed to address the economic impacts of the decline in throughput at ports and rail yards due to the economic recovery that is occurring and the need for reductions of CHE emissions impacting public health in surrounding communities. However, staff is proposing several amendments which will provide additional compliance flexibility and a measure of economic relief to owners/operators at ports and intermodal rail yards.

The one exception to the above statement would be for the Port of Humboldt Bay. The Port of Humboldt Bay has experienced severe economic impacts due to limited operations. The Port of Humboldt Bay tonnage shipped dropped from 800,000 tons in 2005 to 500,000 tons in 2007 and 90,000 tons in 2009. In 2008 the Port of Humboldt Bay annual throughput was approximately 0.2 percent of California's annual throughput of non-petroleum products. Because the port primarily serves the local lumber industry, it has been hard hit due to the close tie of the lumber industry to housing. The North Coast Unified Air Quality Management District (North Coast) and the Humboldt Bay Harbor, Recreation, and Conservation District (Humboldt Bay District) sent letters

to ARB requesting an exemption from the current CHE Regulation for the equipment at this port.

SUMMARY OF PROPOSED AMENDMENTS

What are the proposed amendments?

The proposed amendments were designed to provide additional compliance flexibility, maintain the anticipated emission reductions, and clarify several provisions in the regulation. The proposed amendments address several areas including: retrofit requirements, operational requirements, emission standards, compliance provisions, definitions, and other clarifying language.

Retrofit Requirements

- *Additional time for equipment with no VDECS available:* Staff is proposing to add two years to the current two years maximum annual compliance extensions for in-use non-yard truck equipment for which there are no VDECS available to provide owners/operators the flexibility of the least costly compliance option.

- *Add a safety provision for VDECS:* Staff is proposing to add VDECS safety as a reason for determining there is "No VDECS Available" if the owner/operator can demonstrate that there is no VDECS verified that can be safely and feasibly used for their equipment. The annual extension is contingent upon a re-evaluation of whether or not the VDECS available continue to pose a safety or feasibility issue.

- *Allow more time for extension application:* The time frame to apply for the "No VDECS Available" extension or an extension to use an experimental strategy is proposed to be changed from 6 months to 60 days prior to the compliance deadline in order to give operators more time to determine if a compliance extension is needed.

- *Require equipment with a "No VDECS Available" extension to be brought into compliance within 6 months:* Staff is proposing that the "No VDEC Available" extension be amended to require the installation of VDECS, or another compliance option, within six months of notification that a VDECS becomes available for the equipment. This is currently required for new equipment with retrofit requirements.

- *Allow extensions for experimental diesel PM emissions control strategies for gathering verification data:* Staff is proposing to expand the "No VDECS Available" extension for an experimental diesel emission control strategy to allow use of this extension to gather information needed for verification even in situations where there are other VDECS available..

Operational Practices

- *Low-use compliance extension:* A two-year compliance extension for equipment that operates 200 hours per year or less is proposed. The amendment would allow ARB to limit the number of extensions per fleet to two pieces of equipment or two percent of the fleet. The current CHE Regulation does not include a low-use compliance extension.

- *Non-yard truck equipment transfers:* Staff is proposing to allow non-yard truck CHE owned or leased by one party to be transferred to another location within California owned or leased by the same party. Transfers could not be used to comply, or delay compliance, with the regulation. The equipment would be required to apply BACT prior to being used in the new location. ARB would approve transfer requests, on a case-by-case basis. The allowance would not be available to yard trucks.

- *Warranty engine replacement:* Staff is proposing an amendment allowing, in cases of premature engine failure, the replacement of an engine under the original equipment manufacturers warranty with a like-engine even when newer engine standards are in place.

- *Allow rental of non–compliant equipment for manufacturer delivery delays:* Staff is proposing, in cases where new compliant equipment has been purchased but there is a delay in delivery, to allow rental of equipment that does not meet current standards for up to six months, or until new equipment can be delivered, if rental equipment meeting current standards are not available and the owner/operator can demonstrate need for the equipment. Rental equipment could only be one Tier lower than required engine standards (i.e., if Tier 4 engine standards are in place, only Tier 3 engines could be rented).

- *Initiate CHE opacity based monitoring program:* Staff is proposing that an opacity-based monitoring program be incorporated into the CHE Regulation. This program would establish work practice requirements for annual opacity monitoring of all CHE to ensure proper operation and maintenance so that engines continue to perform as designed and certified. Retrofitted engines would be monitored to ensure that the engine continues to be in compliance with the VDECS executive order. Equipment with excessive opacity would receive necessary maintenance and repair before being returned to service.

Emission Standards

- *Treat Tier 4 Engines Certified to Alternate PM Emissions Standards as Tier 3 Engines:* Staff is proposing to require that any engines certified to Tier 4 Family Emission Limit (FEL) Alternate PM standards be retrofitted with highest level VDECS within one year of acquisition. The U.S. EPA allows engine manufacturers to produce a specified percentage of Tier 4 engines built to

alternative, less stringent, PM and NO_x emissions limits. These engines are referred to as FEL or Averaging, Banking, and Trading (AB&T) engines. The Tier 4 Alternate PM standards are essentially Tier 3 standards and will not result in the emission reductions anticipated by the CHE Regulation with the introduction of Tier 4 engines.

- *Allow demonstration of emissions equivalency for alternative technology:* Staff is proposing an amendment to allow owners/operators to use alternate compression-ignition power systems that meet applicable new or in-use emissions limits**.** Hybrid power systems are an example of a type of systems that could benefit from this amendment.

Compliance Requirements

- *Allow compliance schedule modification to bring older engines into compliance first:* Staff is proposing an amendment to allow CHE owners/operators to modify their non-yard truck compliance schedules such that older model year engines (that happen to have later compliance dates) can be brought into compliance in place of newer model year engines (that are required to comply earlier). The number of engines required to comply each year would remain the same.

- *Exempt equipment at rural low-throughput ports:* Staff is proposing that any port that has an average annual throughput of less than one million tons and is located more than 75 miles from an urban area would be exempt from the requirements of the CHE regulation. The Port of Humboldt Bay is the only port that currently meets this set of criteria. CHE with off-road engines at exempt ports would be subject to ARB's Off-Road In-Use Equipment Regulation. CHE with on-road engines would be subject to the on-road truck and bus regulation.

Amendments to Clarify Language and Intent

- *Definitions:* Staff is proposing to clarify the intent of the CHE Regulation by modifying several existing definitions including: compression ignition engines; intermodal rail yard; newly, purchased, leased or rented cargo handling equipment; owner or operator; port; retirement or retire; and rubber-tired gantry crane.

  In addition, staff is proposing to add definitions for the following terms to support both modified definitions and other amendments: alternate PM standard; cargo; Class I Railroad; construction activities; Family Emissions Limit (FEL); low-throughput port; opacity, Otto cycle engine; safe; two-year average annual cargo throughput; urban area; warranty period; and water-borne commerce.

- *Clarifying Language: S*taff is also proposing to clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs are exempt from the regulation.

IMPACTS OF THE PROPOSED AMENDMENTS

What are the environmental impacts from the amendments?

The goals of the CHE Regulation, to reduce diesel PM by 85 percent and NO_x by 75 percent by 2020, as compared to the 2006 baseline, are expected to be achieved. However, when compared to the emission reductions anticipated for the original rule, there is a potential for small increases in diesel PM emissions in 2012 through 2014 and NO_x emissions in 2012 through 2016. Overall, diesel PM emission reductions will be greater under the proposed amendments than the original rule. However, NO_x emission reductions will be slightly less. At the Port of Humboldt Bay, diesel PM and NO_x emissions will be slightly greater than under the original rule, but will remain well below the 2006 baseline levels due to decreased activity. Staff has not identified any other significant adverse environmental impacts due to the proposed amendments.

What are the health impacts of the proposed amendments?

Given that the proposed amendments will result in a very small potential increase in emissions over a two to four year period and an overall decrease in diesel PM emissions over the 2012 through 2020 timeframe, staff does not anticipate any significant adverse health impacts due to the proposal.

What are the economic impacts from the amendments?

Staff estimates that the proposed amendments will result in both costs and savings to CHE owners/operators. However, the overall cost-effectiveness of the CHE Regulation will remain essentially the same as estimated in the original CHE rulemaking. The overall economic impact is estimated to be a savings of approximately $100,000 to $200,000 annually over the next ten years. These cost savings are due to added flexibility in the rule including the additional two years of annual compliance extension for “No VDECS Available” and low-use non-yard truck equipment. The cost savings associated with the “No VDECS Available” and low-use non-yard truck compliance extensions are based on delayed compliance costs. Currently, the CHE Regulation would require owners/operators to replace equipment for which VDECS are not available once the initial two year extension has expired. Low-use equipment must be similarly brought into compliance or retired. Additionally, the exemption from the CHE Regulation for equipment at the Port of Humboldt Bay, which would then be required to comply with the Off-Road In-Use Regulation, would result in a savings of approximately $1 million to the tenants at this port. The additional costs to CHE owners/operators are the result of the amendments requiring annual opacity testing of all equipment and the retrofit of Tier 4 engines certified to the FEL Alternate PM standards.

What are the impacts from the amendments on greenhouse gas emissions?

The impacts of the proposed amendments on the emissions of greenhouse gases would be minimal. The proposed amendments would have a minor impact to both increase and decrease the emissions of greenhouse gases. While some of the amendments would defer some of the emissions reductions and equipment activity with newer, more fuel efficient engines, the opacity test requirements would require engines producing high soot levels to receive needed maintenance, resulting in a reduction of carbon black emissions. It is anticipated that the net impacts on the emissions of greenhouse gases associated with CHE would be insignificant.

ENVIRONMENTAL JUSTICE

The proposed 2011 amendments to the CHE regulation are consistent with ARB environmental justice policies. These amendments achieve the emissions reduction benefits set forth in the current regulation, irrespective of the two year shift in the required compliance date for a small portion of the in-use equipment. The proposed amendments would have a negligible net effect on emissions and public health risks in communities near ports and intermodal rail yards.

RECOMMENDATION

ARB staff recommends the Board approve the proposed 2011 amendments to the CHE regulation as presented in Appendix A of this Staff Report.

REFERENCES:

(ARB, 2000) California Air Resources Board. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*; October 2000.

(USEPA, 2009) United States Environmental Protection Agency. *U.S. EPA Integrated Science Assessment for Particulate Matter*, December 2009. http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM_ISA_full.pdf

(USEPA, 1990) United States Environmental Protection Agency. *Federal Clean Air Act, Title II, Part A, Sec. 209(e)*; 1990.

I. INTRODUCTION

A. Overview

In this chapter, the Air Resources Board (ARB or Board) staff provides a brief description of cargo handling equipment (CHE), an overview of the Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards Regulation (CHE Regulation or regulation), and regulatory authority.[3] Also included in this chapter is information on the implementation status of the CHE Regulation, the need for the CHE Regulation, and a description of staff's actions to develop the proposed amendments. Additional information on some of these topics can also be found in the Initial Statement of Reasons prepared for the adoption of the regulation in 2005 (2005 ISOR or Staff Report). (ARB, 2005a) The 2005 ISOR can be accessed at the following web address: http://www.arb.ca.gov/regact/cargo2005/cargo2005.htm

The primary purposes of the proposed amendments are to provide additional flexibility to owners/operators in an effort to reduce compliance costs while continuing to reduce emissions of diesel particulate matter (PM) and oxides of nitrogen (NO_x), maintain the anticipated emissions reduction benefits of the regulation, and make clarifying changes. Additionally, the amendments maintain the anticipated emission reductions to be achieved with the introduction of Tier 4 engines and enable the successful use of retrofits. This approach is consistent with ARB's mission to protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants, while recognizing and considering the effects on the economy of the State.

B. Description of Cargo Handling Equipment

Mobile CHE at ports and intermodal rail yards is as diverse a group of equipment as the cargo that it handles. Cargo that arrives and/or departs by ship, truck, or train, can include liquid, bulk (break bulk and dry bulk), and containers. Liquid cargo, such as petroleum products and chemicals, are often transported via pipelines, and therefore, do not usually have mobile cargo handling equipment associated with their operation. Break bulk cargo, such as lumber, steel, machinery, and many types of palletized goods, and dry bulk cargo, such as cement, scrap metal, salt, sugar, sulfur, and petroleum coke, usually require equipment such as loaders, dozers, cranes, forklifts, and sweepers for their operations. Container cargo, which is the most common type of cargo at ports and intermodal rail yards, requires equipment such as yard trucks, rubber-tired gantry (RTG) cranes, top picks, side picks, forklifts, and straddle carriers. There are about 4,400 mobile cargo handling equipment vehicles at California's ports and intermodal rail yards in the updated 2006 baseline inventory.

The most common type of cargo handling equipment is a yard truck, comprising about 55 percent of the in-use CHE at the beginning of regulation implementation. Yard trucks are also known as yard goats, utility tractor rigs, hustlers, yard hostlers, and yard

[3] Title 13, California Code of Regulations, section 2479

tractors. Yard trucks are very similar to heavy-duty on-road truck tractors, but the majority has been equipped with off-road engines. For this report, the CHE are commonly referred to as either yard truck or non-yard truck equipment. A more detailed description of CHE and their uses can be found in the 2005 Staff Report. (ARB, 2005a)

C. Regulatory Authority

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) and 39601 (Standards, Definitions, Rules, and Measures) confer to the ARB, the general authority and obligation to adopt rules and measures necessary to execute the Board's powers and duties imposed by State law. HSC sections 43013(b) and 43018(a) provide broad authority to achieve the maximum feasible and cost-effective emission reductions from all mobile source categories, including off-road diesel engines and equipment.

With respect to toxic air contaminants (TACs), California's Air Toxics Program, established under California law by Assembly Bill (AB) 1807 (Stats. 1983, Ch. 1047) and set forth in HSC sections 39650 through 39675, mandates that ARB identify and control air toxics emissions in California. The identification phase of the Air Toxics Program requires the ARB, with participation of other state agencies, such as the Office of Environmental Health Hazard Assessment (OEHHA), to evaluate the health impacts of, and exposure to, substances and to identify those substances that pose the greatest health threat as TACs. ARB's evaluation is then made available to the public and is formally reviewed by the Scientific Review Panel (SRP) established under HSC section 39670. Following the ARB's evaluation and the SRP's review, the Board may formally identify a TAC at a public hearing. Following the identification of a substance as a TAC, HSC sections 39658, 39665, 39666, and 39667 require ARB, with the participation of the 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. The mobile CHE subject to these proposed amendments to the regulation are vehicular sources for which ARB is the agency that has been vested by the Legislature with near-exclusive authority to adopt standards and regulations. (HSC sections 39002, 39667, 40000, 43000, 43000.5, 43013, and 43018.)

Under federal Clean Air Act (CAA) section 209(e)(2), California may adopt emission standards for off-road engines that are not otherwise expressly preempted under section 209(e)(1).[4] Section 209(e)(1) provides that no state, including California, or any political subdivision thereof may adopt or enforce emission standards or other requirements relating to the control of emissions for nonroad engines under 175 horsepower that are used in farm or construction equipment or used in locomotives or locomotive engines. CAA section 209(e)(2) provides California with sole authority among the states to adopt emission standards and requirements related to emission

[4] The CAA refers to “nonroad engines” and California has historically referred to these same engines as “off-road engines.” For the purposes of this regulation the two terms are interchangeable.

control for new and in-use nonroad engines that are not specifically preempted under section 209(e)(1). Section 209(e)(2) requires that California must obtain authorization from the Administrator of the U.S EPA prior to the regulation becoming effective. As part of the authorization process, ARB must establish that the adopted regulations "will be, in the aggregate, at least as protective of public health and welfare as the applicable Federal standards." U.S. EPA is authorized by CAA section 213 to adopt emission standards and other regulations for only new non-road engines. In *Engine Manufacturers Association v. U.S. EPA* (D.C. Cir.1996) 88 F.3d 1075, the Court concluded that California is the only government body, including U.S. EPA, with authority to adopt emission standards and other regulations for in-use nonroad engines. (*Id.*, at 1089-1091.)

In January 2007, the ARB submitted a waiver and authorization request to the U.S. EPA, pursuant to section 209(e)(2) of the federal Clean Air Act. On January 25, 2011, the U.S. EPA initiated a public comment period on ARB's authorization request. This comment period ended March 17, 2011. As of this publication, the U.S. EPA has not yet made a decision on the request. Nevertheless, as evidenced, by the level of compliance shown in the response, many port terminal and rail yard operators have elected, to date, to comply voluntarily with the regulation's implementation schedule.

D. Summary of the Current Regulation

The CHE Regulation was formally adopted by the Board in 2006 and became operative under California law on December 31, 2006. The regulation is designed to use the best available control technology (BACT) to reduce the public's exposure to diesel PM and NO_x emissions from mobile CHE. In addition, the regulation includes recordkeeping and reporting requirements to provide staff up-to-date information on CHE and activities.

The requirements for newly purchased, leased, or rented equipment, as well as in-use equipment affect owners/operators of mobile CHE that operate at ports and intermodal rail yards in California. The requirements also affect any person who sells, offers for sale, purchases, leases, or rents mobile CHE for use at a port or intermodal rail yard in California. This includes shipping terminals at ports and intermodal rail yard terminals. Mobile CHE that do not operate at a port or intermodal rail yard, portable compression-ignition engines, and cargo handling equipment used to transport personnel and deliver fuel are not be covered by the rule. Table I-1 provides a summary of the key requirements of the CHE Regulation.

Table I-1: Key Requirements of CHE Regulation

	Requirement of CHE Regulation
Yard Trucks	New Yard Trucks • Equip with either a certified on-road engine meeting the current model year standards or a certified final Tier 4 off-road diesel engine.
	In-Use Yard Trucks • Meet BACT performance standards primarily through accelerated turnover of older yard trucks to those equipped with cleaner, certified on-road or off-road engines.
Non-Yard Truck Equipment	New Non-Yard Truck Equipment • Equip with a certified on-road engine meeting the current model year standards or certified Tier 4 off-road diesel engine. • If neither is available, the engine must be certified to the highest level off-road diesel engine standards, and the highest level available verified diesel emission control strategy (VDECS) must be installed within one year or within six months of the VDECS becoming available, whichever is later.
	In-Use Non-yard Truck Equipment • Equipment are required to meet BACT, which includes replacement to cleaner on-road or off-road engines and/or the use of retrofits. • For owners/operators that elect to use retrofits, a second compliance step, which would require replacement to Tier 4 off-road engines or installation of a Level 3 VDECS (85 percent diesel PM reduction), may be required, depending on the equipment category and level of VDECS applied.
Compliance Schedule	• Compliance with the regulation is phased in beginning in 2007 based on the age of the engine, whether or not it is equipped with VDECS, and the size of the fleets. • Compliance date for the in-use performance standards can be extended if: o an engine is within one year of retirement o no VDECS are available for non-yard truck equipment o an experimental diesel PM emission control strategy is used for non-yard truck equipment o there are delivery delays
Recordkeeping	• Owners/operators are required to maintain records for all CHE • Submit a compliance plan • Perform annual reporting

The regulation includes provisions that allow qualified owners/operators to delay compliance with the in-use performance standards under the following circumstances: if an engine is within one year of retirement, if no VDECS are available, if an experimental diesel PM emission control strategy is used, or if there are equipment manufacturer delivery delays. Additionally, owners/operators of yard trucks may delay compliance if the yard truck had received incentive funding from public agencies to apply VDECS by

the end of 2005 with minimum use requirements. The maximum delay depends on the compliance extension granted. Several of the proposed amendments affect these sections of the regulation.

E. Implementation Status

Implementation of the CHE regulation began in 2007 and is reducing diesel PM emissions and associated health risk in communities near ports and intermodal rail yards.[5] The data from the regulation's reporting requirements indicates that as of June 2011, over 2,400 pieces of CHE have been brought in to compliance with the CHE Regulation. Nearly two-thirds of the compliant equipment have been yard trucks due to the accelerated compliance time lines for these vehicles. Consequently, 60 percent of yard trucks and 45 percent of non-yard truck equipment are compliant with the current regulation. The above percentages indicate that the implementation of the regulation is on schedule. Table I-2 provides the current status of the implementation of the existing CHE regulation.

Table I-2: Status of Implementation of Current CHE Regulation (as of June 2011)

Equipment Type	Target Date for Full Compliance	Percent Compliant*
Yard trucks w/off-road engines	2015 or 2016 (w/VDECS)	60
Yard trucks w/on-road engines	2016 or 2017 (w/VDECS)	
Non-yard truck equipment	2013	45

* Compliance with the CHE Regulation is on schedule

Of the 2,400 pieces of compliant equipment, approximately 1,400 pieces of CHE have complied with the current regulation by being retired from service. This represents 58 percent of all compliant equipment. Approximately 850 pieces of CHE (approximately 30 percent of all compliant equipment) have complied with the current regulation by being replaced with equipment having compliant engines. Overall, the two methods used most frequently to comply with the current regulation are equipment retirement and equipment replacement. Staff had anticipated wider use of VDECS for compliance, as this option is typically considered less costly than other means of compliance. However, with the economic downturn and subsequent decline in port and intermodal rail yard activity, owners/operators have elected to retire older equipment as a path to compliance, finding it to be less costly than retrofitting since the equipment was not needed. The retirement and replacement of older equipment has accelerated the emissions reduction of the regulation. Table I-3 provides a breakdown of the methods of yard truck and non-yard truck CHE compliance to-date. However, with

[5] As stated, as of this publication, the U.S. EPA has not yet made a decision on the request. Nevertheless, as evidenced, by the level of compliance shown, many port terminal and rail yard operators have elected, to, date, to comply voluntarily with the regulation's implementation schedule.

economic recovery, it is anticipated that more owners/operators will turn to the use of VDECS for non-yard truck CHE compliance.

Table I-3: Methods Used to Comply with the Current CHE Regulation

Equipment Type	Method of Compliance	Approximate Percent of Compliant Equipment
Yard truck	Retired	49
	Replaced w/on-road engine yard trucks	45
	Use alternate fuel	5
	Other (repower, retrofit, etc.)	1
Non-yard truck	Retired	71
	Aftertreatment controls	17
	Replace w/off-road engine	8
	Use alternate fuel	3
	Other (repower, on-road engine, etc.)	1

A list of the currently verified controls is provided in Appendix D. Table I-4 provides a summary of the verification levels and number of devices that have been verified in each level.

Table I-4: Summary of Verified Diesel Emission Control Strategies

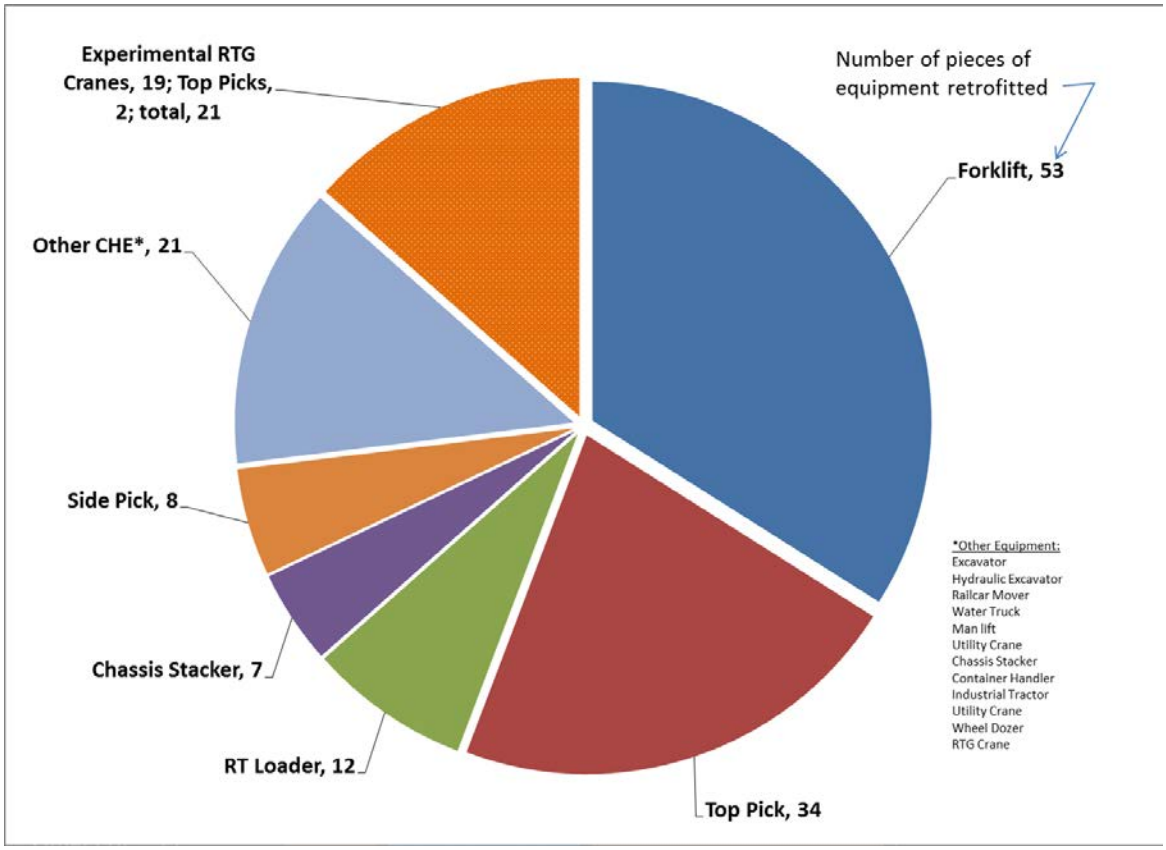
Level of Control	Percent of Control	Number of Verified Devices
3	85 or greater	9
2	50 or greater	1
1	25 to less than 50	4

All of these devices have one or more operational restrictions including engine model year, equipment type, engine horsepower, and operational characteristics of the engine. The Level 1 and Level 2 VDECS are only applicable to RTG cranes. Additional information regarding these VDECS is provided in Appendix D.

Based on information reported to date, there have been over 150 CHE retrofits with various types of control strategies. Of these retrofits, 21 have used experimental control technologies. The types and number of CHE that VDECS have been installed on are shown in Figure I-1 below. The most common equipment types that have been retrofitted are forklifts, top picks, and loaders, comprising approximately 65 percent of all retrofits. The experimental retrofits include DPFs targeting specific equipment types

and engine rebuild kits. The vast majority of the experimental retrofits have been installed on RTG cranes.

Figure I-1: Equipment Types and Number of Equipment Retrofitted with DECS (as of June 2011)



F. Need for the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards

ARB's vision is that all individuals in California, especially children and the elderly, can live, work, and play in a healthful environment – free from harmful exposure to air pollution. In 1998, diesel engine exhaust was identified as a TAC. Diesel engine exhaust is a source of unhealthful air pollutants including PM, carbon monoxide, hydrocarbons, and NO_x. Diesel PM is a primary contributor to adverse health impacts in California. It is estimated that nearly 80 percent of the statewide potential cancer risks from exposure to TACs comes from exposure to diesel PM. Diesel PM is a major source of fine particulate pollution. Exposure to fine PM (PM2.5) has been linked to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths. (USEPA, 2009) CHE are a significant source of diesel PM.

Emissions from diesel-fueled CHE continue to be of concern in communities near ports and intermodal rail yards. The regulation has reduced emissions that have contributed to ambient levels of PM, reducing the resulting community exposures to diesel PM, and

reducing the contribution to NO_x levels and reactive organic compounds (ROG) levels, which are precursors to the formation of ozone. To ensure continued reductions of diesel PM and NO_x from CHE in the most efficient manner, staff is proposing some amendments to the regulation. The proposed amendments to the regulation are designed to provide additional implementation flexibility to CHE owners/operators while continuing to reduce levels of ambient particulate matter, the general public's exposure to diesel PM, and ozone precursor emissions from CHE at ports and intermodal rail yards. Additionally, the amendments will assure that the anticipated reductions are achieved due to the introduction of Tier 4 engines and to enable the successful use of retrofits. Chapter II of this Staff Report contains a discussion of the need for amendments to the regulation.

G. ARB Staff Actions and Process to Develop the Proposed Amendments

Public Outreach

During the development process, ARB staff provided opportunities to present information about the proposed amendments to the regulation at places and times convenient to stakeholders. Attendees included representatives from environmental community organizations, terminal operators, port and rail representatives, engine and diesel emission control associations, and other parties interested in CHE. These individuals participated both by providing data and reviewing draft regulations and by participating in open forum workshops, in which staff directly addressed their concerns. Table I-5 below provides meeting dates that were made to apprise the public about the development of the proposed regulation.

Table I-5: Workshop/Workgroup and Public Outreach Meetings

Date	Meeting	Location	Time
November 30, 2010	Public Workshop	Cal/EPA Building, Sacramento	12:30 p.m.
February 23, 2011	Public Workshop	Cal/EPA Building, Sacramento	9:00 a.m.
March 21 & 22, 2011	Site Visit and Public Meeting	Port of Humboldt Bay, Eureka	2:00 p.m. & 7:30 a.m.
May 26, 2011	Technology Workgroup	Cal/EPA Building, Sacramento	9:00 a.m.
June 27, 2011	Public Workshop	Cal/EPA Building, Sacramento	1:00 p.m.

ARB staff has held three public workshops, one site visit/public meeting, and one exhaust aftertreatment (retrofit) control technology workgroup meeting since November 2010 in developing the proposed amendments. Over 700 individuals and/or companies were notified for each workshop/meeting through a series of mailings. Notices were posted to ARB's CHE and public workshops web sites and e-mailed to subscribers of the CHE electronic list server. The public workshops were broadcast live via the

internet. The public meeting in Eureka was held at the request of the Port of Humboldt Bay, the local air district, and the businesses associated with activities at the port in an effort to make staff more accessible to the stakeholders. In addition, ARB staff and management participated in numerous industry meetings over the past two years, presenting information on implementation of the current regulation and our proposed amendments to the CHE regulation.

As a way of inviting public participation and enhancing the information flow between the ARB and interested parties, staff created a CHE Internet web site (http://www.arb.ca.gov/cargo) in March 2004. Since that time, staff has consistently made available on the web site all related documents, including meeting presentations and draft versions of the proposed regulatory language. The web site has also provided background information on diesel PM, workshop and meeting notices and materials, and other diesel related information, and has served as a portal to other web sites with related information.

Outreach efforts have also included more than a hundred personal contacts via telephone, electronic mail, regular mail, surveys, facility visits, and individual meetings with interested parties. These contacts have included interactions with engine manufacturers and operators, emission control system manufacturers, local, national, and international trade association representatives, and environmental, community, and public health organizations.

Environmental Justice

ARB is committed to integrating environmental justice in all of its activities. On December 13, 2001, the Board approved "Policies and Actions for Environmental Justice," which formally established a framework for incorporating Environmental Justice into the ARB's programs, consistent with the directive of California state law. (ARB, 2001) Environmental Justice is defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.

The proposed amendments to the regulation are consistent with the environmental justice policy to reduce health risks from TACs in all communities, including those with low-income and minority populations, regardless of location. The proposed amendments to the regulation will continue to reduce diesel PM emissions from mobile CHE at ports and intermodal rail yards by requiring a turnover to cleaner engines and the use of BACT. The proposed amendments to the regulation will continue provide air quality benefits for all Californians, particularly those living near ports and intermodal rail facilities where CHE operate.

REFERENCES:

(ARB, 2005a) California Air Resources Board. *Staff Report: Initial Statement of Reason for Proposed Rulemaking, Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards,* October 2005.

(USEPA, 2009) United States Environmental Protection Agency. *U.S. EPA Integrated Science Assessment for Particulate Matter*, December 2009. http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM_ISA_full.pdf

II. NEED FOR AMENDMENTS

In this chapter, ARB staff provides a discussion of the events and information that have resulted in the need for amendments to the CHE Regulation. In addition, ARB staff provides the rationale for the individual amendments. These amendments have been drafted to address a variety of implementation issues that have arisen since the CHE Regulation became effective and provide some relief from the recent economic downturn. While all of the amendments are relatively minor, they provide the additional flexibility sought after by the regulated community without sacrificing significant emission reductions.

A. Retrofit Requirements

The CHE Regulation requires that in-use non-yard truck equipment, as of January 1, 2007, meet BACT emission standards though one of a menu of compliance options. These options include replacement to cleaner on-road or off-road engines and/or the use of retrofits. For owners/operators that elect to use retrofits, a second compliance step, which would require replacement to Tier 4 off-road engines or installation of a Level 3 (85 percent or greater of diesel PM reduction) VDECS, may be required, depending on the equipment category and level of VDECS applied.

While retrofitting of in-use non-yard truck equipment is not required, it is seen as the most cost-effective option for compliance. However, since the regulation has been implemented, the use of VDECS has not been as robust as staff anticipated and some start-up problems have been reported by terminal operators. The use of retrofits is relatively new to port and intermodal rail yard operators. The successful use of retrofits requires some changes in operation and maintenance practices. This has been demonstrated with other regulated categories and their introduction to retrofits.

ARB staff believes a few minor changes to the CHE Regulation will help port and intermodal rail yard owners/operators to more successfully use retrofits as a compliance option. These include:

- Providing an additional two years of eligibility for compliance extensions where no VDECS are available.
- Providing owners/operators with more time to evaluate the need for an extension before having to apply for a “No VDECS Available” extension.
- Including safety issues as a reason for a “No VDECS Available” extension.
- Allowing an experimental extension for situations where a diesel emissions control strategy (DECS) manufacturer is developing an experimental system and needs to generate data for verification.

The following paragraphs discuss the need for these changes.

"No VDECS Available" Compliance Extension

There are CHE for which no currently verified VDECS will work. The CHE Regulation allows an annual compliance extension of up to two years for non-yard truck mobile cargo handling equipment when a VDECS is not available. Owners/operators are required to bring all other equipment into compliance before applying this extension. Under the current CHE Regulation, owners/operators must bring this equipment into compliance by either replacing or retiring if there are still no VDECS available once the two years extension has passed. There are situations where there is specialty equipment required for certain cargo that is very expensive. Staff is proposing to amend the CHE Regulation to add two additional annual years of compliance extension to allow more time for additional DECS to be verified for CHE. These additional two years delays the capital expenditure to replace this equipment and provides more time for an applicable retrofit to be verified. In consideration of the amount of time required for the evaluation of whether VDECS are available or not, staff is also proposing to change the deadline for submitting a "No VDECS Available" compliance extension request from six months to 60 days prior to the compliance deadline.

While a VDECS may be available for a piece of equipment, it is important that the installation of the retrofit device does not impact the safe operation of the equipment. This is a clarification in that safety has always been allowable as a factor in determining available VDECS. Factors impacting the installation include the location of the exhaust outlet, the equipment configuration, and the size of the retrofit device necessary for the engine. One possible impact would be if the retrofit device was placed such that the view of the driver was obstructed. Title 8, section 1591(b) of the California Code of Regulations (CCR) states, "Equipment and accessories installed on haulage vehicles shall be arranged so as to avoid impairing the driver's operational vision to the front and sides." ARB staff has been working with staff of California Division of Occupational Safety and Health (CalOSHA) in an effort to better define what constitutes a line-of-sight impairment so aftertreatment control installers have a consistent standard. Those discussions are on-going. Until such time as the line-of-sight standards are clearly delineated, ARB will work with CHE owners/operators to ensure that aftertreatment controls are installed in safe manner.

Extension for Experimental Systems

Since the start of CHE Regulation implementation, it has been determined that significant differences between RTG cranes and other rubber tired off-road equipment impact their operation with exhaust retrofit devices. RTG cranes are used to lift and move containers from container stacks to trucks or rail cars. The propulsion engine on an RTG crane is a diesel generator set that either produces electricity to run the crane (diesel-electric crane) or runs a pump to produce hydraulic pressure to run the crane (hydraulic crane). These engines are similar to generator sets used for stationary applications. Additionally, the engine operates under a low load (idle) a large percentage of the time, such as when it is moving a container laterally or dropping a container, but then ramps up to high load when it picks up a container. Consequently,

VDECS demonstrated on non-RTG crane equipment may not operate satisfactorily on RTG cranes.

Therefore, RTG cranes are a separate category for verification. Currently, there are only three devices verified for RTG cranes, one Level 2 device and two Level 1 devices. There are approximately 370 RTG cranes in California. Consequently, this is a very small market and may not attract the attention of DECS manufacturers for verification. The devices that are currently verified for RTG cranes were demonstrated using an experimental extension which allows the use of a non-verified DECS if there are no VDECS available for the equipment.

Once there are VDECS available for the equipment, this experimental extension is no longer available. Staff believes that having more verified products for CHE cranes would provide greater flexibility for CHE owners/operators. Therefore, we are proposing to add a provision to allow the use of the experimental extension for situations where a DECS manufacturer needs to generate data for verification of a system, regardless of whether VDECS are available. Staff believes these types of extensions will support the verification of additional DECS.

B. Operational Practices

ARB staff has determined that there are four minor amendments that could be made in the regulation to allow port and intermodal rail yard operators to conduct their operations more effectively while delaying minor emission reductions. These are:

- Providing a low-use extension for a limited number of equipment.
- Allowing non-yard truck equipment to be transferred between terminals or intermodal rail yards controlled by single owner.
- Allowing for warranty replacements due to engine failure.
- Allowing rental of equipment meeting previous engine standards for up to six months after new engine standards go into effect if there is a manufacturer's delay.
- Requiring operators to annually conduct opacity monitoring on the engine-out exhaust for all CHE equipment.

The need for these amendments is discussed in the following paragraphs.

<u>Low-Use Provision</u>

Equipment owners/operators maintain a small number of equipment that is used only for backup should another piece of equipment stop operating. Maintaining this back-up equipment is essential to keeping a terminal operating when a ship comes into dock or a train into a rail yard for loading or unloading. Additionally, some smaller port terminals have specialty equipment that is required for certain cargo such as large steel I-beams and large wire coils and would be expensive to replace. This equipment is used infrequently but is necessary for situations where this cargo comes in. Staff is proposing a two year extension for equipment operated less than 200 hours per year for

such equipment. Other fleet rules include a low-use extension. Staff is proposing an extension for this equipment due to the environmental justice issues related to the residential communities surrounding these captive fleets. A provision would be included that gives Executive Officer discretion to limit the number of pieces of equipment at a facility to two percent or two pieces of equipment of an owner/operator's fleet based on the potential impact of the low-use equipment activity on public health.

Transfer of Equipment

Equipment owners/operators with fleets in different parts of California occasionally need to move equipment from one facility to another facility elsewhere in the State. To require an owner/operator to purchase additional equipment while equipment elsewhere sits unused creates an unnecessary impact on capital expenditures. Currently, these transfers are allowed only if the two facilities are at the same port or if the equipment meets current engine emission standards. Staff is proposing to allow an owner/operator to transfer non-yard truck equipment from one port terminal or intermodal rail yard to another port terminal or intermodal rail yard that is under common control of the same owner/operator if specified conditions we met that ensure that risk exposure and public health are not adversely impacted.. Among the conditions would be a requirement that equipment would have to meet the regulation's BACT performance standards.

Warranty Replacements

An issue has come up regarding engines that fail within the manufacturer's warranty period (usually one to two years after initial purchase). If the new engine standard changed during the warranty period, under the current rule a warranty replacement of an engine meeting the old standard would not be allowed. Since the warranty would only pay for the replacement of an engine identical to the failed engine, the owner/operator would be responsible for the difference between the cost of the warranty engine and new engine and equipment modifications to accommodate the newer engines. Tier 4 engines typically have aftertreatment controls that require more engine compartment space and increased cooling capacity and equipment modifications to accommodate these changes may be costly. To address this situation, staff is proposing to allow engines that fail under warranty to be replaced with a same emission level engine even if there has been an engine emission standard change since the original engine was purchased.

New Equipment Delivery Delays

Equipment with engines meeting new engine standards are often not immediately available once the standard comes into effect. Consequently, if during the time when the new standard first comes into effect, an owner/ operator orders new equipment and there is a manufacturer's delay, they may not be able to rent equipment with engines meeting the new standards to use until the equipment they have purchased is delivered. Consequently, staff is proposing an amendment to allow the rental of equipment

meeting the previous standard for up to six months, or until the equipment is delivered, whichever is longer.

Opacity Based Inspection Program

Diesel engines have been the workhorse of American industry since the early 20th century. These engines, which are designed to withstand the explosive impact of compression ignition, are highly durable and will continue to operate effectively with minimal maintenance. Unfortunately, this can result in delayed maintenance and engines operating at higher than design emission levels.

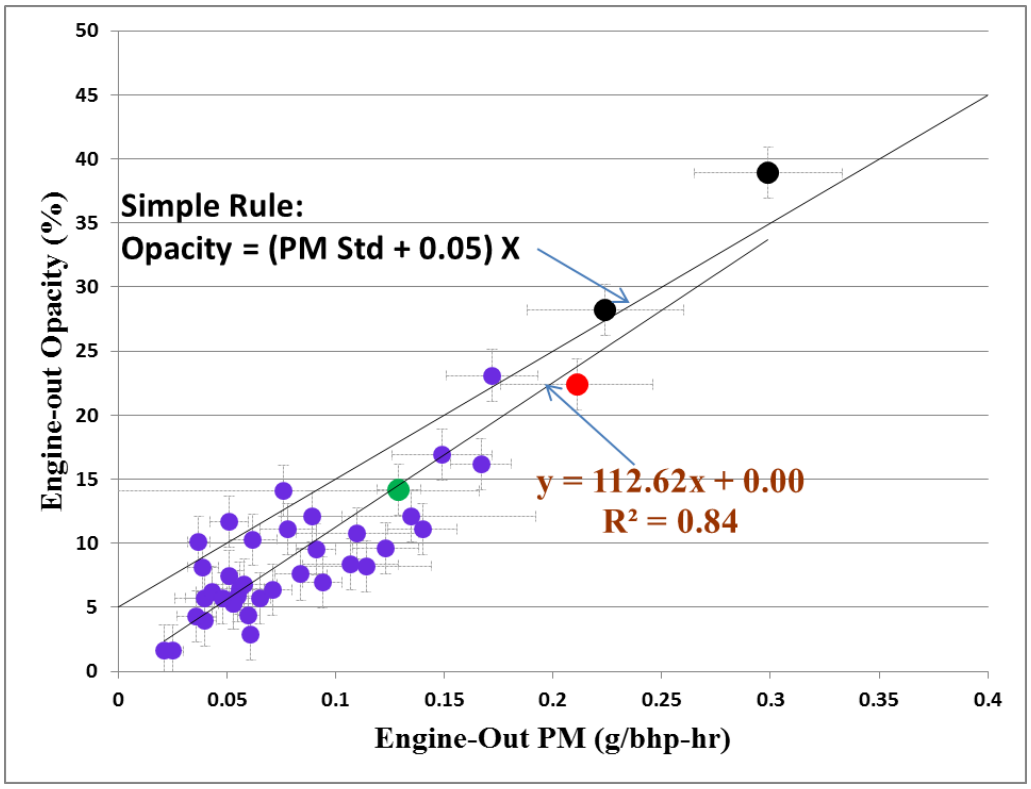
The smoke opacity test is a quick and inexpensive way to detect if an engine is emitting excessive visible emissions. These visible emissions could be an indication of a maintenance issue such as the fuel pump calibration, fuel injection timing, air filter plugging, or turbo pump failure. ARB staff has been using opacity testing to determine when on-road truck engines need maintenance since 1991. This program is called the Period Smoke Inspection Program and requires that diesel truck and bus fleet owners conduct annual smoke opacity inspections of their vehicles and repair those with excessive smoke emissions to ensure compliance.[6] ARB randomly audits fleets, maintenance and inspection records and tests a representative sample of vehicles. All vehicles that do not pass the test must be repaired and retested. Opacity limits for these on-road engines are a maximum of 55 percent opacity for pre-1991 model year (unregulated) on-road engines and a maximum of 40 percent opacity for 1991 model year and later (certified) on-road engines.

The opacity test is performed using the Society of Automotive Engineers' (SAE) J1667 snap-acceleration test procedure. (SAE, 1996) To perform this test, a smoke sensing meter is placed either just above the exhaust, or a probe is placed inside the vehicle's exhaust pipe. The driver then rapidly accelerates the engine three times, with the transmission in neutral, to clear the exhaust of loose particles. The driver then repeats the snap-acceleration test three times. The meter measures the opacity of the smoke being emitted.

ARB is in the first phase of a detailed study on the correlation of measured engine-out exhaust opacity to a variety of engine parameters including measured PM emissions and engine mileage, age and certification level. This study has included measuring both the opacity and engine-out PM of a number of on-road and off-road engines. (ARB, 2011a) The PM measurements were made with a portable emissions measurement system (PEMS). Data from the study indicates that while measured engine-out opacity does not appear to correlate with engine mileage, age, or certification level, it does correlate with measured PM emission levels. The measured engine-out opacity is shown plotted as a function of the measured PM emission data in Figure II-1 below.

[6] Title 13, sections 2180 - 2194

Figure II-1: Opacity and Measured Engine-Out PM Correlation



Two of the preliminary conclusions from this study are that measured opacity can be used to estimate engine PM emission levels and that this test can be easily extended to off-road equipment.

One startling observation of the data from this ARB study is that in-use engine-out PM emissions from certified diesel engines can be significantly higher than the certification levels if the engine manufacturer's recommended engine maintenance schedules are not followed. These in-use PM levels are significantly higher than the expected engine deterioration levels. However, PM emission levels and measured opacity levels in well-maintained fleets correlate much better with their certification levels. Based on this information, ARB staff has devised a simplified correlation of an opacity limit to the PM standard that an engine is certified to. This "Simple Rule", shown in the figure above, is:

Opacity Limit = (PM standard + 0.05) X 100.

So, while measured opacity does not appear to correlate well with the certification level in random fleets, the measured opacity for the engines in well-maintained fleets follow the ARB "Simple Rule" unless engine maintenance or repair is necessary.

The following maximum opacity limits are based on the "Simple Rule".

Table II-1: Maximum Opacity Limits Based on the "Simple Rule"

Off/On-Road Certified at X: (g/bhp-hr)	Maximum Opacity Limit
>0.4	55%
0.31≤X≤0.40	45%
0.21≤X≤0.30	35%
0.11≤X≤0.20	25%
0.05≤X≤0.10	15%
X<0.05	5%

ARB staff is proposing to require an opacity test of the engine-out exhaust of all CHE once a year to identify elevated emission levels and alert operators to potential engine maintenance issues. This is similar to what is required of California truck and bus fleet operators. The engine-out exhaust would be opacity tested for all equipment, including those retrofitted with VDECS or equipped with a factory installed PM control system.

Retrofitted engines would be tested when the VDECS is removed for cleaning out the ash. Engines that include integral aftertreatment devices that are part of the certified engine would not require removing these aftertreatment devices for opacity testing. The maximum opacity limits for certified engines would be based on the limits set by the "Simple Rule," shown in Table II-1 above. The maximum limit for unregulated engines would be set at 55 percent, similar to that for unregulated on-road engines. Retrofitted engines would need to meet the limit set for the installed VDECS. This will help prevent VDECS failures.

The ARB Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (ARB Verification Procedure) requires that when diesel emission control devices are verified for use in California, specifications for the engine size and maximum PM emissions level are included as part of the verification.[7] If a VDECS is installed on an engine that exceeds the PM emissions level that it is designed for, the device quickly becomes clogged with soot and cannot operate as expected. Additionally, if an engine is burning an excessive amount of lubricating oil, the VDECS will quickly become clogged with incombustible ash from the metal additives in the lubricating oil. Consequently, an engine maintenance program designed to keep diesel engines running at sufficient power to complete the job may not be sufficient to keep engines from producing excessive soot and burn excessive oil for proper VDECS operation.

The ARB Verification Procedure in currently being amended to require that a maximum opacity limit be specified for each verified device. (ARB, 2011b) While the ARB Verification Procedure will require that a pre-retrofit opacity test be performed on engines to be retrofitted, it will not require that periodic checks be performed to confirm that the engine opacity does not exceed the maximum level for the device. An annual opacity test program, as proposed here, would help ensure that operators perform

[7] Title 13, sections 2700 - 2711

proper engine maintenance to correct problems before they cause retrofit failure. Additionally, use of the opacity test would help keep non-retrofitted equipment operating more cleanly by requiring repairs to equipment that operate at higher than the specified limits.

C. Emission Standards

With Tier 4 off-road engine emission standards becoming effective for engines used in CHE, some implementation issues have arisen. Interim Tier 4 standards came into effect at the beginning of 2011 for engines of 175 horsepower (hp) or greater and in 2012 for engines of 75 to less than 175 hp. Final Tier 4 standards will become effective in either 2014 or 2015, depending on engine horsepower. The proposed amendments address:

- Tier 4 Family Emission Limits (FEL) engines.
- The demonstration of emissions equivalency.

Tier 4 FEL Engines

U.S. EPA allows engine manufacturers some flexibility during periods where engine emissions standards are transitioning from one tier to the next. This flexibility involves allowing engine manufacturers to certify specific percentages of engines manufactured, and identified as being part of the next Tier, to emissions levels that do not meet the emissions standards for the specified Tier. These engines are known as Family Emission Limits (FEL) engines and are certified to alternate (Alt) PM and Alt NO_x emissions limits. The FEL Alt PM standards allow for emissions that are approximately ten times higher than the Tier 4 PM standards. These Alt PM standards are essentially equivalent to Tier 3 PM standards. The original regulation assumed that all Tier 4 engines would be certified to the Tier 4 PM standards. If engines certified to these Alt PM standards are allowed to be introduced into California's ports and intermodal rail yards as Tier 4 engines, emission reductions anticipated with the adoption of the original regulation will be lost. Consequently, staff is proposing that if engines certified to the Alt PM standards are used at ports or intermodal rail yards, these engines would be treated as if they were Tier 3, and owners/operators would be required to retrofit this equipment with the highest level VDECS within one year of purchase, lease, or rental. Owners/operators will be able to determine if an engine is a FEL engine based on the engine label. Labeling requirements set forth in the Code of Federal Regulations, title 40, part 1039, section 135, require that the FEL standards to which an engine is certified to be included on the label.

Demonstration of Emissions Equivalency

There is now new hybrid technology for RTG cranes that has undergone years of development with Tier 3 engines. Modifying the technology to accommodate Tier 4 engines would require significant additional development funding. The current CHE Regulation would not allow this technology to be introduced at port or intermodal rail yard terminals once Tier 4 engine emission standards come into effect and those

engines are available for RTG cranes. Staff is proposing an amendment that would allow alternative technology developed with an engine certified to a previous standard to be allowed to be purchased, leased, or rented as compliant equipment at a port or intermodal rail yard if it can be demonstrated that the engine provides the same emission reductions that the use of an engine certified to the current standard would with conventional technology. These alternative technologies are much more energy efficient than conventional technologies, thus providing GHG benefits as well as toxic and criteria pollutant reductions. This amendment would encourage the introduction of more energy efficient technologies at terminal ports and intermodal rail yards.

D. Compliance Requirements

Two compliance related issues have surfaced since the start of CHE Regulation implementation. The first issue involves general compliance deadlines for fleets that have in-use engines that were manufactured across several model years; the second issue deals specifically with the Port of Humboldt Bay. To address these issues, two amendments are being proposed:

- Allow compliance schedule modification to bring older engines into compliance first.
- Exempt equipment at rural low-throughput ports.

These are discussed in the following sections.

Compliance Schedule Modification

The compliance schedules in the CHE Regulation organizes the engines in fleets into model year groups and then requires a certain percentage of each group to be brought into compliance each year. Compliance for the older model year groups is initiated earlier than that for the newer model year groups. However, the phased compliance schedules overlap such that a certain number of newer model year engines are required to comply before all of the older model year engines have been brought into compliance. Some owners/operators have requested that they be allowed to bring all of their older equipment into compliance before they start bringing their new equipment into compliance. Allowing modifications to the compliance schedule to swap older engine's earlier compliance dates with earlier dates for newer engines makes sense and provides the same or better emission benefits. Consequently, staff is proposing an amendment to allow such modifications. The newer engines would then be required to comply when the older engines were originally required to comply. The number of engines required to comply each year would remain the same.

Rural Low-Throughput Ports

The North Coast Unified Air Quality Management District (North Coast), the Port Authority of the Port of Humboldt Bay, and Port of Humboldt Bay tenants have requested that ARB consider providing relief to this small port from the CHE Regulation requirements. (North Coast, 2010), (Humboldt Bay District, 2010)

The Port of Humboldt Bay is a small port in Northern California surrounded by a community of less than 50,000 people. (CB, 2011) The 2010 United States Census Bureau designated the surrounding community as an urban cluster. (CB, 2010) The next largest community, Redding, California, which the census designated as an urban area, is over 75 miles away. The North Coast, in which the port is located, is in attainment for ozone per the National Ambient Air Quality Standards (NAAQS) and does not contribute to violations of the federal ozone standard for air districts downwind. (ARB, 2011c)

The port is primarily dependent on the local lumber industry. Logs and chips are the primary cargo going through the port. The rail access to the community and the port is out of service due to the geologic activity in the area and is not anticipated to be brought back into service due to the high maintenance costs related to this area. The community is economically dependent on the lumber industry and the availability of the port to get the lumber products to market. The activity has averaged about one to two wood chip or log barges a month. The recent decline in the economy, and specifically the housing industry, has caused a severe decline in the lumber industry.

Using U.S. Army Corps of Engineers, Waterborne Statistics Data Center Data historical information, the peak port throughput was in 2005 at 815,000 tons of material per year. The economic decline has brought this down to 90,000 tons per year in 2009. (USACE, WSDC, 2010) With the closure of one of the local lumber mills, return to the peak of 2005 is unlikely. However, the Port is seeking additional business in a long-term project to transport containers by barge. The current plan for the project would bring approximately 1,100 twenty-foot equivalent units (TEUs) through the port per month. As planned, it would take several years to reach the project's anticipated annual throughput goals of approximately 140,000 tons. Taking into account the current annual throughput tonnage and the projected increases, a projected annual throughput tonnage of 230,000 tons would be significantly below the maximum throughputs experienced in 2005. (ARB, 2011d)

A survey of port tenants indicated that less than 20 pieces of CHE either work at the port or may work at the port in the future. (ARB, 2011e) Much of this equipment works only part time at the port. The annual hours of operation of this equipment range from 200 up to 2,500 hours, with a horsepower weighted average of 875 annual hours. The average horsepower of the equipment is approximately 240 hp. Average annual hours of operation for similar equipment at other ports are estimated to be approximately 1,500 hours. The emissions for these equipment are estimated to be approximately 0.001 tpd of PM and 0.02 tpd of NO_x. These emissions are less than 1 percent of the emissions of either the Port of Los Angeles or Long Beach in 2011. Consequently, the health risk from these emissions is similarly insignificant.

The variable nature of the lumber industry is expected to result in higher throughputs in some years than in others. The seasonal nature of the lumber industry also results in port activity being limited by weather to May to October. In an effort to even out peak

years with low years, a two-year average is being proposed for determination of the throughput limit. This would allow the port to sustain a single peak year, but not two in a row.

To address this and similar situations in the future, staff is proposing an amendment that would exempt a port from the CHE regulation if it has an annual throughput of less than one million tons and is located more than 75 miles from an urban area.

E. Need to Clarify the Current Regulation

Staff is also proposing changes to clarify the intent of the CHE Regulation by modifying several existing definitions including: compression ignition engines; intermodal rail yard; newly, purchased, leased or rented cargo handling equipment; owner or operator; port; retirement or retire; and rubber-tired gantry crane. In addition, staff is proposing to add definitions for the following terms to support both modified definitions and other amendments: alternate PM standard; cargo; Class I Railroad; construction activities; Family Emissions Limits (FEL); low-throughput port; opacity; Otto cycle engine; safe; two-year average annual cargo throughput; urban area; warranty period; and water-borne commerce. *S*taff is also proposing to clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs would be exempt from the regulation.

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F. Other Issues

Other issues were discussed in the workshops that staff felt were better addressed through means other than a regulatory amendment. These issues include the operation of VDECS on non-yard truck equipment and of on-road engines in the yard trucks. ARB staff conducted a survey of owners/operators with retrofitted equipment and yard trucks with on-road engines and hosted a technical meeting on May 26, 2011, to address these issues. The following sections provide a discussion of the issues, findings, and action plan that evolved from this meeting.

<u>May 26, 2011 Technical Meeting</u>

Staff held a technical meeting on May 26, 2011, in Sacramento to address concerns heard at the workshops from owners/operators regarding the operation of VDECS on non-yard truck equipment and on-road engines in the yard trucks. The morning session addressed the use of VDECS on non-yard truck equipment; the afternoon session addressed the use of on-road engines in yard trucks. All terminal port and intermodal rail yard operators were invited to both meetings. VDECS manufacturers with products verified for use on CHE were invited to the morning session and representatives from the on-road engine manufacturer, Cummins, were invited to the afternoon session. In addition, representatives from the Manufacturers of Emissions Control Association (MECA) were invited to the morning session, and representatives from the Pacific Maritime Association (PMA) were invited to both sessions. An open invitation to provide

a presentation was extended to all participants. The MECA representative and the Cummins representative both provided presentations.

Use of VDECS on Non-Yard Truck CHE

In the technical meeting, owners/operators discussed different operational problems that they have been encountering with the use of VDECS on their non-yard truck CHE. These issues are similar to issues other fleets have encountered under ARB's in-use regulations that require the use of VDECS to reduce in-use fleet emissions.

The owners/operators' concerns primarily involved the operational and financial impacts incurred by the fleets from equipment downtime due to problems with VDECS. Many felt that their equipment duty cycles were not amenable to retrofitting with VDECS due to the degree of idling that occurs during vehicle operation and the resulting low exhaust temperatures. ARB staff, however, has determined that VDECS are available that can operate under these conditions. It appears that a common problem is that many pieces of equipment operating at the ports and rail yards have VDECS installed that have not been adequately matched to the equipment's duty cycles. Additionally, VDECS manufacturers believe that owners/operators need more education on the VDECS operational and maintenance requirements and that this would help the owners/operators operate the retrofitted equipment more effectively. While diesel engines without aftertreatment controls will normally continue to operate without required maintenance, engines that have been retrofitted will more likely incur high incidences of operational problems if they are not properly maintained.

ARB staff found that closer coordination between all of the parties involved, including the owners/operators, equipment field operators, VDECS manufacturers, VDECS installers, and ARB staff is essential in making certain that equipment is properly matched to the VDECS that will be installed, taking into consideration the equipment's duty cycle, and to ensure that proper maintenance is provided. ARB's Verification Procedure, by which devices become verified products, is in the process of being modified to require that VDECS manufacturers provide adequate education to the equipment owners/operators. Additionally, this procedure is being modified to require the VDECS manufacturers to determine a maximum opacity level for equipment that is to be retrofitted with their device. The opacity requirements of the Verification Procedure program would be synergistic with the proposed opacity monitoring requirements proposed herein. The opacity tests would alert owners/operators as to when equipment are starting to produce soot levels that are too high for adequate VDECS operation. The equipment would then be able to receive maintenance necessary to reduce soot levels.

ARB staff have committed to host periodic meetings on the use of VDECS on non-yard truck CHE to work out solutions to issues with retrofitting equipment and to alert owners/operators concerning these solutions.

Use of On-Road Engines in Yard Trucks

In the technical meeting, owners/operators discussed different operational problems that they have been encountering with the use of on-road engines in yard trucks. These issues included DPF regeneration, exhaust pipe leakage, sludge in exhaust the gas recirculation (EGR) system, and diesel fuel fumes in the air brakes. Meeting participants suggested that the problems appear to correlate with drive time and speed.

Multiple causes were identified for problems that have been incurred, including: an engine duty cycle that involves significant idle and low speed operation, lack of truck operator education, and truck operators ignoring necessary maintenance requirements. The Cummins representative made a commitment to meet with the different terminal operators who were having problems with the on-road engines in their yard trucks to determine if maintenance or software upgrade solutions are available.

The findings from the Cummins representative; to date, indicated that he found multiple causes for the operational problems and suggested maintenance practices and upgrades to deal with the different issues. The issues and suggested solutions are provided in the paragraphs below. One of the fundamental issues is that some yard truck operators were not cooperating regarding providing necessary maintenance, primarily the DPF regeneration. Regeneration is the name for the process by which the accumulated soot in the filter is burned off. There is an indicator light on the yard trucks' dashboard that turns on when the engine DPF needs to be regenerated. Performing the regeneration, referred to as a stationary regeneration, requires parking the truck and pushing the regeneration button. This regeneration process takes between 20 to 45 minutes depending on the amount of soot that has accumulated in the filter. (Cummins, 2008) One terminal has addressed the problem by hooking the truck's horn into the electrical circuit for the dash light to call attention to the warning light. Other findings from the Cummins representative were that some terminals have not updated their maintenance procedures for the 2007+ model year engines. These newer engines are significantly different from earlier model year engines. One important difference is that they include an integral DPF. As discussed above, regeneration burns off accumulated soot. However, there is a component of the soot that is not combustible. This non-combustible portion of the soot is called ash. Ash is composed of metals from lubricating oil compounds. Diesel engines burn a small amount of the oil that lubricates the pistons and cylinders. Required DPF maintenance includes regularly removing the DPF from the truck to clean out the ash. As ash accumulates, the engine back pressure increases. If the ash is allowed to accumulate too long, it becomes more difficult to remove all the ash and the engine back pressure will not return to the original conditions after cleaning. This increase in back pressure can cause other problems, as discussed in the next paragraph.

Another Cummins finding was that the exhaust pipe leak was exacerbated by high back pressure in the exhaust system. As discussed above, excessive ash and soot accumulation in the DPF can cause an increase in engine back pressure. Additionally, the exhaust is a two piece system with a slip fit. When the pressure in the exhaust

system increases due to ash and soot buildup in the DPF, exhaust gases may be forced through the slip fit in the exhaust pipe. Consequently, the Cummins representative found that the exhaust leak can be remedied by replacing the original equipment two-piece exhaust with a single piece exhaust system. This single piece exhaust system has significantly less potential to leak when engine back pressure increases.
The Cummins representative also found that there were two possible solutions to the issue of migration of the engine exhaust air into the truck air system. Cummins has a service bulletin describing the relocation of the air compressor inlet to help mitigate this problem. Additionally, the maintenance practice of daily purging the truck's main air tank would also help relieve this problem. Purging the air tanks releases accumulated fluids which could otherwise release vapors and contaminate the air. Terminals that practiced the daily purging did not experience this problem.

One important Cummins finding was that some port yard trucks had not received up to ten calibration updates needed for engines in-field. Since Cummins is responsible for the critical updates, closer interaction between Cummins and owners/operators would facilitate the necessary calibration updates.

ARB staff has determined that closer coordination among all parties, including Cummins representatives, terminal owners/operators, equipment field operators, and ARB staff is needed to continue troubleshooting the operational problems being encountered. ARB staff have committed to host periodic technical meeting to review the performance of the on-road engines in yard trucks, find out what is working, and what is needed for future success.

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(North Coast, 2010) North Coast Unified Air Quality Management District. Letter of Recommendation, July, 2010.

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(ARB, 2011d) California Air Resources Board, Personal correspondence, Stephen Pepper, May 19, 2011.

(ARB, 2011e) California Air Resources Board, Humboldt Bay Cargo Handling Equipment Database: Results from 2011 Survey of Operators at the Port", April 2011.

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III. PROPOSED AMENDMENTS

In this chapter, we discuss the key requirements of the proposed amendments to the regulation for mobile CHE at ports and intermodal rail yards. This chapter begins with a general summary of the proposed amendments to the regulation, and each major requirement of the proposed amendments is discussed and explained. Unless otherwise noted herein, all references to mobile CHE include mobile CHE at ports and intermodal rail yards, as defined in the current regulation.

A. Summary of the Proposed Amendments to the Regulation

The complete text of the proposed amendments to the regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards is included in Appendix A. The proposed amendments have been developed to provide CHE owners/operators with additional flexibility when complying with the regulation while using BACT to reduce the general public's exposure to diesel PM and NO_x emissions from mobile CHE. Amendments are also being proposed to maintain the anticipated risk reduction with the introduction of Tier 4 engines, enable the more successful use of retrofits, and provide clarification of the regulatory language. The proposed amendments address several areas including retrofit requirements, operational requirements, emission standards, compliance provisions, definitions, and other clarifying language.

Retrofit Requirements:

- allow an additional two years of annual extension for equipment for which there are no VDECS available,
- add safety as a factor when considering VDECS availability,
- allow more time for extension applications,
- require equipment with a "No VDECS Available" extension to be brought into compliance within 6 months of a VDECS becoming available, and
- allow an experimental extension regardless of VDECS availability if it supports generating data for verification.

Operational Practices:

- allow a two year extension for a limited number of low-use equipment (200 annual hours of operation or less),
- allow transfer of non-yard truck equipment for which BACT has been applied,
- allow replacement of an engine that fails while under warranty to be replaced with a like engine regardless of the current emissions standard,
- allow rental of non-compliant equipment when there are manufacturer delays for the delivery of purchased compliant equipment, and
- require CHE opacity monitoring to ensure that engines meet original design specification or VDECS manufacturers' smoke opacity limits.

Emission Standards:

- treat Tier 4 engines certified to Alternate PM Standards as Tier 3 engines, and
- allow alternative technologies that demonstrate emissions equivalency.

Compliance Requirements:

- allow compliance schedule modification to bring older engines into compliance first, and
- exempt CHE equipment at rural low-throughput ports.

Clarify language and intent:

- modify several existing definitions and add others to support the amendments, and
- clarify that equipment brought onto a port or intermodal rail yard solely for construction or unexpected repairs are exempt from the regulation.

These amendments are explained in the following sections.

B. Discussion of the Proposed Amendments to the Regulation

The following paragraphs provide a plain English description of each of the proposed amendments. This discussion has been grouped by the general areas of the regulation where the amendments apply.

1. Applicability

Staff is proposing to add a sentence to the Applicability section, title 13, CCR section 2479(b) which clarifies that the regulation is applicable only to equipment powered by diesel fueled (compression ignition) engines and not gasoline or propane fueled (spark ignition) engines. Diesel fueled engines are certified to a test cycle referred to as the diesel cycle and gasoline and propane fueled engines are certified to a test cycle referred to as the Otto cycle. Consequently, the added sentence states that CHE powered by engines certified to a cycle other than the diesel cycle, such as the Otto cycle, are not subject to the CHE Regulation.

2. Exemptions

Staff is proposing several new exemptions to title 13, CCR section 2479(c) to provide additional clarity to the CHE Regulation and flexibility to owners/operators. The proposed amendments also include a reorganization of the exemption paragraphs to delete repetitious language.

a. Construction Equipment and Equipment for Unexpected Repairs - Section (c)(1)(D) and (G)

The proposed amendments would clarify the intent of the current regulation by including an exemption for equipment used solely to support construction activities at a port or

intermodal rail yard and an exemption for rented, leased, or contracted equipment brought onto a port or intermodal rail yard to perform repairs that are not anticipated. These are repairs that are not routine or predictable. These equipment types were never intended to be covered by the CHE Regulation and have been excluded based on the definition of cargo handling equipment.

b. Personnel and Fuel Delivery Vehicles - Section (c)(2)

An exemption for personnel and fuel delivery vehicles has been clarified. Again, these vehicles were never intended to be covered by the CHE Regulation.

c. Warranty Replacement of Engines - Section (c)(3)(A)

Under the current CHE Regulation, if an engine fails while still under warranty but a new engine standard has come into effect since the time of purchase, the engine must be replaced with an engine meeting the new standard. Staff is proposing to allow an owner/operator to replace the engine with the warranty engine, even if new engine emissions standards are in place at the time of replacement. This amendment is needed to protect owners from losing the value of their new engine warranties.

d. Transferring Non-Yard Truck Cargo Handling Equipment from One Terminal to Another - Sections (c)(3)(B) and (k)

The current CHE Regulation requires that any CHE that was not part of the in-use fleet as of January 1, 2007, that is brought onto a port or intermodal rail yard must meet the requirements of newly purchased, leased, or rented equipment. Consequently, any non-yard truck CHE that is powered by a diesel engine that does not meet current engine emission standards cannot be moved from an owner/operator's terminal in one part of California to their terminal in another part of California. This results in added expense if an owner/operator must purchase additional equipment to meet operational needs at one facility while equipment sits idle at another facility.

Staff is proposing an amendment that would allow owners/operators to transfer non-yard truck CHE equipment from one location in California to another location in California through an application/approval process. This exemption is needed in cases where there is unused equipment at an owner/operator's one terminal and the need for that equipment at another of the same owner/operator's terminal. This amendment provides a process by which the equipment can be approved for the move. Application requirements specified in a proposed new section (k), Executive Officer Approval to Transfer Non-Yard Truck Mobile Cargo Handling Equipment Between Two Facilities, include:

- Both the originating and destination facilities must be in California and must be under common control.
- The move must not be used to meet compliance requirements at either of the two facilities.

- The equipment must be brought into compliance with the in-use requirements prior to it being put into use at the destination facility.
- The Executive Officer finds no significant adverse public health impact due to the action. The added regulatory language provides parameters to be considered in evaluating the public health impact.

3. Definitions

Staff is proposing to add 13 definitions in the Definitions section, title 13, CCR section 2479(d) to the current regulation. These 13 definitions support the other proposed changes to the CHE Regulation, including the exemptions previously discussed, proposed clarification of existing definitions, and other proposed changes that are discussed in the following sections. The proposed definitions listed were developed by staff, with input from the public during workshops and workgroup meetings. Staff working on the proposed amendments to the regulation also coordinated with staff working on other diesel PM regulations to provide consistency where it is practical.

The new definitions are listed below by category:
Definitions added to support the proposed clarifications to existing definitions include; "cargo", "Class I Railroad", and "water-borne commerce."
Definitions added to support the proposed modifications to the exemptions include: "two-year average annual cargo throughput", "construction activities", "low-throughput port", "Otto cycle engine", "urban area", and "warranty period."

Definitions added to support proposed changes to the requirements include: "Alternate PM Standard", "Family Emissions Limits (FEL)", "opacity", and "safe."

Staff is also proposing to clarify the following seven definitions: "compression ignition engine", "intermodal rail yard", "newly, purchased, leased, or rented cargo handling equipment", "owner or operator", "port", "retirement or retire", and "rubber-tired gantry crane or RTG crane." These definitions were clarified based on questions that had come up during the first few years of implementation of the CHE Regulation.

4. Requirements

Staff is proposing a number of changes to the Requirements section, title 13, CCR section 2479(e) of the current regulation. Some of these changes are non-substantive changes to clarify the language while others are to provide flexibility. Some of the amendments apply to newly purchased, leased or rented equipment, some apply to in-use equipment, and some apply to both. Staff is also proposing to add requirements for an opacity based monitoring program. Additionally, staff is proposing to require engines certified to FEL Tier 4 alternate PM standards to be treated similarly to Tier 3 engines and require retrofit with highest level verified control within one year of purchase, lease, or rental. The proposed amendments to the compliance requirements of the current regulation are discussed below.

a. Treat Engines Certified to the FEL Alternate PM Standard as a Tier 3 Engine – Sections (e)(1)(B)2.a., (e)(3)(B)1.a., b., and c., 2.a., b., and c., and 3.a., b., and c.

When the CHE regulation was initially adopted in 2005/2006, ARB expected that most owners/operators electing to comply with the regulation's performance standards would install new engines meeting the primary Tier 4 PM emission standards. ARB subsequently discovered, however, that at least some, if not many, non-yard truck equipment are equipped with engines certified to the less stringent alternative PM and NO_x standards based on family emission limits (Tier 4 FEL engines). The Tier 4 FEL engine PM standard is at least ten times dirtier the primary Tier 4 PM standard and is similar in stringency to the primary Tier 3 PM standard.

To address this problem, staff is proposing to add language clarifying ARB's initial intent – that engines meet the primary Tier 4 engine emission standards, not the FEL standards. The amendments specifically require that engines must meet the primary standards set forth at title 13, CCR section 2423(b)(1)(B). Additionally, staff is proposing that to the extent that owners/operators choose or are compelled to use FEL Tier 4 engines, because of limited availability of primary Tier 4 engines in the marketplace, such engines must be retrofitted with the highest level VDECS within one year of purchase, lease, or rental. As mentioned above, the Tier 4 FEL PM standards are essentially primary Tier 3 PM standards and do not achieve the PM emission reductions initially anticipated with the adoption of the CHE Regulation. The amendments insure that originally anticipated emission reductions are achieved while concurrently providing owners/operators with flexibility to meet short-term operational needs by using engines meeting less stringent emission standards.

b. Demonstration of Emissions Equivalency – Sections (e)(1)(B)4.d., (e)(3)(B)1.d., 2.d., and 3.d. and (n)

Staff is proposing an amendment that would allow alternative technology developed with an engine certified to a previous standard to be purchased, leased, or rented as new equipment if it can be demonstrated that the power system provides the same emission reductions that the use of an engine certified to the current, more stringent standard would achieve with conventional technology. The proposed language requires a demonstration that the power system meets the interim or final Tier 4 NO_x and PM off-road engine emissions standards for the rated horsepower and current model year. The amendment is needed to allow the use of hybrid and other energy efficient lower-emission power systems that have been developed with Tier 3 engines after Tier 4 engine emission standards have become effective. These would only be allowed if they achieve the same emission reductions as an engine certified to the current standards.

Five methods are provided in a new section (n), Test Methods, for determining this emissions equivalency. These are:

- results from using test methods specified in proposed new section (n), or an alternative test method approved by the Executive Office,

- certification test data or other emissions test data of the engine manufacturer for that engine
- emissions test data derived from another in-use engine that has a similar configuration or use,
- emissions test data used to verify an emission control device through ARB's Verification Program, or
- emissions test data used for U.S. EPA certification of a system for remanufacture to a cleaner standard.

The addition of approved test methods was necessary to support the proposed amendment to allow the use of equipment that could be demonstrated to meet the required emissions standards.

c. Rental of Non-Compliant Non-Yard Truck Equipment due to Manufacturer Delivery Delays – Section (e)(1)(B)5.

The off-road engine emissions standards began transitioning from Tier 3 engine emissions standards to Tier 4 standards in January 2011, with Interim Tier 4 (Tier 4i) standards for engines with maximum horsepower of 175 and higher becoming effective early 2011. Tier 4i standards for engines from 75 to 175 horsepower will become effective in 2012. While the standards take effect at the beginning of the year, CHE with engines certified to Tier 4i may not be available until later in the year. Consequently, owners/operators who wish to buy new equipment with Tier 4i engines may experience manufacturer delivery delays. If an owner/operator needs the equipment prior to the anticipated delivery date, they would need to rent a piece of compliant non-yard truck equipment. However, compliant rental equipment, with engines meeting the Tier 4i standard, may not be available.

This amendment would allow an owner/operator that has purchased new equipment but has not received it due to manufacturer delays to rent equipment not meeting the current standard for up to six months or until delivery of the compliant equipment, whichever is later. The new proposed regulatory language specifies an application process, which requires that the CHE owner/operator provide to the ARB Executive Officer information about the equipment purchased, including the predicted delivery date, and documentation from representatives of equipment and/or engine manufacturers supporting the claim of non-availability of compliant rental equipment and providing the anticipated date of availability. This amendment would allow owners/operators to meet their operational needs while waiting for the delivery of new equipment.

d. Opacity Based Inspection Program – Sections (e)(2)(A)4., (e)(3)(A)3., and (i)(1)(D)

Engine exhaust opacity testing has been used for two decades to control excessive smoke emissions from heavy-duty on-road diesel trucks and buses. Truck and bus fleets are required to test their fleets for engine exhaust opacity on an annual basis and

repair engines that do not meet the set maximum opacity limit. Similarly, opacity testing is being used by VDECS manufacturers as a soot level indicator to determine whether or not an engine is too dirty for their filter to operate properly. Currently proposed amendments to the ARB Verification Procedure, title 13, section 2700, would require that VDECS manufacturer set a maximum engine-out exhaust opacity level for their verified device.

The amendment proposed here would require CHE fleets to measure the engine-out exhaust opacity of all CHE on an annual basis. The requirement would include a phase-in period that would allow time for fleets to obtain opacity meters and have their mechanics trained to perform the test. Training is available at community colleges. Specifications for opacity meters allowed for use are also included. Those fleets that choose not to have their mechanics perform the test could hire a third party to test their engines. Engines with VDECS installed could schedule their opacity test to coincide with normally scheduled VDECS removal for cleaning and inspection.

The amended language sets maximum opacity limits for non-retrofitted engines based on a correlation of opacity with measured PM emissions developed by ARB. Engines for which VDECS are installed would need to meet the limits set by the VDECS manufacturers for the verified device. Testing procedures are included in the amended language. Similar to the on-road engine fleet rule, engines that test dirtier than the maximum opacity limit would need to be repaired such that they meet the engine standards or the engine-out emission limits for the VDECS. Owners/operators will need to include the opacity test results as part of their on-site recordkeeping, as specified in proposed new section (i)(1)(D).

This amendment is needed to help the early identification of engine maintenance issues that result in excessive exhaust soot. This excess soot can result in higher than design emissions. This monitoring test can also identify failure of aftertreatment controls that are part of the certified engine system. These additional recordkeeping requirements would allow ARB to verify that the annual opacity testing is being conducted.

e. Modification of Compliance Schedule to Bring Older Engines into Compliance First- Section (e)(3)(C)1.c.

The compliance schedules in the CHE Regulation organizes the engines in fleets into model year groups and then requires a certain percentage of each group to be brought into compliance each year. In general, compliance for the older model year groups is initiated earlier than that for the newer model year groups. However, the phased compliance schedules overlap such that a certain number of newer model year engines are required to comply before all of the older model year engines have been brought into compliance. This amendment would allow owners/operators to modify their non-yard truck equipment engine compliance schedule such that older model year engines (that are not required to comply until later) are brought into compliance in place of newer model year engines (that are otherwise required to comply earlier). The newer engines would then be required to meet the compliance dates initially established for

older engine compliance. The total number of engines that must come into compliance each year for a specific fleet, however, would not change under the proposed amendment. This amendment is the result of a request by owners/operators that wanted to replace all of their older equipment before bringing their newer equipment into compliance.

5. Compliance Extensions

Staff is proposing a number of changes to the Compliance Extensions section that is presented in title 13, CCR section 2479(f) of the current regulation. Staff's proposed amendments for compliance extensions include:

- adding an additional two years to the "No VDECS Available " compliance extension for non-yard truck equipment,
- allowing owners/operators to file an extension request closer to the compliance deadline,
- requiring the compliance of an engine with a "No VDECS Available" extension within six months of being notified by ARB that a safe and feasible VDECS has become available,
- clarifying that reasons for determining that there are no VDECS available include safety considerations,
- expanding the experimental controls extension to include cases where the installation is necessary to obtain data for verification regardless of whether there are other VDECS available, and
- adding a two-year annual compliance extension for a limited number of non-yard truck equipment that operate less than 200 hours annually.

These amendments are discussed in more detail below.

a. No Verified Diesel Emission Control Strategy- Section (f)(2)

The current regulation allows an annual compliance extension to be granted for two years for equipment for which there are no VDECS available. Staff is proposing to allow CHE owners/operators to apply for two additional one-year compliance extensions if the owner/operator can continue to demonstrate that there is no VDECS available for their equipment. These additional extension years are being proposed to provide compliance flexibility for specialty equipment for which VDECS are not yet verified. There are specialty equipment that is not frequently used but is expensive to replace. This may allow additional VDECS to become verified for this equipment. If VDECS do not become available, this adds an additional two years of life to this equipment.

b. Allow Owners/Operators to Request Compliance Extensions Closer to the Compliance Date- Sections (f)(2)(A) and (3)(A)

Staff is also proposing to provide owners/operators with additional time before having to file an extension application. The current regulation requires owners/operators to request an extension six-months prior to the compliance deadline. The proposed

amendments would allow owners/operators to request extensions as late as 60 days prior to the compliance deadline. This would allow owners/operators more time to determine if there are VDECS available for their equipment or if there is an experimental control available. This provides more compliance flexibility without impacting emission reductions.

c. Clarify that Safety is a Consideration for VDECS Availability-Sections (f)(2)(A)4., (f)(3)(B), and (f)(3)(D)

Staff proposes to add language to the "No VDECS Available" extension to clarify that safety is a consideration in determining if a VDECS is available for equipment. Similar clarifying language was also added to the section allowing for the use of experimental controls when VDCES are unavailable. This is a clarifying amendment. The safe operation of a VDECS has always been a consideration in determining VDECS availability.

d. Require Retrofit of an Engine with a "No VDECS Available" Extension within Six Months of a VDECS Becoming Available-Section (f)(2)(B)

Staff is proposing to require that if, at any time while a "No VDECS Available" extension is in effect, a VDECS becomes available for an engine, an owner/operator must install the VDECS, or otherwise bring the engine into compliance, within six months of being notified by ARB that a VDECS has become available. This requirement is already included in section (e)(1)(B)3 which describes the requirements for the installation of VDECS on new equipment. This amendment clarifies that this requirement also applies to in-use equipment.

e. Allow Experimental Control Extension in Cases where Data is Necessary for Verification-Section (f)(3)

Staff is proposing to add language that would allow an extension to be granted for the use of a diesel emission control strategy that is not verified if the installation is necessary for collecting data to support verification for that control strategy. This would be granted regardless of whether there were other VDECS available for the equipment. This would allow the verification of a larger number of controls. This amendment was proposed to allow more opportunity for the verification of additional control strategies.

f. Non-yard Truck Equipment Operated Less Than 200 Hours Annually-Section (f)(6), (i)(2)(I), and (j)(3)(F)

Staff is proposing adding a low-use compliance extension. This would allow owners/operators with equipment that operates less than 200 hours per year a two-year compliance extension. This extension may be limited, at the Executive Officer's discretion, to 2 percent of a fleet or two pieces of non-yard truck equipment, whichever is greater. This amendment was proposed to allow limited use of back-up equipment that is kept for use when another piece of equipment stops operating. Maintaining this

back-up equipment is essential for keeping a terminal or rail yard operating when a ship comes into dock or a train into the rail yard for loading or unloading. Additionally, it may be used for specialty equipment that is used infrequently but would be expensive to replace.

The following requirements would need to be met for this extension:

- install a non-resettable hour meter on the low-use engine,
- submit an application 60 days prior to the compliance deadline,
- identify the engine by manufacturer, serial number, model year, and engine family and series,
- report hours of operation annually, as specified in proposed new section (j)(3)(F), and
- maintain record of engine use, as specified in proposed new section (i)(2)(I).

Owners/operators must provide documentation from the previous year that the engine had operated less than 200 hours. Since the hour meter may not have been on the engine the previous year, other methods for determining the previous year's hours are allowed. These include fuel records or some other credible method upon approval of the Executive Officer. Owners/operators must also identify their fleet size.

The Executive Officer would base the decision regarding limiting the number of extensions on an evaluation of the impact on public health. The parameters to consider would be the numbers of equipment requested, the hours of operation, estimated emissions levels, and the proximity of the equipment to off-site residences.

Amended section 2479(i)(2) specifies the information that must be kept in the vehicle to document that it is operating within the requirements of the low-use extension. This would allow ARB to verify that the equipment is in compliance with the requirements of the low-use extension. The proposed amendments would add annual reporting requirements regarding the operating hours for any equipment that are operating under the proposed low-use extension. These requirements are added to allow ARB to maintain records on equipment operating under this extension.

In addition, this amendment would require that owners/operators notify ARB if engine operation exceeds 200 hours, and the owner/operator must stop operating the engine until it is brought into compliance with the in-use compliance requirements.

6. <u>Exempt Equipment at Low-Throughput Ports in Rural Areas - Section (l)</u>

Staff is proposing to add a paragraph to exempt from the entire CHE Regulation any CHE equipment operating at low-throughput ports located in rural areas. The port must be at least 75 miles from an urban area, as defined by the U.S. Census Bureau. (CB, 2010) An urban area is defined as containing 50,000 or more people. These values were chosen to represent a rural area. The port must have a two-year average annual throughput of less than one million tons excluding petroleum products. Petroleum products are excluded because they do not use CHE. The two-year average

annual throughput would be evaluated every year using the arithmetic average of throughput (as reported by the U.S, Army Corps of Engineers Waterborne Commerce Statistics Center) for the previous two years. A two-year average would be used to allow for an occasional high production year. The only California port that presently meets, and is expected to meet in the foreseeable future, these criteria is the Port of Humboldt Bay. If the two-year average annual throughput exceeds the limit of one million tons or the surrounding community's population grows to 50,000 or more then, within six month of the notification of exceeding the limit, the CHE owners/operators at the port would be required to submit a plan showing how they would come into compliance with the CHE Regulation within three years.

This amendment was needed for the Port of Humboldt Bay, the only California port that meets the throughput and location requirements. The North Coast and Humboldt Port Authority requested the exemption because compliance with the CHE Regulation would be economically infeasible for the businesses operating at the port. Additionally, the North Coast is in ozone attainment and does not contribute to any downwind ozone violations.

REFERENCES:

(CB, 2010) Federal Register, Department of Commerce, *Proposed Urban Area Criteria for the 2010 Census; Notice*, August, 2010.

IV. AIR EMISSIONS AND HEALTH IMPACTS FROM PROPOSED AMENDMENTS

This chapter presents the most recent emissions inventory for diesel-fueled cargo CHE engines operating at ports and intermodal rail yards in California, the emissions impacts of the proposed amendments, as well as a discussion on the potential health risks that may occur due to exposures to emissions from CHE.

A. Emissions from Cargo Handling Equipment

Since the original CHE emissions inventory was developed (ARB, 2005a), a number of new data sources became available. A revised 2006 CHE baseline emissions inventory has been developed using those new data sources. The new sources include:

- data associated with CHE regulatory reporting requirements,
- annual emission inventories developed for the ports of Los Angeles and Long Beach (2005 through 2009),
- emissions inventory for the Port of San Diego (2006),
- emissions inventory for the port of Oakland (2005), and
- rail yard health risk assessments (2005).

Baseline emission estimates of diesel PM and NO_x for the year 2006 were developed and emission projections to 2014 and 2020 were developed using estimates of expected growth, effects of the economic downturn, and equipment turnover. In addition, staff updated key assumptions about engine load and annual activity. These updates, as well as the impacts from the proposed amendments are presented below. Details of the emissions inventory methodology and data sources can be found in Appendix B. The updated inventory and emissions model, Cargo Handling Emissions Inventory Model, or CHEI, and the CHEI Working Files are posted on ARB's web site at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm. (ARB, 2011f), (ARB,2011o) Table IV-1 presents the equipment population at ports and intermodal rail yards used in the original 2005 inventory and the updated 2006 baseline inventory for CHE.

Table IV-1: Equipment Population for Baseline Inventory

Equipment Type	Original 2005 Inventory	Updated Inventory
Yard Tractor	2,441	2,368
Forklift	485	778
Container Handling Equipment	559	525
Crane	360 (All Cranes)	342 (RTG Only)*
Construction Equipment	135	195
Other General Industrial Equipment	46	164
Total	**4,026**	**4,372**

*Mobile cranes other than RTG cranes are now covered by either the Off-Road In-Use Equipment Regulation or the On-Road Truck and Bus Regulation.

As shown in Table IV-1, approximately 4,400 pieces of CHE were operating at ports and intermodal rail yards in California in 2006. Of these, approximately 55 percent are yard trucks.

Updated 2006 Baseline Emission Estimates for Diesel-fueled CHE

The updated statewide 2006 diesel PM and NO_x emissions inventory for cargo handling equipment are presented in Table IV-2. The updated 2006 baseline emission inventory for diesel-fueled CHE equipment is approximately 0.54 tons per day or 196 tons per year of diesel PM emissions and 13.4 tons per day of NO_x, statewide. Yard trucks make up the majority of the emissions, representing approximately 55 percent of the diesel PM emissions and 52 percent of the NO_x emissions for CHE. Combined, yard trucks, container handling equipment (top picks, sides picks, etc.), and cranes are responsible for approximately 85 percent of the emissions for all pollutants.

Table IV-2: Estimated Statewide 2006 Cargo Handling Equipment Emissions

Equipment Types	Updated 2006 Baseline Emissions (tons per day)	
	PM	NO_x
Construction Equipment	0.046	1.03
Container Handling Equipment	0.094	3.06
Forklift	0.032	0.56
Other General Industrial Equipment	0.030	0.54
RTG Crane	0.038	1.23
Yard Tractor	0.298	6.98
Totals	**0.538**	**13.4**

The ARB staff also updated the district-specific emissions associated with CHE. The allocation of these estimates is based on the location of the port or intermodal rail yard. Table IV-3 presents a district-by-district estimate of emissions from CHE for the 2006 baseline.

Table IV-3: Estimated 2006 Cargo Handling Equipment Emissions by District (tons per day)[8]

District	PM	NO_x
Bay Area AQMD	0.080	1.91
Yolo-Solano AQMD	0.001	0.02
San Diego County APCD	0.003	0.07
San Joaquin Valley Unified APCD	0.016	0.30
South Coast AQMD	0.436	11.06
Ventura County APCD	0.002	0.04
North Coast Unified AQMD	0.0009	0.02

Note: The following districts did not have emissions allocated to them; Amador, Antelope Valley, Butte, Calaveras, Colusa, El Dorado, Feather River, Glenn, Great Basin Unified, Imperial, Kern, Lake, Lassen, Mariposa, Mendocino, Modoc, Monterey Bay, Unified, Northern Sierra, Northern Sonoma, Placer, Sacramento, San Luis Obispo, Santa Barbara, Shasta, Siskiyou, Tehama, and Tuolumne. (The numbers may not match the statewide totals in Table IV-2 due to rounding.)

Projected 2014 and 2020 Emission Estimates for Cargo Handling Equipment

The updated baseline (without the CHE Regulation) projected emission estimates for the years 2014 and 2020 are presented in Table IV-4. These estimates are based on updated annual growth rates which have been adjusted to reflect the impacts of the recent economic downturn.

[8] The total emissions may vary slightly from the values shown in Table IV-2 due to rounding.

Table IV-4: Cargo Handling Equipment Engines Projected Year 2014 and 2020 Baseline Emission Estimates (Without the CHE Regulation)

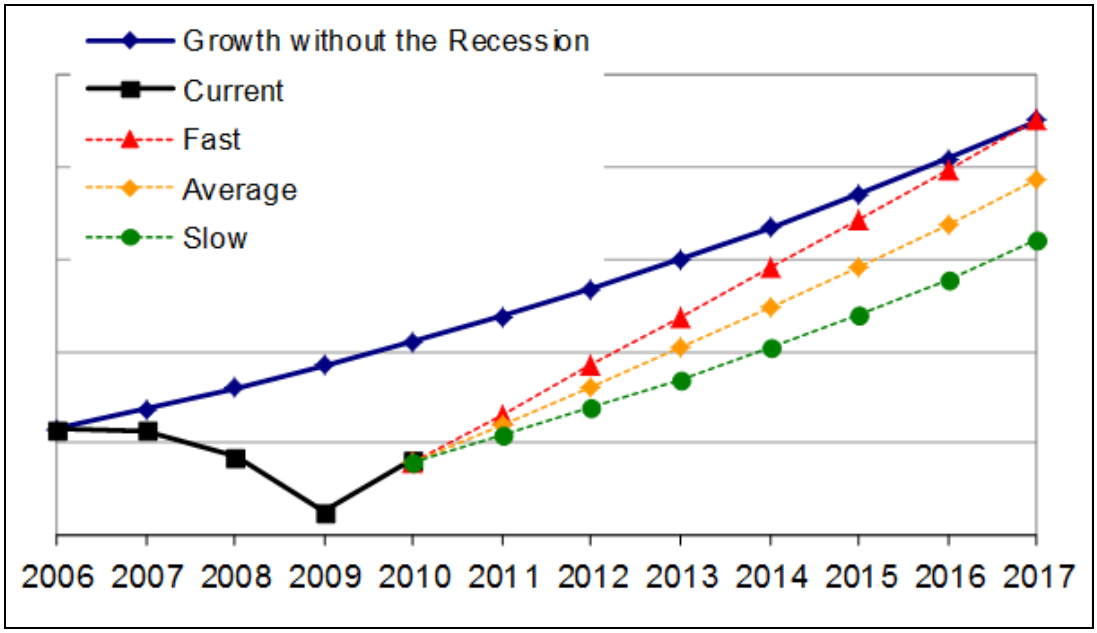
Equipment Types	2014 Emission, (tons per day)		2020 Emission, (tons per day)	
	Diesel PM	NO_x	Diesel PM	NO_x
RTG Cranes	0.03	0.93	0.02	0.71
Construction Equipment	0.04	0.86	0.04	0.78
Forklifts	0.03	0.45	0.02	0.41
Container Handling Equipment	0.07	1.97	0.05	1.32
Other General Industrial Equipment	0.02	0.42	0.02	0.38
Yard Trucks	0.11	2.65	0.04	1.08
Total	**0.30**	**7.3**	**0.20**	**4.7**

Values have been rounded

Projected Equipment Inventory Growth

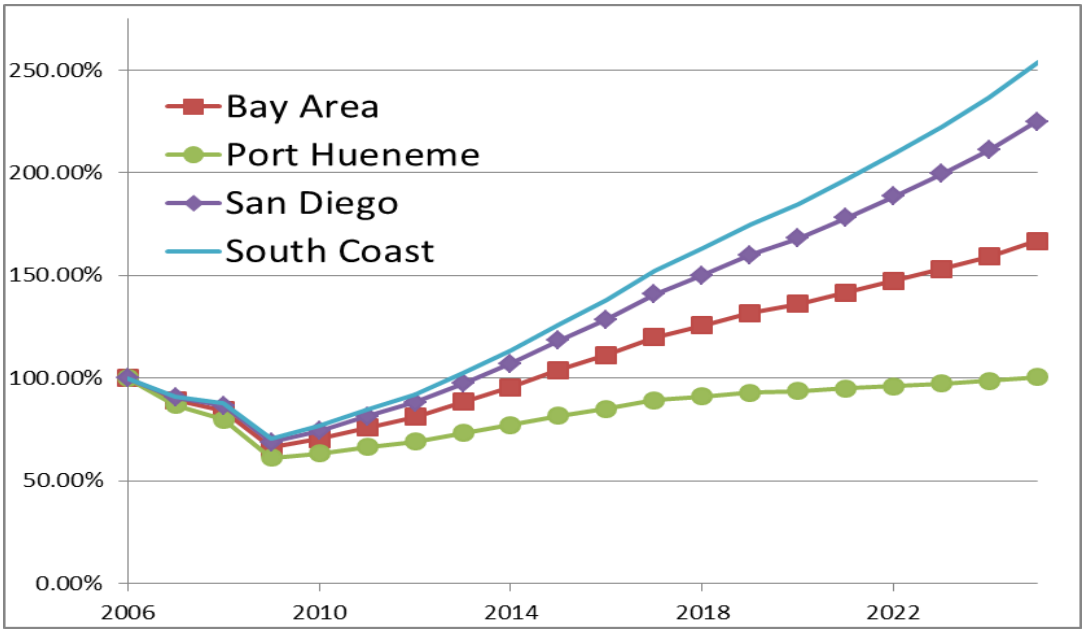
To forecast the impact of the recession on CHE activity, three recovery scenarios were considered to encompass the possible rates of growth of “fast”, “slow”, and “average”. These are shown in Figure IV-1. The fast recovery scenario assumes that total activity would return to projected historically average levels in 2017 and then grow at the historical average rate. For the slow recovery scenario, staff assumed that activity would be permanently depressed relative to historical levels, but continue to grow at historical rates. The average scenario is the average of the fast and slow scenarios. Given the uncertainty in forecasting emissions after such a deep recession, staff relied on the average recovery scenario. This scenario, for the years of interest for these regulatory amendments, was used for the recent ocean-going vessel regulation and is also supported by the most recent San Pedro Bay forecasts. The methodology is consistent with the On-Road Truck and Bus and Off-Road In-Use Equipment rules.

Figure IV-1: Economic Recovery Scenarios



The growth rates were aggregated according to ports and rail yards in the South Coast, San Diego, Bay Area, and Hueneme and are shown in Figure IV-2 below and in Appendix B. The growth rates are composed of two parts, the equipment inventory and equipment activity level. Staff assumed that both the equipment inventory and the equipment hours of use will increase, so the equipment inventory will grow at a factor less than this growth rate, with the increase in hours of use accounting for the remainder. The growth rates for the Bay Area and the South Coast range from 140 to 175 percent in 2020. The equipment inventory projections result in approximately a 140 percent growth compared to the 2006 inventory.

Figure IV-2: Growth Factors for California Ports

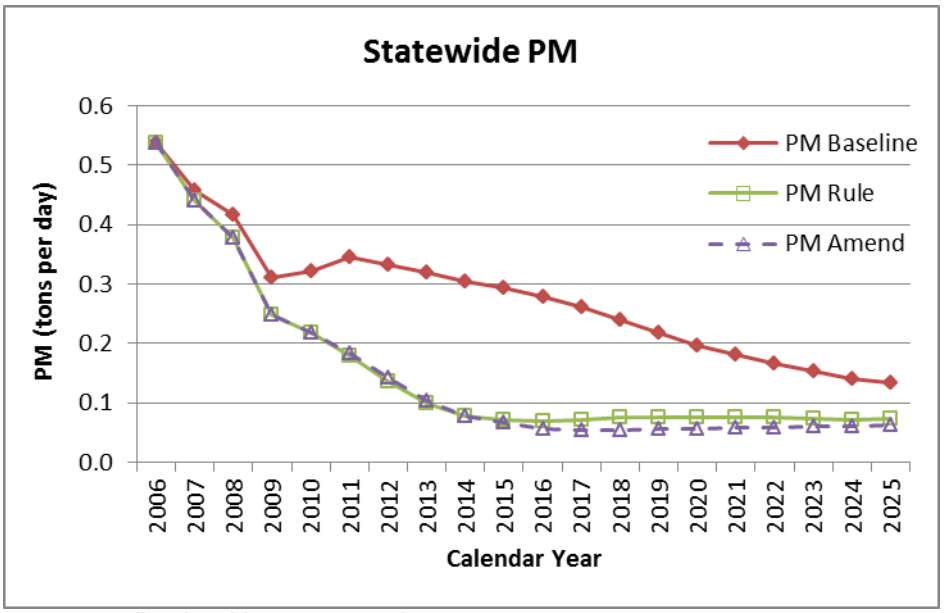


B. Emission Impacts from the Proposed Amendments

Statewide Emission Impacts from Proposed Amendments

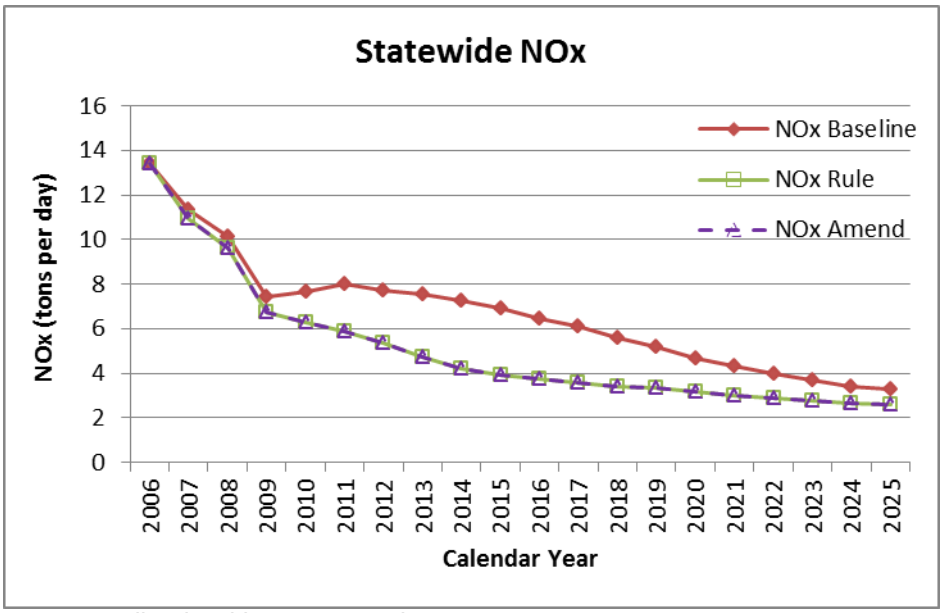
Staff estimated the projected emission impacts from the current adopted CHE Regulation and from the proposed amendments for both statewide PM and NO_x. The increased reductions in the years following the start of CHE Regulation implementation include benefits from the use of equipment retirement and replacement as the preferred compliance options used to date. Overall, we estimate a net impact of the amendments to be 5 percent more diesel PM reductions and 2 percent less NO_x reductions between 2012 and 2020 as compared to reduction estimates for the current rule. As seen in Figure IV-3 and IV-4, the proposed amendments will result in slightly less reductions of diesel PM and NO_x emissions in 2012 through 2016 than originally anticipated. This is due to the delay in emission reductions associated with the proposed low-use and the "No VDECS Available" extensions. However, other proposed amendments will result in slightly more reductions in diesel PM in 2015 and beyond. These additional PM reductions are due to the Tier 4 Alt PM Engine requirement to retrofit with VDECS after one year of in-use service. These retrofits reduce PM but do not provide a NO_x benefit.

Figure IV-3: Projected Statewide PM Emission Estimates from CHE



Note: Baseline is without CHE Rule

Figure IV-4: Projected Statewide NO_x Emission Estimates from CHE



Note: Baseline is without CHE Rule

A comparison of the Statewide emissions inventories for the 2006, 2011, 2014 and 2020 calendar years is provided in Table IV-5 below for the baseline, current adopted CHE Regulation (noted as "Rule"), and the proposed amendments. It is apparent from this table that the statewide emissions inventories for the amendments compared to the rule are the same within about 3 percent for each of the reported years. The exception is benefit of increased reduction in the PM inventory in 2020 due to the amendment to require the retrofit of Tier 4 Alt PM standard engines.

Table IV-5: Emissions Inventory Statewide (tons per day)

Statewide						
Calendar Year	PM (tons per day)			NO_X (tons per day)		
	Baseline*	Rule	Amendments	Baseline*	Rule	Amendments
2006	0.54	0.54	0.54	13.4	13.4	13.4
2011	0.35	0.18	0.19	8.0	5.9	5.9
2014	0.30	0.08	0.08	7.3	4.2	4.3
2020	0.20	0.08	0.06	4.7	3.2	3.1

*Without Rule

The inventories for the South Coast Air Basin and the San Francisco Air Basin are provided in Tables IV-6 and IV-7. The impacts on these two air basins are similarly very small.

Table IV-6: Emissions Inventory for South Coast Air Basin (tons per day)

South Coast Air Basin						
Calendar Year	PM (tons per day)			NO_X (tons per day)		
	Baseline*	Rule	Amendments	Baseline*	Rule	Amendments
2006	0.44	0.44	0.44	11.1	11.1	11.1
2011	0.28	0.15	0.15	6.6	4.9	4.9
2014	0.24	0.07	0.06	5.9	3.4	3.5
2020	0.15	0.06	0.05	3.7	2.6	2.5

*Without Rule

Table IV-7: Emissions Inventory for San Francisco Air Basin (tons per day)

San Francisco Air Basin						
Calendar Year	PM (tons per day)			NO_X (tons per day)		
	Baseline*	Rule	Amendments	Baseline*	Rule	Amendments
2006	0.08	0.08	0.08	1.9	1.9	1.9
2011	0.05	0.03	0.03	1.1	0.9	0.9
2014	0.05	0.01	0.01	1.1	0.7	0.7
2020	0.03	0.01	0.01	0.8	0.5	0.5

*Without Rule

The PM and NO_x emission reductions due to the current adopted CHE Regulation and the emissions reductions impacts due to the proposed amendments are tabulated for

the years 2006 through 2020 in Table IV-8 below. The total emission impacts from the proposed amendments are estimated to be a reduction of approximately 0.08 tpd of PM and a small increase of 0.4 tpd of NO_x, as seen in Table IV- 8 below. This is 5 percent additional PM reduction and 2 percent loss in NO_x benefits, as shown in Table IV-9 below. As seen in Table IV-8, the initial delay in PM reductions due to the additional two years of compliance extensions is recovered when the requirement to apply VDECS to the FEL engines becomes effective. Consequently, the net emissions impacts of these amendments over the 2012 to 2020 would be a small reduction in PM emissions and a slight increase in NO_x emissions compared to the original rule.

Table IV-8: Statewide Emission Reductions Attributable to the Existing CHE Regulation and Reductions Attributable to the Proposed Amendments

Calendar Year	Reductions Under the Rule (tons per day)		Reductions due to the Amendments (tons per day)	
	PM	NO_x	PM	NO_x
2006	0.00	0.00	0.000	0.00
2007	0.02	0.37	0.000	0.00
2008	0.04	0.55	0.000	0.00
2009	0.06	0.65	0.000	0.00
2010	0.10	1.37	0.000	0.00
2011	0.17	2.15	0.000	0.00
2012	0.19	2.34	-0.005	-0.13
2013	0.22	2.77	-0.004	-0.12
2014	0.23	3.07	-0.001	-0.13
2015	0.22	3.02	0.004	-0.11
2016	0.21	2.75	0.012	-0.05
2017	0.19	2.50	0.018	0.02
2018	0.16	2.17	0.020	0.05
2019	0.14	1.84	0.020	0.05
2020	0.12	1.50	0.019	0.05
Total	2.08	27.05	0.084	-0.37

Note: Positive numbers indicate emissions reduction. Negative numbers indicate emissions increase.

Table IV-9: Total PM Emissions Reductions and NO_x Emissions Increases Due to Proposed Amendments

Reductions	PM		NO_x	
	Tons	%*	Tons	%*
Emissions Reduced 2012 to 2020 (Tons)	31	5.0%	-135	-1.7%
Annual Average Reductions (Tons per Year)	3	5.0%	-15	-1.7%

*As compared to predicted reductions for current regulation from 2012 to 2020 of 616 tons of PM and 8,015 tons of NO_x

Emission Impacts on Port of Humboldt Bay

One of the proposed amendments will exempt small ports with a throughput of less than one million tons of cargo handled per year and which are located no closer than 75 miles to an urban area. The Port of Humboldt Bay is the only port in California meeting these requirements. While CHE at the Port would be exempt for the CHE Regulation, the equipment with off-road engines would then be subject to the ARB's Off-Road In-Use Regulation for diesel engines. The equipment with on-road engines would be subject to ARB's On-Road Truck and Bus Regulation. The total number of CHE at the Port of Humboldt Bay is small and the proposed amendment will have an insignificant environmental impact. (ARB, 2011n) Shown below in Table IV-10 are the potential estimated emission differences for the port due to the proposed amendments. The difference in the compliance requirements for the equipment is presented in detail in Chapter V on the economic impacts of the proposed amendments. These emissions increases represent less than a 0.5 percent increase in PM and NO_x emissions due to mobile sources in the North Coast, based on the Almanac Emissions Projection data published in 2009. (ARB, 2009) Additionally, this air district is in attainment of the State and federal ozone standards and does not contribute to violations of State or federal ozone standards for air districts downwind. Consequently, this is determined to be an insignificant emissions increase.

Table IV-10: Comparison of Port of Humboldt Bay Emissions Inventory: Subject to CHE Regulation Compared to Subject to Off-Road In-Use Equipment Regulation

Controlling Regulation	2006-2020 (tons per day)	
	PM	NO_x
Without Amendment: CHE Regulation	0.006	0.18
With Amendment: Off-Road In-Use Regulation	0.013	0.32
Total Potential Difference in Emissions	0.007	0.14

Greenhouse Gas Emission Impacts

The accelerated replacement of older technology engines occurring as a result of the CHE Regulation should reduce greenhouse gas emissions (GHG). However, some actions allowed by the proposed amendments could result in a slight delay in those reductions. Two of the proposed amendments allow CHE owners/operators to delay compliance with the regulation for a year or two, but that delay does not have a significant impact on projected emissions reductions. This is the case with emissions of GHGs as well. One of the amendments, the requirement for an opacity based maintenance program, could result in a reduction in soot levels from CHE. This amendment would require owners/operators to test the exhaust opacity of all their non-yard truck equipment annually. A check of engine opacity would alert mechanics to needed maintenance that would reduce exhaust soot levels contributing to the inventory of carbon black. Overall, these proposed amendments are not anticipated to result in any significant increase or decrease in GHG's. However there is potentially a small decrease in carbon black emissions.

C. Public Health Impacts from the Proposed Amendments

Reducing diesel PM emissions from CHE at ports and intermodal rail yards will have public health and environmental benefits. The proposed amendments will continue to reduce localized potential cancer risks associated with emissions from CHE and will continue to contribute to the reduction of the general exposure to diesel PM that occurs on a region-wide basis due to collective emissions from diesel-fueled engines. Additional benefits associated with the proposed amendments include further progress in meeting the ambient air quality standards for PM_{10}, $PM_{2.5}$, and ozone, and enhancing visibility.

The proposed amendments will result in a temporary delay in diesel PM reductions anticipated in 2011 through 2014 under the original rulemaking. However, the proposed amendments will provide additional reductions in PM in 2015 and beyond. The proposed amendments will also result in a small increase in NO_x emissions from 2012 through 2016 compared to the reductions estimated in the original rulemaking. Staff

does not expect any significant adverse health impacts due to the delay in diesel PM reduction or the projected increase in NO_x emission due to the very small magnitude of the emissions and the limited time period over which the emission "increase" will occur.

This section examines the exposures and potential cancer health risks associated with PM emissions from diesel-fueled CHE at ports and intermodal rail yards. This discussion is a brief recap of the discussion of potential exposures and risk presented in the ISOR for CHE Regulation in 2005. (ARB, 2005a) ARB staff believes that the results from the risk assessment presented in that ISOR remain substantially unchanged and are still applicable to the proposed amendments to the CHE regulation as only negligible emission impacts are expected before 2014 and increased emission reductions will occur after that year.

Exposures to Diesel PM

The diesel PM emissions from cargo handling equipment contribute to ambient levels of diesel PM emissions. Based on the updated emissions inventory for the 2006 baseline, there are about 4,400 pieces of diesel-fueled CHE operating at ports and intermodal rail yards in California. The majority of ports and intermodal rail yards are in urban areas and, in most cases, are located near where people live, work, and go to school. This results in exposures to diesel PM emissions from the operation of diesel-fueled cargo handling equipment.

Because analytical tools to distinguish between ambient diesel PM emissions from CHE and that from other sources of diesel PM do not exist, we are unable measure actual exposures to emissions from diesel-fueled cargo handling equipment. However, modeling tools have been be used to estimate potential exposures. In 2004, ARB staff used dispersion modeling to estimate the ambient concentration of diesel PM emissions that result from the operation of cargo handling equipment at the Ports of Los Angeles and Long Beach. The potential cancer risks from exposures to these estimated ambient concentrations of diesel PM were then determined. The complete results from this study and additional details on the methodology used to estimate the health risks are presented in Appendix C of the ISOR prepared for the CHE Regulation in 2005. Because the emission changes due to the proposed amendments were very small and of limited duration, staff did not find it necessary to do a new dispersion modeling analysis and health risk assessment.

The annual diesel PM emission changes due to the proposed amendments at the Ports of Los Angeles and Long Beach are shown in Table IV-6 (Emissions Inventory for South Coast Air Basin). As shown in the table, the annual percent change in diesel PM emissions due to the proposed amendments range from 1 to 2 percent of the annual emissions at the ports. A reasonable approximation of the change in potential cancer risk due to the changes would be on the same order as the percent change in emission. Thus, staff finds that the potential cancer risk impact of the proposed changes are not likely to result in a significant adverse health impact near the Ports of LA and Long Beach. And, by inference, the proposed changes will not have an adverse impact at

other ports since the greatest potential for adverse impacts are at these ports, based on the health risk assessments of the Ports of LA and Long Beach and for West Oakland. (ARB, 2006), (ARB, 2008)

REFERENCES:

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V. ECONOMIC IMPACTS FROM PROPOSED AMENDMENTS

In this chapter, we present the estimated costs, savings, and resulting economic impacts associated with implementation of the proposed amendments to the CHE Regulation. The costs and savings presented are the estimated incremental costs and savings associated with the proposed amendments relative to the costs under the original CHE Regulation, which is the cost of industry compliance with the current CHE Regulation.

A. Summary of Statewide Economic Impacts

ARB staff estimates that the proposed amendments will result in a net savings of approximately $1 to $2 million to industry between 2011 and 2020. The proposed amendments are listed in Table V-1 below with a notation as to whether they would result in costs or a savings. Only two of the proposed amendments are anticipated to result in additional costs whereas the others either result in savings or no impact. The estimated cost or savings associated with each amendment is also shown in Table V-1. The savings anticipated from several of the amendments are difficult to estimate with a high level of confidence due to uncertainty as to how often the action allowed by the amendment would be needed. However, estimates were made and the assumptions are discussed in this chapter. The total net savings corresponds to about $100,000 to $200,000 annually on average for the years 2011 through 2020, expressed in 2011 dollars.

Table V-1: Costs or Savings Associated With Proposed Amendments over Years 2011 through 2020 in 2011 Dollars

Amendment Description	Costs	Savings	Costs/(Savings) ($ millions)
1. Additional time for equipment with no VDECS available		X	($4.3)
2. Add safety as provision for no VDECS available extension			0
3. Low-use compliance extension		X	($3.3)
4. Exempt equipment at low-throughput ports in NO_x-exempt areas not within 75 miles of an urban area		X	($1.0)
5. Require CHE opacity testing and set maximum allowable levels	X		$2.1 to $3.1
6. Allow demonstration of emissions equivalency		X	
7. Non-yard truck equipment transfers		X	($1.4)
8. Manufacturer delays for new equipment			0
9. Warranty engine replacement		X	
10. Treat Tier 4 engines certified to FEL Alt PM emissions standards as Tier 3 engines	X		$6.0
11. Add flexibility to extension for experimental diesel PM emissions control		X	0
12. Allow compliance schedule swapping	NA*	NA*	0
Net Costs/(Savings)		X	($1) to ($2)

*Not applicable

B. Legal Requirements

In this section, we explain the legal requirements that must be satisfied in analyzing the economic impacts of the proposed amendments.

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation of, and the ability of California business to compete with businesses in other states.

Also, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance (DOF). The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

In addition, Health and Safety Code section 57005 requires the ARB to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding 10 million dollars in any single year. The criterion of exceeding 10 million dollars in cost is not met for the proposed amendments. However, we have conducted an economic analysis of two alternatives to the proposal.

C. Methodology

In this section, ARB staff describes the methodology used to estimate the economic impacts from the proposed amendments. The methodology is based on an approach similar to that used when estimating the costs associated with the original 2005 rulemaking.

As mentioned previously, while a majority of the proposed amendments will provide a savings to affected industries, there is uncertainty in how often situations utilizing some of these amendments would arise. The assumptions used to estimate the frequency of these occurrences are presented in the following section.

The costs or saving for each amendment was based on an evaluation of the action allowed by the amendment and estimating the cost or savings. Some amendments allow a delay in capital expenditure whereas others allow an avoidance of capital expenditure. In cases where costs are delayed, the savings is based on the capital expenditure and the cost of money for that expenditure over the delay time period. The cost of money is based on a real annual interest rate of 5 percent.

Capital costs for purchasing equipment and retrofit costs were based on costs for similar off-road equipment used in the cost analysis for the Off-Road In-Use Equipment Regulation. (ARB, 2010a) The costs for the purchase of RTG cranes were based on

costs generated for the original CHE Regulation rulemaking. The equipment purchase costs include a premium cost for Tier 4 engines, as developed for the Off-Road In-Use Equipment Regulation, where it would be anticipated that Tier 4 engines would be purchased.

The costs and savings were estimated as future costs in 2011 dollars and then converted to present value dollars. A real interest rate of 5 percent was used for this evaluation.

All costs and savings were compared in present value dollars. This was calculated using the following equation:

Present Value = Future Cost x $1/(1+i)^n$
where i = real interest rate and n = future date – 2011.

The cost estimate for each amendment is discussed in the following section. More detailed information on the cost estimations can be found in Appendix C. Worksheets with the calculations for the economic analysis are posted on ARB's web site at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm. (ARB, 2011g)

D. Costs and Savings Estimated To Result From Proposed Amendments

The following paragraphs provide an explanation of the estimated costs and savings for each amendment listed in Table V-1 above.

1. Additional time for equipment with no VDECS available

This proposed amendment would allow an additional two years of annual compliance extension for in-use non-yard truck equipment for which there are currently no VDECS available. The regulation currently allows two years of annual compliance extension, and requires the in-use equipment to be brought into compliance by repower, replacement, or retirement if there are still no VDECS available when the current two-year extension period expires.

This proposed amendment would allow manufacturers more time to develop VDECS for a wider range of CHE engines. As more VDECS become available, there is more opportunity for owners/operators to comply with the regulation by retrofitting non-yard truck equipment rather than replacing.

This proposed amendment delays the owner/operator's capital expenditure of either replacing the engine or equipment or installing a retrofit. This would save owners/operators the time value of the capital expenditure over two years. The savings was estimated by comparing the cost to replace or retrofit the equipment at the end of the initial two years extension to the cost at the end of the additional two year extension, all in 2011 dollars. This is shown in Table V-2 below. It was assumed that equipment

that would be required to comply in 2011 would become eligible for the two additional year extensions once the Board approves the amendments.

It was estimated that about 300 pieces of equipment would be eligible for these additional two years of compliance extension based on the history of the equipment that have been granted extensions in the past and an evaluation of possible safety criteria. It is assumed that at the end of the second two years of extension some of the equipment would be replaced and some would be retrofitted to achieve compliance, depending on the type and age of the equipment.

In order to determine the cost savings, assumptions had to be made as to whether equipment would be retrofitted or replaced at the end of the extension. It was assumed that the equipment would not be retired based on the large numbers of equipment that have already been retired due to the current recession. The compliance path for container handling equipment, construction equipment, and general industrial equipment (approximately 20 percent of the CHE identified for this extension) was assumed to be that half of the equipment would be retrofitted and half of the equipment replaced. The compliance path for forklifts (approximately 80 percent of the CHE identified for this extension) was assumed to be that 10 percent would be retrofitted and 90 percent replaced. These assumptions were based on observed industry practices. Forklifts generally have low residual value near the end of their useful life and it is more cost effective to replace them rather than to retrofit. This analysis is provided in more detail in Appendix C, Table C-4.

Table V-2: Savings from Delayed Expenditure Due to Additional Two Years of "No VDECS Available" Amendment

Year	Equipment Eligible for "No VDECS Available" Extension	Compliance Cost Without Amendment*		Compliance Cost at End of Extension*		(Savings)* Present Value
		Future Cost in 2011 Dollars	Present Value	Future Cost in 2011 Dollars	Present Value	
2011	13	$2,770,000	$2,770,000	-		($260,000)
2012	42	$6,810,000	$6,480,000	-		($600,000)
2013	82	$13,860,000	$12,570,000	$2,770,000	$2,510,000	($1,170,000)
2014	88	$14,710,000	$12,710,000	$6,810,000	$5,880,000	($1,180,000)
2015	87	$14,500,000	$11,930,000	$13,860,000	$11,400,000	($1,110,000)
2016		-		$14,710,000	$11,530,000	
2017		-		$14,500,000	$10,820,000	
2018		-		-		
Total	312	$52,650,000	$46,462,000	$52,650,000	$42,140,000	($4,320,000)

*Values have been rounded

A savings of approximately $4.3 million, in present value dollars, was estimated for the 312 pieces of equipment that are expected to qualify for this extension.

2. Add safety as a provision for evaluating VDECS availability

This proposed amendment would add language specific to safety considerations to the current “No VDECS Available” extension. This is a clarifying amendment and does not provide additional cost savings.

3. Low-use compliance extension

Adding a two year compliance extension for equipment that operate 200 hours per year or less would result in savings for owners/operators who keep back-up CHE for use when other equipment is out of service for maintenance. The number of extensions per fleet would be limited.

This proposed extension would save owners/operators the delayed cost of either retrofitting this equipment or purchasing a new piece of equipment for back-up operation. It was estimated that 176 pieces of equipment would be eligible for this extension. This was based on data from a survey of operators with low-use equipment. Assumptions for retrofit or replacement were similar to those made for the additional two years of compliance extension for equipment without VDECS available discussed in section 1. above. The cost to bring this equipment into compliance at the original compliance date was compared to the cost to bring it into compliance after the two-year extension. The cost savings are shown in Table V-3.

The savings due to the delayed compliance costs for these 176 pieces of equipment are summarized in Table V-3 below. Compliance costs for this equipment would have occurred in 2011 through 2013.

Table V-3: Savings from Delayed Expenditure Due to Low-Use Amendment

Year	Equipment Eligible for Low-Use Extension	Compliance Cost Without Amendment*		Compliance Cost at End of Extension*		(Savings)* Present Value
		Future Cost in 2011 Dollars	Present Value	Future Cost in 2011 Dollars	Present Value	
2011	86	$15,790,000	$15,790,000			($1,470,000)
2012	57	$12,350,000	$11,760,000			($1,090,000)
2013	33	$8,910,000	$8,080,000	$15,790,000	$14,320,000	($750,000)
2014				$12,350,000	$10,670,000	
2015	8			$8,910,000	$7,330,000	
2016						
2017						
2018						
Total	176	$37,050,000	$35,630,000	$37,050,000	$32,320,000	($3,310,000)

*Values have been rounded

A savings of approximately $3.3 million in present value dollars was estimated based on delaying the expenditure of capital for two years. Details are summarized in Appendix C.

4. Exempt equipment at low-throughput ports not within 75 miles of an urban area

The savings associated with the proposal to exempt equipment at small rural ports was estimated based on an analysis of the equipment at the Port of Humboldt Bay. The Port of Humboldt Bay is the only port that meets the criteria for this exemption. An inventory of equipment was generated based on a survey of the companies either operating or planning to operate at the port. Two compliance plans were generated, one for compliance with the CHE Regulation and another for if the equipment were exempted and become subject to the Off-Road In-Use Equipment Regulation. The net present value of the compliance costs for each scenario was estimated in 2011 dollars and compared to determine the cost savings.

There are currently 17 non-compliant pieces of equipment at this port, either operating or planning to operate in the future, as shown in Table V-4 below. These equipment are from three different fleets, identified as fleets A, B, and C in the table. Under the proposed amendment, this equipment would become subject to either the Off-Road In-Use Equipment or On-Road Truck and Bus Regulation, depending on if the equipment has an on-road or an off-road engine. An analysis of the equipment indicated that 16 pieces of equipment would fall under the Off-Road In-Use Equipment Regulation and one (a dump truck with an on-road engine) would fall under the On-Road Truck and Bus Regulation.

Table V-4: Cost Savings for Small Port Equipment Exemption

Fleet	Equipment	Engine Model Year	Max. Horse-power	CHE Compliance***			Off-Road Compliance***		
				Year	Cost in 2011 Dollars	Present Value	Year	Cost in 2011 Dollars	Present Value
A	Loader	1981	200	2011	$177,000	$177,000	2021	$177,000	$109,000
A	Loader	1981	375	2012	$317,000	$302,000	2022	$317,000	$185,000
A	Loader	1982	200	2011	$177,000	$177,000	2025	$177,000	$90,000
A	Loader	1987	215	2012	$189,000	$180,000	2026	$189,000	$91,000
B	Loader	1995	235	2011	$205,000	$205,000	2021	$205,000	$126,000
B	Loader	1987	410	2012	$354,000	$340,000	2022	$354,000	$209,000
B	Loader	2003	180	2011	$25,000	$25,000	N/A**	0	0
B	Loader	1990	250	2013	$217,000	$197,000	2028	$217,000	$95,000
B	Loader	1973	170	2011	$147,000	$147,000	2019	$147,000	$100,000
C	Loader	1981	375	2012	$317,000	$302,000	2019	$317,000	$214,000
C	Loader	2004	260	2011	$25,000	$25,000	N/A**	0	0
C	Log Loader	2005	135	2013	$18,000	$16,000	N/A**	0	0
C	Bulldozer	2003	120	2011	$18,000	$18,000	2028	$153,000	$67,000
C	Bulldozer	1985	300	2012	$370,000	$352,000	2022	$370,000	$216,000
C	Backhoe	2003	85	2011	$18,000	$18,000	2028	$73,000	$32,000
C	Dump Truck*	1996	400	2011	$15,000	$15,000	2012	$15,000	$14,000
C	Fork Lift	1990	120	2011	$84,000	$84,000	2027	$84,000	$51,000
Total Fleet Cost (2011 dollars)				$2,580,000			$1,599,000		
Total Savings Under Off-Road vs. CHE Regulation							($981,000)		

* The dump truck has an on-road engine and therefore would be subject to On-Road Truck and Bus Regulation.

** These pieces of equipment are not required to retrofit because the fleet meets its fleet average target and/or has sufficient BACT carry-over retrofit credit under the Off-Road In-Use Equipment Regulation.

*** Values have been rounded

A comparison of the capital costs to bring equipment at the Port of Humboldt Bay into compliance with the CHE Regulation versus the Off-Road In-Use Equipment Regulation is provided in Table V-4 above. The compliance dates required under each of the regulatory scenarios is given for each piece of equipment in the table. A compliance cost was estimated for each piece of equipment. Each compliance cost was then converted to present value using a 5 percent rate. A summation of the costs in 2011 dollars was made to compare the costs under the two scenarios. The following paragraphs describe the different compliance paths.

For compliance with the CHE Regulation, it was assumed that equipment with off-road engines of 1996 model year and older would be replaced after obtaining a two-year compliance extension, and that these engines would not be repowered or retrofitted. It was assumed that VDECS will be available for engines that are Tier 1 or newer (model year 1996 or newer). Most of the CHE in the identified Port of Humboldt Bay fleets have engines with 1970s and 1980s model years. These equipment were assumed to

be replaced. The five pieces of equipment that are model years 2003 to 2005 were assumed to be retrofitted.

The Off-Road In-Use Equipment Regulation is a fleet rule that requires certain non-compliant engines to be replaced or retrofitted beginning in 2019 through 2028, depending on the model year of the engine. The net effect of exempting this equipment from the CHE Regulation and allowing them to comply with the Off-Road In-Use Equipment Regulation would be to delay bringing these pieces of equipment into compliance 7 to 16 years beyond the dates specified in the CHE regulation. All of the equipment under the Off-Road In-Use Equipment Regulation were assumed to be replaced for compliance. This was because the equipment would all be over 25 years old by the time that they were required to comply. Additionally, one of the fleet rule provisions exempts three of the newest engines (model years 2003, 2004 and 2005) from compliance requirements, which would otherwise be scheduled for 2028. The one piece of equipment with an on-road engine, the dump truck, would be required to be retrofitted in 2012 under the On-Road Truck and Bus Regulation.

In summary, compliance costs for the 17 pieces of equipment would be a total of $2.6 million in 2011 dollars under the CHE Regulation. Under the Off-Road In-Use Regulation, the expenditures during 2019-2028 total $1.6 million in present value dollars. The difference is a cost savings to the owners/operators of $981,000 in present value dollars.

5. Require CHE opacity monitoring

This proposed amendment would require annual opacity monitoring of the engine-out exhaust for all CHE engines. Tests for equipment retrofitted with VDCES could be scheduled for when the VDECS is removed for cleaning and inspection. This amendment would result in incremental costs to owners/operators.

Owners/operators may opt to purchase the test equipment and train their mechanics to test the equipment themselves or to hire consultants to test the equipment.

The costs for in-house testing would include an initial capital investment of purchasing the test meter and training the mechanics to perform the tests in addition to the yearly cost to test each engine. Training costs include the class tuition plus the labor cost for the mechanics to attend class. Two one-day (eight-hour) classes are required for certification in the test procedure. Labor rates are estimated at $100 per hour. The tuition for the training classes is $175 per one-day class. The training costs are summarized in Table V-5 below. The total cost for training is estimate to be $1,950 per mechanic.

Table V-5: Opacity Test Training Costs

Cost Category	Cost	Required	Cost for two 8-hour classes
Class tuition	$175/class	2 classes	$350
Labor rate	$100/hour	16 hours	$1,600
Total costs			$1,950

ARB staff assumed that each terminal would train two mechanics. It was assumed that there would be approximately 140 terminals and rail yards based on the initial number of facilities that reported under the CHE Regulation in 2005. Consequently, the total training costs for industry would be $546,000, as presented in Table V-6.

Table V-6: Opacity Test Training Cost for Two Mechanics at 140 Facilities

Cost for two 8-hour classes	Mechanics Per Terminal	Number of Facilities	Training Cost
$1,950	2	140	$546,000

ARB staff estimated the cost for an opacity meters at approximately $5,500 each based on the experience of the ARB staff performing the opacity correlation study. It was assumed that each of the 140 terminals and rail yards would purchase a meter for a total industry cost of $770,000.

The total initial cost for training mechanics and purchasing opacity meters for each of the approximately 140 terminals and rail yards is $1.3 million as summarized below in Table V-7.

Table V-7: Initial Statewide Costs for Mechanic Training and Opacity Meters

Cost Category	Initial Cost*
Mechanic Training	$546,000
Opacity Meters	$770,000
Total Initial Cost	$1,316,000
Total Initial Cost, 2011$	$1,253,000

*Values have been rounded

Testing an engine is estimated to take approximately 30 minutes. At a labor rate of $100/hour, this results in a cost of $50 per engine per year. The total estimated fleet cost is summarized In Table V-8 below:

Table V-8: Statewide Costs for Terminal Mechanics to Conduct Opacity Tests

Calendar Year	Non-Yard Truck Engines	Yard Trucks Engines	Total Engines	Mechanic Testing Cost Per Year*	
				Cost in 2011 Dollars	Present Value
2012	1,585	2464	4,049	$202,000	$193,000
2013	1606	2502	4,108	$205,000	$186,000
2014	1707	2660	4,367	$218,000	$189,000
2015	1841	2853	4,694	$235,000	$193,000
2016	1979	3042	5,021	$251,000	$197,000
2017	2137	3256	5,393	$270,000	$201,000
2018	2256	3419	5,675	$284,000	$202,000
2019	2383	3590	5,973	$299,000	$202,000
2020	2487	3732	6,219	$311,000	$200,000
Total					$1,763,000

*Values have been rounded

The total estimated costs for terminals or rail yards to perform the opacity testing in-house would be the sum of the initial capital costs of $1.2 million plus the recurring cost of testing of $1.8 million dollars for a total of $3.1 million in present value dollars.

The industry cost for opacity testing was also estimated based on consultant costs for testing. Consultant costs to run opacity tests range from $30 to $60 per engine. ARB staff used the higher value of $60 per engine to estimate the opacity test costs of about $2 million in present value dollars over the 2012 to 2020 period, as summarized in Table V-9 below:

Table V-9: Cost for Consultants to Conduct Opacity Tests

Calendar Year	Non-Yard Truck Engines	Yard Trucks Engines	Total Engines	Consultant Testing Cost Per Year*	
				Cost in 2011 Dollars	Present Value
2012	1,585	2464	4,049	$243,000	$231,000
2013	1606	2502	4,108	$246,000	$224,000
2014	1707	2660	4,367	$262,000	$226,000
2015	1841	2853	4,694	$282,000	$232,000
2016	1979	3042	5,021	$301,000	$236,000
2017	2137	3256	5,393	$324,000	$241,000
2018	2256	3419	5,675	$340,000	$242,000
2019	2383	3590	5,973	$358,000	$243,000
2020	2487	3732	6,219	$373,000	$241,000
Total					$2,116,000

*Values have been rounded

Opacity testing costs are estimated to range from $2.1 to $3.1 million in present value dollars, based on the costs for terminals or rail yards to hire a consultant for the testing or the cost to perform the tests themselves.

Engines with monitored opacity levels greater than the limit consistent with their certification level would be required to be repaired. However, this repair cost would not result in additional costs as this would be maintenance required to keep the engine well maintained to operate as originally designed and certified.

6. Allow demonstration of emissions equivalency

Allowing owners/operators to purchase new technology that uses engines that can be demonstrated to achieve the applicable new or in-use emissions limits could possibly result in cost savings to the owners/operators. This proposed amendment would allow flexibility to owners/operators to use hybrid systems developed with Tier 3 engines which could result in fuel cost savings in the long term. Any economic impact is expected to result in savings by virtue of reducing fuel cost over the engine life in excess of any voluntary initial capital investment. These savings are not anticipated to be significant.

7. Non-yard truck equipment transfers

Allowing owners/operators to move their non-yard truck equipment from port-to-port or rail yard-to-rail yard to provide operational flexibility will eliminate the need to purchase redundant equipment. This would result in a savings. The savings to industry would depend upon the number of transfers requested, the cost to purchase the equipment, and transportation costs if the equipment were moved.

The cost savings is estimated to be the difference between the cost to purchase a new piece of equipment and the cost to transport the equipment. ARB staff assumed a purchase cost of approximately $200,000 based on current population of equipment and current replacement costs. The transportation costs would depend on the type and size of equipment and the distance between terminals. The transportation cost could be significant. It is reasonable to assume that an owner/operator would not transfer older equipment if the transfer costs were more than 50 percent of the purchase price. Therefore, ARB staff assumed that transportation costs were 50 percent of the purchase cost, or $100,000 per piece of equipment transferred.

ARB staff assumed that two pieces of equipment are required to be moved each year, over the period from 2012 to 2020. This estimate was based on the assumption that there would be some need for transfers but that it would not be excessive. These transfers are estimated to result in a net savings of $200,000 per year as summarized in Table V-10 below. The total savings, in present value dollars, would be $1.4 million.

Table V-10: Savings Due to Equipment Transfer

Calendar Year	Annual Transfers	Transfer Cost*	Purchase Cost*	(Savings)* in 2011 Dollars	(Savings)* Present Value
2012	2	$200,000	($400,000)	($200,000)	($190,000)
2013	2	$200,000	($400,000)	($200,000)	($181,000)
2014	2	$200,000	($400,000)	($200,000)	($173,000)
2015	2	$200,000	($400,000)	($200,000)	($165,000)
2016	2	$200,000	($400,000)	($200,000)	($157,000)
2017	2	$200,000	($400,000)	($200,000)	($149,000)
2018	2	$200,000	($400,000)	($200,000)	($142,000)
2019	2	$200,000	($400,000)	($200,000)	($135,000)
2020	2	$200,000	($400,000)	($200,000)	($129,000)
Total					($1,421,000)

*Values have been rounded

8. Manufacturer delays for new equipment

This proposed amendment would allow owners/operators who are awaiting the delivery of newly purchased compliant equipment to rent equipment that does not meet current standards for up to six months or until the newly purchased equipment is delivered. This amendment would not result in any costs or savings to the owner/operator.

9. Warranty engine replacement

This proposed amendment would allow the replacement of an engine under warranty with the same engine type in cases of premature engine failure, even when newer engine standards are in place. This would result in a savings to owners/operators. Owners/operators would save the capital cost to acquire a new engine meeting the new emissions standards. However, as the number of engines expected to fail during the warranty is small, this savings is not expected to be significant.

10. Treat Tier 4 engines certified to Alt PM emissions standards as Tier 3 engines

This proposed amendment would require Tier 4 engines certified to FEL Alternate PM (Alt PM) emission standards to be retrofitted with highest level VDECS within one year of acquisition. The FEL Alt PM emissions standards are essentially the same as Tier 3 PM emission standards and do not require the use of original engine manufacturer diesel particulate filters to meet them.

Engine manufacturers are allowed to certify a maximum of 20 percent of their U.S. production to the FEL Alt PM emission standards. Staff was unable to determine what portion of these engines would be delegated to cargo handling equipment. Therefore, it was assumed that 20 percent of all new CHE engines will be certified to the FEL Alt PM emission standards. This resulted in an estimated 224 FEL engines.

The cost for 224 FEL engines to be retrofitted with VDECS was estimated based on the cost as a function of engine horsepower. For this calculation, staff used the distribution of engine sizes predicted by the emissions inventory model for the 224 engines. A summary of the estimated costs per year is provided in Table V-11 below. Details of this calculation are provided in Appendix C. The cost to retrofit was estimated to be $7.0 million. This cost would be incurred during the 2012 to 2015 calendar years. This cost is estimated to be $6.0 million in present value dollars.

Table V-11: Cost for VDECS Retrofits for FEL Alternative PM Engines

Year	Number of FEL Engines	Cost to Retrofit* in 2011 Dollars	Present Value*
2011			
2012	32	$1,070,000	$1,019,000
2013	34	$1,110,000	$1,012,000
2014	56	$1,760,000	$1,521,000
2015	53	$1,640,000	$1,348,000
2016	49	$1,460,000	$1,142,000
2017			
2018			
Total	224	$7,040,000	$6,042,000

*Values have been rounded

Only the initial cost to retrofit is being included for this estimate. Any VDECS maintenance costs would be similar to maintenance costs incurred if an owner/operator was to purchase a Tier 4 certified to the non-FEL standards. As such, these costs were included in the costs associated with the current CHE Regulation.

The emissions benefit of this proposed amendment is tabulated by year in Appendix C. The total benefit for retrofitting the 224 engines was estimated to be a total of 48 tons over the 2012 to 2020 time period. This benefit results in a cost-effectiveness of $63 per pound of PM with all costs attributed to the PM reduction.

The cost to retrofit FEL engines may be an avoidable cost as owners/operators may request engines certified to the non-FEL Tier 4 standards in order to avoid the need to retrofit.

11. Add flexibility to the extension for experimental diesel PM emissions control

This proposed amendment would provide additional compliance flexibility by allowing extensions for use of experimental strategies for non-yard truck equipment when needed to generate information for verification regardless of whether or not there are VDECS available. This proposed amendment would enable the verification of additional control technologies and may result in cost savings. However, these cost savings are not anticipated to be significant.

12. Allow compliance schedule swapping

This proposed amendment would allow CHE owners/operators to modify their non-yard truck compliance schedules such that older model year engines (that happen to have later compliance dates) are brought into compliance in place of newer model year

engines (that are required to comply earlier). The number of engines required to comply each year would remain the same. There is not anticipated to be any cost or savings associated with this amendment.

E. Estimated Costs to Businesses

In this section, we summarize the costs, savings, and economic impacts on businesses. ARB staff estimated that while the proposed amendments would result in both costs and savings to businesses, the overall total statewide impact on businesses would be a net savings of $1 to $2 million in present value dollars. The annual net cost savings range from $100,000 to $200,000 over the time period of 2011 to 2020.

It would be expected that the costs and savings associated with the different proposed amendments would impact the different sectors of the industry in a relatively uniform manner. The one exception to this would be the proposed amendment to exempt small rural ports. The approximately $1 million savings associated with this amendment would impact only those businesses operating at the Port of Humboldt Bay.

A summary of the estimated year by year estimated costs is presented in Table V-12 below. Both the minimum and maximum cost estimates are shown for the opacity monitoring program.

Table V-12: Summary of Annual Costs/(Savings) Resulting from Proposed Amendments (Present Value)

Year	Additional 2 Years for VDECS*	Low-Use Extension*	Small Rural Ports Off-Road*	Require Opacity Monitoring		Non-Yard Truck Transfers*	Allow Tier 4 FEL Engines*
				Minimum*	Maximum*		
2011	($257,000)	($1,468,000)	($303,000)				
2012	($603,000)	($1,094,000)	($560,000)	$231,000	$1,446,000	($190,000)	$1,019,000
2013	($1,169,000)	($751,000)	($118,000)	$224,000	$186,000	($181,000)	$1,012,000
2014	($1,181,000)			$226,000	$189,000	($173,000)	$1,521,000
2015	($1,109,000)			$232,000	$193,000	($165,000)	$1,348,000
2016		-		$236,000	$197,000	($157,000)	$1,142,000
2017				$241,000	$201,000	($149,000)	
2018				$242,000	$202,000	($142,000)	
2019				$243,000	$202,000	($135,000)	
2020				$241,000	$200,000	($129,000)	
Total	($4,319,000)	($3,313,000)	($981,000)	$2,116,000	$3,016,000	($1,421,000)	$6,042,000

* Values have been rounded

Costs to a Typical Business

Cost impacts on businesses that operate at ports or intermodal rail yards, and have diesel powered cargo handling equipment, will vary depending on the age, number, and type of equipment operated.

While the costs associated with an opacity-based maintenance program are fairly predictable for a typical business, the savings provided by the additional two years of extensions for equipment with the proposed “No VDECS Available” or low-use equipment amendments, or savings due to the flexibility to move equipment when business needs arise, are less predictable.

Additionally, the cost to retrofit Tier 4 engines certified to the FEL Alt PM standards may be an avoidable cost. Armed with the knowledge that Tier 4 engines certified to the FEL Alt PM standards will need to be retrofitted, owners/operators may be able to specify an engine that meets the non-FEL standards when purchasing equipment.

The assumptions made to determine estimated costs for a typical business are discussed in the following paragraphs. A typical port container terminal, evaluated for the initial CHE Regulation rulemaking, was selected as a typical business to evaluate. Costs and savings associated with the proposed amendments are tabulated in Table V-13 below for this typical business.

Savings from the proposed No VDECS available and the low-use equipment extensions as well as costs for the proposed FEL engine amendment would be expected to impact this business. While smaller business would not be expected to benefit from the proposed non-yard truck equipment transfers amendment, a container terminal with 77 pieces of equipment may benefit from this amendment. The number of low-use engines was limited to no more than two per business based on the option for ARB to limit the use of this extension.

The estimated equipment that could be affected by the amendments and associated costs and savings are shown in Table V-13 below. As discussed in the section on opacity costs above, the cost for opacity monitoring was estimated assuming compliance in two different ways. The first way is for terminals and rail yards to purchase the opacity measurement device and train employees to perform the monitoring. The other way is to hire a third party consultant to monitor the engines annually. Using in-house employees to monitor engines results in a higher initial cost, but slightly lower on-going costs of $50 per engine tested. The initial cost of purchasing an opacity meter and training two employees is estimated at $9,400. Hiring a third party was assumed to cost $60 per engine test. For the opacity testing, the typical container terminal business would be anticipated to purchase the opacity measurement device and train employees to perform this function, which results in a higher initial cost, but a slightly lower opacity test cost of $50 per engine per year.

Table V-13: Estimated Costs and Savings for Typical Businesses in 2011 Dollars Over 2011 to 2020 Time Period

Business	Typical Container Terminal*
Total Inventory	77
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	4
# Low-Use	2
# Equipment Transfers	1
# FEL engines	4
Costs/(Savings) from 2011 to 2020	
No VDECS	($55,000)
Low-Use	($38,000)
Equipment Transfers	($79,000)
FEL engine	$108,000
Opacity	$44,000
Total	**($20,000)**

* Values have been rounded

The net impact on a typical business over the 2011 through 2020 time period is predicted to be a net savings ranging of $20,000. These costs and savings include both capital and on-going operation and maintenance (O&M) costs. The annual ongoing O&M costs for a typical business are based on the required opacity monitoring. The annual ongoing O&M costs for this typical business are $3,850 per year.

Small Business Costs

Staff estimated the costs and savings for small business associated with the proposed amendments. A survey conducted for the original rulemaking estimated that a typical small business has an average of 11 CHE. The cost for a typical small business was based on this.

For a small business, savings from the proposed non-yard truck equipment transfers amendment are not applicable. However savings from the proposed No VDECS available and the low-use equipment extensions as well as costs for the proposed FEL engine amendment would impact these businesses. The estimated equipment affected by these amendments and associated costs and savings are shown in Table V-14 below. For the typical small business with 11 pieces of equipment it was assumed that it would have two pieces of equipment impacted by the proposed No VDECS available extension and one piece each impacted by the proposed low-use extension and the proposed FEL engine amendment. Small business may have more need for these extensions due to their more limited resources. The opacity monitoring is estimated to

cost $60 per equipment per year. These costs are shown for the 2011 to 2020 time period in Table V-14.

Table V-14: Estimated Costs and Savings for Typical Small Businesses in 2011 Dollars Over 2011 to 2020 Time Period

	Typical Small Business
Total Inventory	11
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	2
# Low-Use	1
# Equipment Transfers	0
# FEL engines	1
Costs/(Savings) from 2011 to 2020*	
No VDECS	($27,700)
Low-Use	($18,800)
Equipment Transfers	
FEL engine	$27,000
Opacity	$5,940
Total	**($13,600)**

* Values have been rounded

As shown in this table, the net costs over the 2011 to 2020 time period for this typical small business is estimated to be a cost savings of $12,500. These net costs include both capital and O&M costs. The O&M costs are estimated at $60 per engine per year for this typical small business, or $660 per year.

Potential Business Impacts

In this section, we analyze the potential impacts of the estimated costs of the proposed amendments on business enterprises in California. Section 11346.3 of the Governments Code requires that, in proposing to adopt or amend any administrative regulation, state agencies shall assess the potential for adverse economic impact on California business enterprises and individuals. The assessment shall include a consideration of the impact of the proposed or amended regulation on the ability of California businesses to compete with businesses in other states, the impact on California jobs, and the impact of California business expansion, elimination, or creation.

It is anticipated that there would be no overall impact on business competitiveness. A short delay in capital investment would be expected due to the proposed amendments that provide for a two year delay in compliance for equipment with no VDECS available and low-use equipment. This delay is expected to benefit equipment owners/operators and has no adverse impact on VDECS manufacturers because these manufacturers are

unable to supply a marketable VDECS for this equipment at this time. Overall, the proposed amendments are expected to result in cost savings to business, mitigating any negative impact that the original regulation might have on business or jobs.

F. Potential Costs to Local, State, and Federal Agencies

With the exception noted below, this regulation does not directly affect any local and State agencies, or Federal funding of state programs. We anticipate no increase in costs for ARB to assist in implementation of the regulation. Some local agencies established for the oversight of ports also own CHE. The proposed amendments would impose a mandate on some local agencies established for the oversight of ports that also own CHE, but any costs incurred are not reimbursable under Government Code section 17500 et seq. ARB staff estimated that while the amendments would result in both costs and savings, the net impact on specific local agencies that own CHE would be a minor cost savings, similar to the impact on small and typical businesses. The specific agencies and fleets are provided in Appendix C. Table V-15 shows the overall potential costs to local agencies.

Table V-15: Estimated Costs and Savings for Local Agencies in 2011 Dollars Over the 2011 to 2020 Time Period

Business	Total Equipment
Total Inventory	37
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	4
# Low-Use	3
# Equipment Transfers	0
# FEL engines	2
Costs/(Savings) from 2011 to 2020	
No VDECS	($55,400)
Low-Use	($56,500)
Equipment Transfers	
FEL engine	$54,000
Opacity	$20,000
Total	**($37,900)**

G. Analysis of Alternatives

In this section, we compare the proposed amendments to two alternatives: (1) provide an additional three years of annual extensions for equipment for which there are no VDECS instead of the proposal to add an additional two years, and (2) do nothing regarding Tier 4 engines certified to the FEL Alt PM emission standards.

Alternative 1: Three additional years extension for “No VDECS Available”

This alternative would be to provide three additional years of extension for engines for which there are no VDECS available instead of the proposal for two additional years extension. This alternative would extend the emissions reduction delay an additional year and provide additional savings of approximately $2 million. This delay would result in an additional 6 ton increase in the diesel PM emissions and an 81 ton increase in NO_x emissions. The purpose of this amendment is to allow more time for technologies to become verified for use on CHE. Adding an additional year to the extension would extend the compliance delay out to 2018. Staff believes that this additional year of delay would not provide any significant benefits in terms of additional VDECS becoming verified. Tier 4 engines, which will not require retrofits for final compliance with the CHE Regulation if certified to the non-FEL standards, will be fully available by 2015 and the vast majority of CHE would have been brought into compliance. Consequently, there would be little incentive for VDECS manufacturers to continue verification efforts into this time frame. Therefore, staff rejected this alternative because it is not responsive to the purpose of the amendment.

Alternative 2: Do not require Tier 4 engines certified to FEL Alt PM standards to apply VDECS

This alternative would be to not require Tier 4 engines certified to FEL Alt PM standards to apply highest level VDECS within one year of acquisition. This alternative would save $6 million for the regulated industry. However, the PM emissions would be anticipated to increase by a total of 48 tons. This would result in a net PM emissions disbenefit for the amendments. This would possibly allow a significant population of engines not meeting the effective Tier 4 PM standards into the CHE inventory as new engines. Staff rejected this alternative because it would not meet the goals of the original CHE Regulation.

REFERENCES:

(ARB, 2010a) California Air Resources Board. *Proposed Amendment to the Regulation for In-Use Off-Road Diesel-fueled Fleets and the Off-Road Large Spark Ignition Fleet Requirements,* Appendix F: Cost Methodology. October 2010. http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadappf.pdf

(ARB, 2011g) California Air Resources Board. *Economic Analysis Worksheets*, http://www.arb.ca.gov/ports/cargo/cheamd2011.htm*, July 2011.*

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VI. CEQA ENVIRONMENTAL IMPACTS ANALYSIS

In this chapter, ARB staff discusses potential significant adverse environmental impacts from the proposed amendments. This regulation and the associated amendments generally apply statewide. Typical locations where equipment subject to this regulation operate include, but are not limited to ports at Los Angeles, Long Beach, Oakland, Stockton, Hueneme, San Diego, San Francisco, Richmond, Sacramento, Redwood City, Humboldt, and other Bay Area ports, and intermodal rail yards located in Los Angeles, Long Beach, San Bernardino, San Diego, City of Commerce, Oakland, Stockton, Lathrop, City of Industry, Fresno, Richmond, and other Bay Area rail yards. Staff has identified a potential significant adverse impact on air quality due to the proposed amendments. Emissions of diesel PM and NO_x will continue to decrease each year even with the proposed amendments. However, when compared to the emission reductions anticipated for the original rule, there is a potential for small increases in diesel PM emissions in 2012 thorough 2014 and NO_x emissions in 2012 through 2016. Overall, diesel PM emission reduction will be greater under the proposed amendment than the original rule. However, NO_x emission reductions will be slightly less. At the Port of Humboldt Bay, diesel PM and NO_x emissions will be slightly greater than under the original rule, but will remain well below the 2006 baseline levels due to decreased activity. Staff has not identified any other significant adverse environmental impacts due to the proposed action.

The following is a detailed discussion of the potential environmental impacts and feasible mitigation measures to address any significant adverse impacts due to the proposed amendments. Also discussed are feasible alternatives means of complying that would reduce or eliminate any significant adverse impacts.

A. Legal Requirements

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential environmental impacts of proposed regulations. Because the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources pursuant to Public Resources Code section 21080.5, the CEQA environmental analysis requirements may be included in the ISOR for this rulemaking. In the ISOR, ARB must include a “functionally equivalent” document, rather than adhering to the format described in CEQA, consisting of an Initial Study, a Negative Declaration, and an Environmental Impact Report. In addition, staff will respond, in the Final Statement of Reasons for the regulation, to all significant environmental issues raised by the public during the public review period or at the Board public hearing.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following:

- An analysis of reasonably foreseeable environmental impacts of the methods of compliance;
- An analysis of reasonably foreseeable feasible mitigation measures; and

- An analysis of reasonably foreseeable alternative means of compliance with the regulation.

B. Reasonably Foreseeable Environmental Impacts of Methods of Compliance

Since the proposed amendments do not require changes to the existing infrastructure at ports or intermodal rail yards, staff finds that, no new facilities, expansion of existing facilities, or changes in operations from the status quo are likely to occur. Therefore, ARB staff finds that there will be no adverse impacts on aesthetics, land-use/planning, population and housing, transportation, agricultural and forestry resources, cultural resources, mineral resources, public services, utility and service systems, geology and soils, hydrology and water quality, or recreation.

Taking a conservative approach, ARB staff has, however, identified a potentially significant adverse environmental impact to air quality from compliance with the proposed amendments. Staff is making this determination even though the amendments will not impact the intended goals of the initially adopted CHE Regulation – to attain 85 percent diesel PM and 75 percent NO_x emissions reductions relative to the 2006 baseline by 2020 – and there will be no actual increase in emissions due to the proposed amendments, merely that the emission reductions in the future will decrease at a slightly lower rate. Nonetheless, staff has concluded that potentially adverse impacts may result from a slight loss in emission reductions 2012 through 2016 associated with the amendments when compared to the emission reductions anticipated from the initially adopted regulation. This is a due to the following proposed amendments:

- Providing an additional two year extension times for compliance where no VDECS systems compatible with the in-use equipment are available.
- Allowing a two year low-use compliance extension.
- Providing an exemption of rural low-throughput ports.

Less Diesel PM and NO_x Emissions Reductions due to the Proposed Amendments for No VDECS Available, Low-Use Equipment, and the Low-Throughput Port Exemption

As discussed in Chapter IV, staff finds that there will potentially be a small decrease in diesel PM and NO_x emission reductions, compared to the reductions anticipated in the original rule, due to the proposed amendments that provide a two year compliance extension when no VDECS are available, the low-use compliance extension, and the exemption for low-throughput ports. The magnitude of the potential decrease in emission reductions is shown in Table VI-1.

The second column in Table VI-1, labeled, “Reductions Under the Rule”, shows the diesel PM and NO_x emission reductions anticipated from the current rule without the proposed amendments. The third column labeled “Reductions due to the Amendments”

show how much less reductions will be achieved with the proposed amendments. A negative value indicates that the proposed amendments will result in less reductions compared to the original rule.

Table VI-1 Statewide Emission Reductions Attributable to the Existing CHE Regulation and Reductions Attributable to the Proposed Amendments

Calendar Year	Reductions Under the Rule (tpd)		Reductions due to the Amendments (tpd)	
	PM	NO_x	PM	NO_x
2006	0.00	0.00	0.000	0.00
2007	0.02	0.38	0.000	0.00
2008	0.04	0.55	0.000	0.00
2009	0.06	0.65	0.000	0.00
2010	0.11	1.37	0.000	0.00
2011	0.17	2.15	0.000	0.00
2012	0.20	2.34	-0.005	-0.13
2013	0.22	2.77	-0.004	-0.12
2014	0.23	3.07	-0.001	-0.13
2015	0.22	3.02	0.004	-0.11
2016	0.21	2.75	0.012	-0.05
2017	0.19	2.50	0.018	0.02
2018	0.16	2.17	0.020	0.05
2019	0.14	1.84	0.020	0.05
2020	0.12	1.50	0.019	0.05
Total	2.07	27.05	0.084	-0.37

Note: Positive numbers indicate emissions reduction,
Negative numbers indicate emissions increase

Staff anticipates less emission reductions due to the proposed amendments for diesel PM in 2012 through 2014 and for NO_x in 2012 through 2016. However, the magnitude of the change is very small. For example, looking at calendar year 2012 in Table VI-1, staff estimates that the proposed amendments would result in 0.005 tpd less diesel PM reductions and 0.13 tpd less NO_x reductions. What this means is that in 2012, with the proposed amendments, diesel PM reductions would be 0.195 tpd instead of 0.20 tpd and NO_x reductions would be 2.21 tpd instead of 2.34 tpd.

The table also shows (in “Total” row) that future year emission reductions due to the proposed amendments will, overall, result in greater diesel PM reductions than anticipated in the original rule. Over the 2006 through 2020 time period, the proposed amendments will result in 0.084 tpd more diesel PM reductions but 0.37 less NO_x reductions compared to the original rule. However, from 2017 through 2020, annual NO_x emissions will be greater in each year with the amendments than if the original rule were unchanged.

C. Reasonably Foreseeable Mitigation Measures

CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impact. In this section, ARB staff discusses the mitigation measures that were identified to achieve cost-effective emission reductions while providing CHE owners/operators with additional compliance flexibility.

Potential Mitigation Measures for the Proposed Amendments Allowing No VDECS Available and Low-Use Compliance Extensions

Staff has identified three feasible mitigation measures that will reduce or eliminate the adverse impacts due to the proposed amendments that provide a two year compliance extension when no VDECS are available and the low-use compliance extension. The mitigation measures include: limiting the duration of the extensions, allowing the Executive Officer (EO) to limit the number of low-use extensions per facility, and adding other proposed amendments that will provided emission reductions, beyond those anticipated in the original rule, which will "offset" the impacts of the proposed amendments that would be causing reductions in emission benefits.

The current "No VDECS Available" extension is limited to two years. The proposed amendment would allow up to two additional years for situations where a suitable VDECS is not available. Limiting the duration of the extension to a maximum of four years will partially mitigate the air quality impact of the proposed amendment, because at the end of the extension period, the equipment will either need to be removed from service, replaced with a lower-emissions engine or equipment, or have a VDECS installed. Any of these options will significantly reduce emissions in the future. Further, extending the final compliance date of this equipment may in fact allow the installation of newer, cleaner engines that will become available in the future or new VDECS that may become available in the next few years. Thus, both the PM and NO_x emissions would partially be mitigated by the compliance of equipment at the end of the extension period. Further, the proposed mitigation amendments would require that if a suitable VDECS becomes available during the time period of the extension, ARB would notify the equipment owner/operator, who would be required to install a VDECS within six months; or otherwise bring the equipment into compliance with the CHE Regulation.

The low-use extension is also a limited duration extension. This extension is available for a maximum of two years. At the end of this time period, the owner of the equipment must retire the equipment, replace it with a new engine or equipment, or install a VDECS. As with the "No VDECS Available" extension, the duration of emissions increase is limited, which provides partial mitigation of any increase. Further, to mitigate the potential for numerous extensions at one location, the proposed amendments would incorporate an adaptive management approach to mitigation by giving the EO the authority to limit the number of low-use extensions allowed at individual locations.

We have also included a proposed amendment that would provide additional emission reductions beyond what was required by the original rule. The original rule requires that

in-use non-yard truck equipment comply with Tier 4 emission standards by specified dates. ARB subsequently learned that engine manufacturers are certifying some new engines used in CHE to Tier 4 family emission limits (FEL) that are certified to alternate (Alt) PM and Alt NO_x emissions limits. The FEL Alt PM standards allow for emissions that are approximately ten times higher than the non-FEL Tier 4 PM standards. These Alt PM standards are essentially equivalent to Tier 3 PM standards.

In estimating emission reductions from the CHE Regulation, as initially adopted, staff assumed that all Tier 4 engines would be certified to the non-FEL Tier 4 PM standards. If engines certified to these Alt PM standards are introduced into California's ports and intermodal rail yards as Tier 4 engines, emission reductions anticipated with the adoption of the original regulation will be lost. To address this problem, staff is proposing that if engines certified to the Alt PM standards are used at ports or intermodal rail yards, these engines would be treated as if they were Tier 3 engines, and owners/operators would be required to retrofit this equipment with the highest level VDECS available within one year of purchase, lease, or rental. The amendment requiring the use of VDECS on these engines would achieve additional emission reductions that would offset and mitigate potential emission increases from the above-described exemptions for "No VDECS Available" and low-use equipment. The total PM emission reductions from this proposed amendment to require VDECS on FEL Alt PM Tier 4 engines, between the 2012 and December 31, 2020, will be greater than the potential "increase" in emission due to the extensions discussed above.

Additionally, we are including a proposed amendment that would require owners/operators to annually monitor the engine exhaust opacity and provide restorative repair or maintenance if the measured opacity is higher than empirically derived levels for properly maintained engines. An ARB study showed that in-use engine PM emissions from diesel engine fleets that are not well maintained can be significantly higher than the certification levels would indicate. Measuring engine exhaust opacity is a tool that can be used to identify high levels of visible emissions that are an indication that the engine is not operating as designed and that engine maintenance or repair is needed. This proposed amendment would assist owners/operators keep diesel engine emissions within the anticipated design or certification level. While the reduction in diesel PM due to this amendment is not quantifiable, it would provide a measure of mitigation for the short term PM increases in the 2012 to 2014 time frame.

Potential Mitigation Measures for Proposed Rural Low-Throughput Port Exemption

By exempting low-throughput ports in rural areas from the requirements of the CHE Regulation, future anticipated emissions reduction for the single ports that will qualify for the exemption would not be achieved. Two mitigation strategies have been identified to reduce the impact of this proposed amendment. The first mitigation measure would require off-road engines at an exempted port to be subject to ARB's Off-Road In-Use Equipment Regulation. The second measure would require equipment with on-road engines to be subject to the On-Road Truck and Bus Regulation. However, the

requirements of these regulations would not achieve the same level of emission reduction in the future or on the same timeline as if this equipment remained subject to the CHE Regulation.

As part of the proposed amendments, staff is employing an adaptive management strategy for the port exemption. The proposed amendments would establish cargo throughput and community population trigger levels which, if exceeded, would require all CHE at the port to come into full compliance with the CHE Regulation within three years. If this were to occur, the emission reductions anticipated in the original rule would be fully realized.

Staff was unable to identify other reasonably foreseeable mitigation measures that could further lessen the potential environmental impacts while meeting the need to provide owners/operators at the Port of Humboldt Bay with needed economic and technical flexibility to comply with the purposes and objectives of the CHE Regulation.

D. Reasonably Foreseeable Alternative Means of Compliance with the Proposed Amendments

Below staff discusses alternative means of compliance with the propose amendments.

No Project Alternative

This alternative would eliminate the identified potential adverse impact associated with the two extension provisions and the low-throughput port exemption. It would, however, negatively impact overall diesel PM emission reductions by eliminating the proposed requirements on FEL engines that would achieve approximately 0.13 tons per day of emission reductions. Most importantly, the No Project Alternative would not address legitimate economic issues associated with equipment where control systems are not available and where equipment is used less than 200 hours per year. There are cases where specialty equipment is needed to unload certain cargo, such as steel and massive wire coils. This specialty equipment is used infrequently but is necessary for these cargos and would be very expensive to replace. Further, it does not address equity issues since a similar provision has been included in ARB's on-road and off-road rules. Lastly, the no project alternative, also would not address the economic issues at the Port of Humboldt Bay. Both the local air district and the port authority have requested relief from the CHE Regulation due to the identified significant impact that the regulation, as initially adopted, will have on the Port of Humboldt Bay businesses. For these reasons, staff rejected this alternative.[9]

[9] While exemptions were provided in these other rules, the CHE Regulation is providing extensions rather than exemptions due to the environmental justice issues associated with a captive fleet surrounded by residential communities.

Reducing the Duration of the Extension Period

This alternative would limit the duration of the “No VDECS Available” extension to one additional year rather than two and limit the low-use extension to one year. This alternative would eliminate the potential adverse air quality impacts for both PM and NO_x due to the proposed extensions because any increases in emissions due to a one-year extension would be effectively off-set by the additional emission reductions from the Tier 4 FEL engine amendment requiring the retrofitting of such engines one-year after introduction at a port or intermodal rail yard.

This alternative would reduce the economic relief that the two-year extensions would have provided by approximately 50 percent, from $7.6 million to $3.8 million, because equipment owners would have to purchase new equipment at the end of the one year. This could potentially have a significant adverse economic impact on some operators, particularly smaller operators. From a program administration and new product development standpoint, staff found that a one-year extension from the CHE Regulation compliance requirement would not be sufficient to address the needs of the regulation in that it would not provide sufficient time for development and verification of new emission control strategies, the underlying purpose of the additional extension years. In staff’s opinion, the two additional years provided by the proposed amendments would provide the time needed, for newer, cleaner engines and VDECS to come onto the market, which would result in additional long-term environmental benefits.

The proposed alternative to shorten the “No VDECS Available” and low-use extensions to one year would not address the increased emissions that would result from granting the low-throughput port exemption that applies to the Port of Humboldt Bay and would not off-set any increased emissions resulting from exempting the port. Neither the proposed two-year extensions nor the alternative one-year extensions would address the special economic and environmental circumstances facing that port. Of course, it goes without saying that if the relief of the low-throughput exemption were not provided and the port were able to remain in operation, the limited one-year “No VDECS Available” and low-use extensions that Port of Humboldt CHE could use would substantially lessen the environmental impacts that would otherwise be incurred from granting the low-throughput exemption.

Because the alternative limiting extensions to one year would not address the underlying purposes of the proposed amendments, staff rejected this alternative.

Allow fleet averaging instead of extensions

This alternative would allow for a fleet-wide averaging program instead of allowing for extensions where no VDECS is available or for low-use equipment. This alternative would eliminate the potential adverse air quality impact associated with the “No VDECS Available” and low-use extensions, since, under this alternative, extensions would not be allowed. Instead under the fleet averaging alternative, owners/operators would be

able to comply by managing the introduction of lower emissions equipment with higher emissions equipment to ensure that an overall fleet-wide average would be met.

The level of economic relief may be less than under the proposed amendments but difficult to quantify. It may be an economically viable approach for some companies but not others, particularly since we are several years into the implementation of the rule. To allow fleet-wide averaging now, would require significant changes to the regulation and require significant time and effort to address a multitude of issues that would arise regarding compliance, including issues of equity for those owners/operators who have invested significant capital in meeting the originally adopted regulation. Moreover, the fleet average plan may not provide the emissions and flexibility benefits envisioned by the extensions, especially for smaller operators. Those benefits include time to allow new VDECS to come into the market and additional time to work through Cal OSHA safety issues.

For the reasons, outlined above, this alternative would not be intended as an alternative to the low-throughput port exemption, would not address the special economic and environmental issues facing the Port of Humboldt Bay, and would not eliminate the potential adverse air quality impact associated with the low-throughput port exemption. For all of the above reasons, staff rejected this alternative.

ARB staff concludes that the proposed amendments provide the most effective and least burdensome approach to reducing the public's exposure to diesel PM, NO_x, and other air pollutants emitted from diesel-fueled cargo handling equipment and at the same time ensuring the action is technically and economically feasible. Additionally, the compliance responses to these alternatives would not be expected to have any greater or lesser impact on environmental factors other than air emissions.

E. Summary

In summary, staff has determined that between 2012 and December 31, 2020, the proposed amendments, taken as a whole, would provide greater diesel PM reductions than the original rule, fully mitigating the potential adverse impacts of the proposed “No VDECS Available” and low-use extension amendments. However, the proposed mitigation will not fully offset the NO_x emissions “increase” anticipated from the proposed extensions.

Concerning the Low-Throughput Port Exemption, staff finds that the diesel PM and NO_x emission reductions anticipated by the initially adopted CHE Regulation will not be realized. The transfer of equipment at an exempted low-throughput port to the Off-Road In-Use Equipment and On-Road Truck and Bus regulations and the adaptive management proposal may lessen the identified environmental impacts but will not fully avoid the significant or potentially significant impacts. The mitigation measures identified above for the “No VDECS Available” and low-use extensions would not mitigate the impacts at an exempted low-throughput port because the equipment at the port would no longer be subject to the CHE Regulation.

Staff has also found that no reasonably foreseeable alternatives to the amendments proposed would be able to avoid or further lessen the emissions impact of the amendments without jeopardizing the compliance flexibility and potential long-term benefits from development of cleaner, more efficient engines and VDECS that would be achieved from the amendments.

Because the NO_x impacts due to the proposed extension amendments, and the diesel PM and NO_x impacts due the low-throughput port exemption would not be fully mitigated, staff finds that there is a potential for a significant adverse air quality impact due to the proposed amendments. Prior to taking any formal action on the proposed amendments, ARB would have to determine whether overriding consideration exist meriting approval of the amendments.

In balancing the benefits of the proposed amendments against the unavoidable adverse environmental effects, staff weighed the fact that there would be no actual increase in emissions due to the proposed amendments merely that the emission reductions in the future will decrease at a slightly lower rate. Staff weighed this impact against the flexibility that the amendments would provide for compliance and the benefits that would potentially result in both the near and long term. Staff estimates that the two extensions would result in a cost savings to CHE owners of approximated $7.6 million dollars over the next several years and provide flexibility for specialty equipment and small operators. Staff believes that this cost savings and needed flexibility would provide a level of relief, particularly to smaller operators. And, would provide additional time for development and refinement of cleaner, more durable engines and VDECS.

In the case of the low-throughput port exemption, staff finds that the economic impact of taking this action would outweigh the small air quality disbenefit (0.007 tpd PM and 0.14 tpd NO_x). The only port that is likely to qualify for this exemption is the Port of Humboldt Bay. This port is operating well below its historic level due to the recession and it is not anticipated that the port will return to its historic levels for many years. The Port of Humboldt Bay handles approximately 0.2 percent of California's annual port throughput. This port primarily serves the local lumber industry, has had a very difficult time responding to the impacts of the economic downturn due to the close tie of the lumber industry to housing. The North Coast Unified Air Quality Management District (North Coast) and the Humboldt Bay Harbor, Recreation, and Conservation District (Humboldt Bay District) have requested that ARB exempt the Port of Humboldt Bay from the current CHE Regulation. The North Coast is in attainment for ozone and does not contribute to any downwind violations. Staff estimates that the proposed exemptions would provide a saving of about $1 million for port owners/operators. Without the proposed amendment operations at this port would likely be further reduced or eliminated altogether.

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