June 24, 2005

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COPY

Honorable James K. Hahn
Mayor of Los Angeles
City Hall – 200 N. Spring Street
Los Angeles, CA 90012

Dear Mayor Hahn:

We are pleased to announce that on June 21, 2005 your No Net Increase Task Force concluded its work towards development of a NNI Plan.

On behalf of the members of the NNI Task Force, we are proud to transmit the final Report to Mayor Hahn and Councilwoman Hahn. This comprehensive document includes specific initiatives and technologies that may be used to achieve NNI in emissions from Port-related sources, 68 measures, legal analysis and financial analysis, stakeholder recommendations, and stakeholder opinions and concerns relative to all issues.

As co-chairs of the No Net Increase Task Force appointed by Mayor Hahn and Councilwoman Hahn, we recommend that the Mayor receive this plan and that it be referred back to the Board of Harbor Commissioners for immediate implementation of the voluntary and incentive-based measures and prompt review and consideration of the remaining proposed and additional measures as identified in the plan.

Please contact us if you should have any comments or questions.

Sincerely,

Camilla Townsend
CAMILLA TOWNSEND
Co-Chair
No Net Increase Task Force

Tom Warren
TOM WARREN
Co-Chair
No Net Increase Task Force

Attachment

cc: Councilwoman Janice Hahn
Tim McOsker, Office of the Mayor
Doane Liu, Office of the Mayor
Board of Harbor Commissioners
Bruce Seaton, Interim Executive Director
Dave Mathewson, Dir. of Plan. & Env. Affairs

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Report to Mayor Hahn
and
Councilwoman Hahn
by the
No Net Increase Task Force

June 24, 2005

Disclaimer Notice

The No Net Increase Task Force membership is comprised of appointees from a diverse group of stakeholders in the Port community. This report represents the compilation of the efforts from these stakeholders to put forth recommendations and a strategy to achieve the Mayor's directive to have "no net increase" in air emissions from operations at the Port of Los Angeles.

The information contained in this report has not necessarily been reviewed, verified, accepted or agreed upon by the City, the Harbor Department or any particular Task Force member. Additionally, the opinions, findings, statistical analysis, materials and conclusions expressed herein should not be construed as adopted by the City, the Harbor Department or any particular member of the Task Force. No individual member of the Task Force, the Harbor Department or the City should be considered liable or responsible for the content in any part of the report presented here, except in the presence of specific attribution.

This document reflects the framework and starting point for further discussion and debate by various policy makers and stakeholders for implementation of the No Net Increase Plan in order to decrease air pollution and improve air quality in the Port of Los Angeles.

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ABBREVIATIONS AND ACRONYMS

AAR	American Association of Railroads
AMP	alternative maritime power
ARB	State of California's Air Resources Board
BACT	Best Available Control Technology
CAAQS	California Ambient Air Quality Standards
CEQA	California Environmental Quality Act
CO	carbon monoxide
DMV	State of California's Department of Motor Vehicles
DPM	diesel particulate matter
EPA	United States Environmental Protection Agency
FWG	Financial Working Group
IMO	International Maritime Organization
Inventory	2001 Port-wide Baseline Air Emission Inventory prepared for the Port of Los Angeles
LWG	Legal Working Group
MATES	Multiple Air Toxics Exposure Study
$\mu g/m^3$	micrograms per cubic meter
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NNI	No Net Increase
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NRDC	Natural Resources Defense Council
NSR	new source review
O_3	ozone
PCAC	Port Community Advisory Committee
PHL	Pacific Harbor Lines
PM	particulate matter

$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
Plan	The No Net Increase Plan offered by the Task Force to Mayor James K. Hahn and Councilwoman Hahn
Port	The Port of Los Angeles
ppm	parts per million
SCAQMD	South Coast Air Quality Management District
SECA	sulfur emission control area
SIP	State Implementation Plan
SO_2	sulfur dioxide
SoCAB	South Coast Air Basin
TAC	Toxic Air Contaminant
TEU	twenty-foot equivalent unit
TOG	total organic gases
TWG	Technical Working Group
ULSD	ultra low sulfur diesel
USC	University of Southern California

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EXECUTIVE SUMMARY

In October of 2001, the Board of Harbor Commissioners for the Port of Los Angeles (Port) established a new environmental policy, which set as a goal, No Net Increase (NNI) in air emission from future Port operations, and set 2001 as the baseline year. This report documents the results of an eight-month stakeholder process set in place by Mayor James K. Hahn and Councilwoman Janice Hahn "*…to build consensus on an innovative and realistic strategy to achieve 'No Net Increase' at the Port of Los Angeles*."[i]

Background

The status of the Port as a gateway for international commerce and a local, regional and national economic resource, has resulted in increased air emissions from the predominantly diesel-fueled equipment used to transport the increasing cargo destined for all parts of the nation. The 2001 baseline air emission inventory for the Port indicates that goods movement within the South Coast Air Basin, in which the Port is located, from Port activities contributes approximately twelve percent of the basin's total diesel particulate matter (DPM) emissions. Since the 1990s there has been growing awareness of the potential effects of diesel exhaust including its identification as a toxic air contaminant by the California Air Resources Board in 1998. Research also documents an association of asthma and other acute and chronic respiratory impairments from exposure to diesel particulate matter. The South Coast Air Basin is also designated by the U.S. Environmental Protection Agency as a non-attainment area for ozone, carbon monoxide, and particulate matter (defined as PM_{10}, particles less than ten microns in diameter). Oxides of nitrogen gases (NOx) are important precursors to the formation of photochemical smog, including ozone. Port operations collectively contribute substantial amounts of NOx (thousands of tons per year) to the regional airshed. Regional plans to reduce ozone levels across the basin must therefore include reduction of NOx emissions. Community concerns over health, and the above considerations, focused the discussion primarily on NOx and particulate matter (as PM_{10} or DPM) reduction strategies.

A Task Force was appointed by Mayor Hahn, composed of representatives from national, state, and regional air quality regulatory agencies; several neighborhood councils; community environmental organizations; maritime, rail, and commerce representatives; port labor representatives; Harbor Department staff; environmental and health experts. The Task Force was co-chaired by Harbor Commissioners Camilla Townsend and Thomas Warren.

The No Net Increase (NNI) Task Force met regularly between October 2004 and June 2005 to suggest, discuss, refine, and debate information needed and available for use in emissions growth projections, pollution reduction approaches, and related feasibility issues. Sub-groups of the larger Task Force were informally established to address the development of technical measures for pollution reduction, the financial costs of potential emissions reduction measures, and the legal/jurisdictional issues associated with implementation of specific reduction approaches and measures.

Emissions and Growth Estimates

Accurate information, including credible baseline inventory data of port-related emissions and likely scenarios for port-related cargo and emissions growth, were critical for Task Force progress. To estimate future growth, the Task Force selected four specific years for comparison – 2008, 2010, 2012, and 2025. These milepost years were selected to provide a near-term estimate (2008), mid-term evaluations (2010 and 2012), and a long-term out-year (2025) to assess the ability to maintain emission reductions in the face of predicted growth. The 2001 Port-wide Baseline Emissions Inventory was exploited as the most current, accurate, and appropriate reference to apply in evaluating current port operations and emissions. Growth scenarios based on historical growth rates of cargo throughput and proportional emissions increases were evaluated for each of the five emissions inventory components (ships, harbor craft, off-road cargo handling equipment, rail, and on-road trucks). Significant differences of opinion were present within the Task Force regarding selection of the most appropriate growth rate scenarios to apply to cargo throughput growth. Ultimately, a conservative approach that assumed relatively unconstrained continued growth at recent annualized rates was applied to cargo throughput activities. This resulted in a 422% increase in activities for ocean-going vessels over 2001 levels, a 443% increase in cargo handling equipment activities, essentially no change in harbor craft activity, a 355% increase in rail locomotives activity, and a 372% increase in truck activity.

To estimate emissions growth, the Task Force elected to focus on emissions projections for near-term years (2005-2010) and to make estimates based on a worst-case/highest impact scenario, the mitigation of which would be most protective of public health. Application of this estimated approach, without additional emission controls, leads to linear increases in NOx and PM_{10} emissions from their estimates of 25,940 and 1,580 tons per year in 2005, respectively, to 37,290 and 2,650 tons per year, respectively, in 2025.

Task Force members and support staff proposed over 70 control measures for possible consideration. This included adopted measures, engine standards, fuel requirements, retrofit/repower, and operational efficiencies or improvements. Emission reduction estimates for several of the proposed measures could not be made, due to insufficient detail, development, or evolution of some of the potential reduction approaches. The remaining 68 measures were evaluated for emissions reduction opportunities and included in the projected emissions reduction calculations.

Emission contributions and the number of control measures identified for each of the five major source categories associated with port-related diesel emissions are summarized in Table ES-1. Ship emissions, followed by trucks calling at the Port, represent the largest sources of port-related emissions.

Table ES-1. Port Emission Sources and NNI Control Measures

Emission Source	Percent of Inventory (NOx)	Percent of Inventory (PM_{10})	Number of Measures
Ships	36.1	54.8	17
Harbor Craft	18.3	18.4	11
Cargo Handling Equipment	9.6	11.5	9
Rail Locomotives	12.8	6.2	12
Trucks	23.2	9.1	19
Total Measures			68

If (a) future cargo growth activity increases as forecasted, (b) the direct proportional relationship between cargo growth and emissions is valid, and (c) all 68 proposed emissions reduction measures are implemented as scheduled, then it is estimated that the goal of No Net Increase could be attained by or around 2009. A summary of predicted emissions levels, and the impact of the proposed reduction measures, are summarized in Figures ES-1 for NOx and ES-2 for PM_{10}.

Figure ES-1. Total NOx Emissions, Adjusted For Implementation of Control Measures

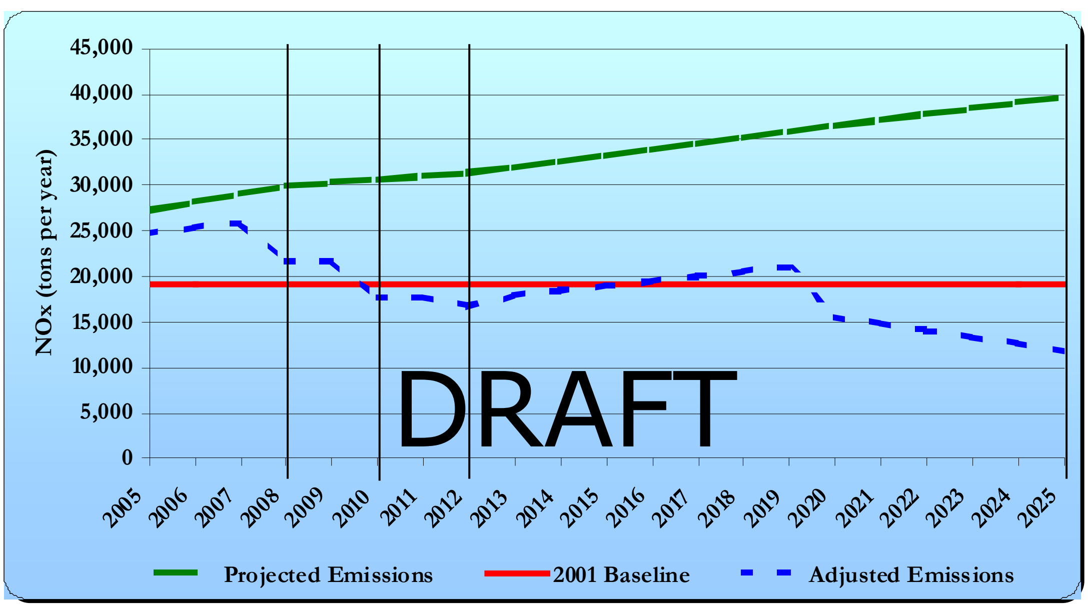
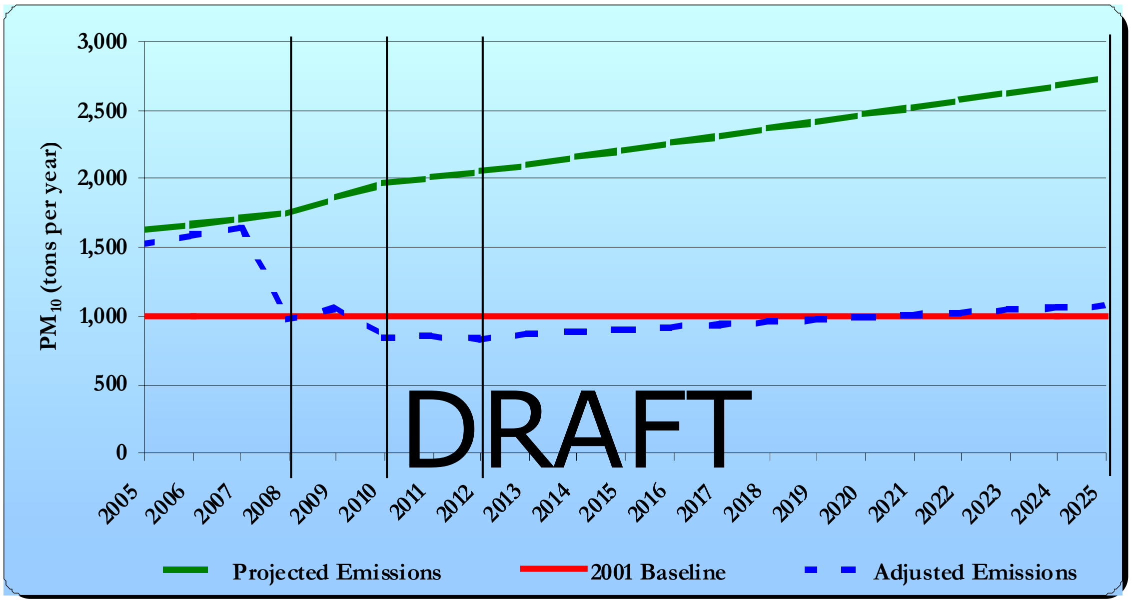


Figure ES-2. Total PM_{10} Emissions, Adjusted For Implementation of Control Measures



The predicted growth in cargo throughputs, even with the described control measures, will drive emissions of NOx and DPM over the 2001 baseline around 2015 and 2021, respectively. In fact, these two principles (forecasted cargo growth activity and the relationships between growth and emissions levels) are the fundamental foundation on which the NNI technical and financial analyses are based. NOx emissions can be reduced in future years (circa 2020) through application of new ship engine technology while DPM emissions will require application of undetermined control measures to remain below the baseline.

Financial Analysis

A financial analysis of the proposed control measures estimated "Order of Magnitude" costs associated with each respective measure, potential funding sources to provide for the anticipated costs, and the potential cost benefits, in terms of health care cost savings, achieved by the emissions reduction. Preliminary cost estimates are provided for 52 of the 68 measures. Undiscounted estimates of annual regulatory and non-regulatory costs (e.g., unfunded) ranged between \$10 Million and \$1.8 billion per year through 2025. Total costs associated with the evaluated NNI control measures through 2025 are estimated to range between \$11.6 billion, with \$15.7 billion, with the unfunded non-regulatory costs ranging from \$9.5 billion to \$13.6 billion. Absent federal, State and regional funding, the Port and its tenants would likely be looked to for funding of these non-regulatory unfunded costs. Assuming the most likely financial scenario, net revenues from Port operations would be unable to fund NNI without a substantial deficit of the Harbor Revenue Fund. In comparison, preliminary estimates of avoided undiscounted health care costs and costs attributable to premature death associated with

NOx and PM emissions from Port-related goods movement is \$11 to \$28 billion. Its important to note that these "Order of Magnitude" cost estimates rely on a long string of assumptions that were made during the technical analysis and the Task Force process. The cost estimates have not been reviewed by the sources that will be asked to implement the proposed control measures and therefore, should only be considered as preliminary estimates.

There were several costing issues that were not settled in the Financial Working Group (FWG) and still need further analysis as the process moves forward and for some measures there were opposing cost estimates that were developed by different stake-holders. For example, two rail measures were estimated independently by the SCAQMD and the rail group, resulting in two different costing scenarios. After considerable debate, consensus could not be reached on accepting one scenario over the other and therefore, both scenarios were included in the cost measure estimates. The California Air Resources Board evaluated the potential health benefits associated with the projected emissions reductions from the control measures and developed estimates of the potential health benefits from these reductions, which ranged from \$9 to \$28 billion. There was considerable debate on the projected health benefits of the NNI control measures and the monetary values assigned to those benefits, and consensus was by no means reached. Table ES-2 presents the aggregated NNI emissions reductions, unfunded costs associated with the control measures considered, and the potential health benefits valuation associated with the reduced emissions.

Table ES-2. Aggregated NNI Emissions Reductions, Unfunded Costs, Total Costs, and Health Benefits Valuations

	2005 - 2009	2010 - 2014	2015 - 2019	2020 - 2025	Totals
Oxides of Nitrogen Reductions (tons)	25,040	67,260	69,720	141,910	**303,930**
Diesel Particulate Matter Reductions (tons)	1,870	5,850	6,620	9,020	**23,360**
Unfunded Costs (SCAQMD rail measure estimates)	\$620,000,000	\$1,990,000,000	\$2,310,000,000	\$4,530,000,000	**\$9,500,000,000**
Cost Ranking & Priorization Value (\$/ton reduced)	\$14,175	\$15,824	\$16,995	\$19,517	
Unfunded Costs (Rail group measure esitmates)	\$736,000,000	\$2,109,000,000	\$6,428,000,000	\$4,318,000,000	**\$13,600,000,000**
Cost Ranking & Priorization Value (\$/ton reduced)	\$16,827	\$16,770	\$47,293	\$18,603	
Total Costs (SCAQMD rail measure estimates)	\$740,300,000	\$2,433,800,000	\$2,913,000,000	\$5,513,600,000	**\$11,600,000,000**
Total Costs (Rail group measure estimates)	\$856,300,000	\$2,552,800,000	\$7,031,000,000	\$5,301,600,000	**\$15,700,000,000**
Health Benefits Valuation (Mean)	\$1,400,000,000	\$4,700,000,000	\$5,500,000,000	\$8,567,000,000	**\$20,200,000,000**

* - Cost ranking & prioritization values are not the same as common cost effectiveness values, and are not comparable

Legal Analysis

A legal evaluation of the plan and control measures was undertaken. The evaluation looked at the legal authority of the Port and City of Los Angeles in implementing the control measures, federal preemption issues, interstate and foreign commerce issues, potential limitations on municipal powers, and statutes and agreements governing railroads among others. Selected control measures were also reviewed individually. There was a general consensus on the various issues involved in implementation of NNI; however, there were significant differences of opinion on how the courts would resolve those issues.

Implementation

Implementation of an NNI Plan would be a phased process, incorporating a number of control methods and requiring further development strategies and regular reevaluations. Control measures will be implemented using a combination of voluntary, incentive-based, and enforceable approaches. Voluntary measures are those implemented by participants without legal obligation and include procedural efficiency improvements, vessel speed reduction programs, use of cleaner fuels in exempt equipment, and purchase of newer lower-emission equipment for port operations. Incentive-based measures seek to make adoption of the respective control measure cost-neutral for the participant. Examples of such measures include subsidized use of lower sulfur or alternative fuels and conversion of engines through the Carl Moyer funding program. Enforceable measures ensure mandatory compliance by regulatory ordinance, contractual obligation, or other similar means. Examples of such measures include mandated emissions reductions, use of specific low-sulfur fuels or engine types. Near-term measures are largely adopted well-understood control measures that would be implemented between 2005 and 2007. Mid-term measures are technologies that are being developed and will become available between 2008 and 1010, while long-term measures require further research and development and would be added/applied from 2011 on. Contingency measures that were considered include identification of emerging technology, implementing operational capacity restraints and regular reevaluations to examine progress and adjust the program as necessary.

The NNI process should include plan review and revision on a regular basis, such as every three years, to incorporate the latest emissions, technology, and cargo forecast information, as well as to gauge progress and adjust measures, as needed. Implementation should also include a comprehensive integration of findings and stakeholder involvement to ensure compliance and measure/document improvement.

Approval of the Plan in its entirety or in part by a decision making body (e.g., the Los Angeles Harbor Department) would require evaluation in accordance with the California Environmental Quality Act (CEQA). Individual control measures could be found to be exempt from CEQA on a case-by-case basis, while approval of some measures and a comprehensive plan would likely require preparation of an Environmental Impact Report (EIR).

Limitations and Constraints

This report is subject to a large number of caveats and limitations due the short time frame in which the report was prepared, and assumptions necessary due to the state of technical knowledge and future projection period of 20 years (through 2025). Conservative estimates of growth, which may have resulted in an over-prediction of emissions, were purposely used to provide an added margin of emission reductions. If these estimates do turn out to be high, the resulting emissions reductions will be achieved in a more timely fashion, to the public health benefit of the regional population.

Therefore, this first analysis of NNI should be considered a starting point for further analyses, which should utilize updated cargo forecasts, new emission inventories and updated emission control technology.

This report is based on an assumption of unconstrained growth in port activity, and has not factored in physical constraints on port infrastructure, such as available land or space for facility expansion, layout, or modification. Other logistic and infrastructural support needed to support a dynamic goods movement (including distribution of the shipped goods via roads or rail to warehouses and distribution centers) may effectively limit port growth and port emissions.

This document does not represent a consensus among the involved stakeholders on No Net Increase. During its development significant technical, legal, financial and policy-related issues arose which would be difficult to resolve even within a longer time frame. Significant among these issues are the following:

- The reliability of the assumptions made in forecasting future cargo activity and the relationships between growth and emissions.
- The methodologies used to generate the cost and benefits analysis.
- The technical and cost feasibility of some of the proposed emission control measures.
- The legal authority of local, regional, state and federal governments to control emission sources pre-empted by higher authority (e.g. state control over federal sources).
- The over- or underestimate of the health implications associated with exposure to diesel particulate matter.
- The broad policy implications of the economic vitality versus chronic and acute health implications of implementing or not implementing NNI.

Having documented these outstanding issues, the document does represent an incredible effort on behalf of the parties involved, over a very constrained period of time. While there is no clear consensus on all of the specific means to reduce diesel toxics, it is clear that all parties acknowledge the significance of the issue and the need to continue aggressive programs to improve air quality.

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[i] Letter to Mr. Larry A. Keller, Executive Director, Port of Los Angeles from Mayor James Hahn and Los Angeles City Councilmember Janice Hahn, District 15. August 6, 2004.

1. INTRODUCTION

The Port was established in 1907 by a State Tidelands Grant to the City of Los Angeles for the benefit of maritime commerce, fisheries, navigation and (more recently) for recreation. The Port is administered for the City by the Los Angeles Harbor Department, which acts as a landlord and leases its property to various customers, who in turn operate their own facilities. The Port utilizes funds received from its customers for the maintenance and modernization of Port facilities and other activities consistent with the Tidelands Trust.

Today, due to its location adjacent to one of the nation's largest consumer economies and its deep draft marine facilities and connections to inland transportation systems, the Port is the busiest port in the United States. It includes 7,500 acres of land and water and 43 miles of waterfront. The Port currently houses 26 cargo terminals. These terminals handle import/export liquid bulk, dry bulk, break bulk, cruise passengers and containerized cargo. The Port serves as the Number One gateway for containerized cargo trade between Pacific Rim countries and the United States, and in calendar year 2004 the Port handled just over four million containers. This is equivalent to 7.3 million twenty-foot equivalent unit (TEU) containers[i]. Major trading partners include China, Japan, Taiwan and Thailand, and top imports from these countries include furniture, apparel, electronic products, toys, cars and computer equipment. The Port is a critical hub in the international supply chain, and an integral part of the local, regional and national economy. The Port generates 16,000 local, 259,000 regional, and more than a million national jobs. In fact, $1 out of every $23 in wages in Southern California can be attributed to the Port, totaling $8.4 billion. Port operations also inject nearly $1.5 billion into the regional and state economy in the form of tax revenue.

While a large portion of Port cargo is utilized in the local market area, nearly 50 percent of these containers are destined for locations east of the Rockies. When combined with the neighboring Port of Long Beach, the port complex is the fifth busiest container port in the world and approximately 40 percent of all the nation's import cargo passes through these two ports. Based on projections carried out on behalf of the Port, cargo volume received at the Port is expected to continue to increase and is expected to triple by 2020.

Associated with the significant success of the Port as an international gateway for commerce and a local economic engine are the increased environmental effects associated with air emissions from the predominantly diesel-fueled equipment used to transport this cargo. In 1990, the State of California listed diesel exhaust as a chemical known to the State to cause cancer. In 1998 the California Air Resources Board identified diesel exhaust as an air toxic. This was followed in 2000 with the release of the Multiple Air Toxics Exposure Study (MATES II) conducted by the South Coast Air Quality Management District, which attributed approximately 70 percent of the estimated cancer burden from ambient exposure to diesel particulate matter in the South Coast Air Basin. Other published research also documented an association of asthma and other acute and chronic respiratory impairments with diesel particulates. This growing knowledge on the significant effect of combustion particulates on public health resulted in significant concern from community members, environmental groups, public agencies and political leaders in regard to the effects of Port operations.

Concerned about the effects of air emissions on the public, and on the local communities of San Pedro and Wilmington, which are immediately adjacent to the Port, the Los Angeles Board of Harbor Commissioners, acting on behalf of Los Angeles Mayor James K. Hahn, established a policy that there would be "*no net increase in air emissions*" from Port activities over October 2001 levels. Subsequent to this, the Mayor established a diverse stakeholder Task Force to develop a plan to achieve NNI. The Task Force convened in October 2004 and began work on the NNI objective.

The contents of this report are the result of eight months of work by the Task Force. Section 3 of the report summarizes 68 proposed emissions control measures for application to ships, cargo handling equipment, trucks and trains. Sections 4 and 5 include a preliminary analysis of the financial implications of implementing these measures and discussion of the legal issues relating to local (including the Port of Los Angeles), state and federal agencies to implement these control measures. Information on plan implementation and future review are contained in Sections 6 and 7. Finally, the last sections identify outstanding issues, report limitations and a summary with recommendations.

There are complex technical, legal, financial and policy issues associated with Port activities and air quality, and it is important to recognize that this NNI Plan (Plan) is a work in progress. In order to be accurate and effective, the Plan and its associated assumptions will require progress monitoring, and key parameters such as air emissions inventories, cargo projections and emission reduction technologies and strategies will need to be revisited to ensure that the intent of the Plan to achieve its stated goal will become a reality. In addition, prior to implementation of any proposed measures to be developed by the Port of Los Angeles, a rigorous and thorough technical evaluation to determine the technical feasibility, effectiveness and cost of each measure must be undertaken. Consideration must be given to stakeholder and community input prior to presenting the proposal to the Board of Harbor Commissioners.

This document is provided as a template for others to improve upon, to help achieve the balanced goal of economic prosperity in goods movement with a recognition of and commitment to the primary importance of protection of public health in any plans for continued Port operations and expansion.

Stakeholder Comments Received:

Pacific Energy Partners
Introduction, page 1, 3rd paragraph. The statement that cargo throughput will triple in this paragraph is inconsistent with the discussion on page 19 that says a 422% growth factor was used.

Introduction, page 2, paragraph beginning "There are complex..." Before last sentence add: Also, before some of the control measures can be considered, significant research is needed to determine if any state or local entity has the authority to implement these measures.

Introduction, page 6, top. Add new paragraph after run-on paragraph from previous page. "While efforts were made to obtain feedback from industry stakeholders, it is important to note that the task force included only two representatives from shipping and several railroad representatives. The task force did not include any representatives from the harbor craft, cargo handling and trucking source categories. Also, the stakeholder workshops occurred fairly early in the process and no additional meetings with industry groups were held as the control measures were refined. Thus, while there were opportunities for input from the industries to be regulated by the proposed control measures, the opportunities were somewhat limited and in most instances confined to task force members."

Pacific Merchant Shipping Association

1. Introduction - The NNI plan is a complex and evolving process that must be open to future modifications. Significant areas of this report including the legal, financial and feasibility issues have not yet been completed. While it may not be possible to resolve all issues it is important to acknowledge the scope of uncertainties and to make commitments to fill these gaps. Following resolution of these issues within the taskforce and the NNI plan must be submitted for a full public review in compliance with CEQA before any approvals are given by the Port or the Mayor.

The proposed estimation of cargo tripling by 2020 is an unconstrained forecast that did not consider limitations resulting from limited terminal, roads, or railways. They also assumed continued growth of the Asian and U.S. economies that would be unabated. Many things have occurred since this forecast was originally completed in 1998, not the least of which was the disaster of September 11, 2001. In addition, fuel costs have more than doubled, congestion at the Port in 2004 has resulted in lower than expected throughput this year, and other ports are taking more market share than was expected under the Mercer study. All of this makes the Mercer projections uncertain and makes the case that an updated cargo forecast is long overdue.

While it is true that the State of California has designated diesel particulate as a cancer causing air toxic and has assigned a health risk factor the U.S. EPA has not yet done so and has stated that the available data does not support the assignment of a health risk factor.

The statement that "approximately 70% of the estimated cancer burden from ambient exposure to diesel particulate in the South Coast Basin" is wrong. The accurate statement is the MATES II study attributed approximately 70% of the cancer burden from air toxics to diesel particulates. In general the cancer risk in the U.S. is roughly 250,000 per million people exposed. The MATES II study found that the average cancer risk from all air toxics is roughly 1,400 per million people exposed. While we don't want to minimize the significance of the exposure to diesel particulates these types of characterizations of the risk must be corrected.

Sections 4 and 5, the financial and legal analysis are not complete or available for review at this time. This discussion must be changed to indicate that there has been no taskforce or public review of these sections prior to the deadline for comments on June 14, 2005.

Rail Industry

Introduction - Due to complex technical, legal, financial, and policy issues associated with Port activities and air quality, this NNI response should be considered a work in progress. These fundamental issues must be resolved and the necessary work completed, including proper CEQA review, before the report can be used for any purpose by any governmental body. We concur, therefore, with the following comments California Air Resources Board submitted on May 23, 2005:

- *"The draft report does not reflect the fact that the list of measures is a starting point for further evaluation by the entities responsible for implementing them and that the Technical Working Group did not do the level of review necessary to assume each measure can be implemented as initially outlined. ... We suggest that the document be modified to ensure the* *public understands that prior to implementation of any proposed measure additional evaluation and public process is necessary to ensure the proposed approach is technically and practically feasible for the application, can be implemented by adopting entity, is cost effective, and the impacts are fully understood.*

There has not been consensus on both the process used to develop the NNI Plan and its content by all members of the NNI Task Force. This should be clearly stated in the Executive Summary and the Introduction."

1.1. No Net Increase Definition and Policy Recommendations

To address community concerns about air quality and other impacts, Mayor Hahn requested action by the Board of Harbor Commissioners. In response to that request, the Board of Harbor Commissioners first defined NNI in an environmental policy established for the Port of Los Angeles on October 10, 2001. Board President Nicholas G. Tonsich stated, *"The Board is proud to establish this new environmental policy which sets a goal that there will be no net increase in air emissions or traffic impact from future Port operations."* [ii] Several months later, during the Port Community Advisory Committee (PCAC) meeting of March 21, 2002, Board President Tonsich stated the baseline date for NNI would be October 10, 2001.

To initiate action on meeting the goal, the Board of Harbor Commissioners directed Port staff to plan, schedule and carry out several environmental baseline studies to measure the impact of Port operations on the surrounding communities. The first step toward preparing a plan to meet the NNI goal was the completion of the Draft Port-Wide Baseline Air Emissions Inventory in June 2004, which established the baseline of Port-related emissions for 2001. The results of the first baseline Air Emissions Inventory for the Port of Los Angeles have been released, establishing the emissions from the Port for the NNI baseline year of 2001. An Executive Summary of the report is available in Appendix A.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 1.1 - It is important to note that No Net Increase applies to both air quality and traffic congestion. Accordingly, this report is incomplete since the traffic congestion issue has not been resolved. Future efforts by the Port should include this important issue.

1.2. Task Force Mission and Goals

When developing the Task Force, Mayor James K. Hahn and Councilwoman Janice Hahn recruited community, environmental, industry and regulatory stakeholders to work with Port staff collaboratively to prepare a Plan. In their introductory letter, Mayor Hahn and Los Angeles City Councilwoman Janice Hahn provided the mission of the Task Force *"…to build consensus on an innovative and realistic strategy to achieve 'No Net Increase' at the Port of Los Angeles."* [iii]

While the original charge to the Task Force was to have a Plan developed by the end of 2004, it became evident that additional time was needed, and an extension into Spring 2005 was requested of and approved by the Mayor in January 2005. The purpose of this extension was to allow for technical, legal and economic review of the Plan recommendations.

***Stakeholder Comments Received*:**

Pacific Merchant Shipping Association

Section 1.2 - We do not believe that this report accomplishes any of the stated goals of the Taskforce. There has not been adequate consensus achieved and many of the measures are not capable of being fully evaluated due to lack of financial, legal and implementation analysis. At this time we can only conclude that the goal for the Taskforce has not been met and we hope efforts to try and reach consensus on this important issue will continue. The original extension approved by Mayor Hahn was a response to the fact that the report could not be completed on the original schedule. For the same reasons we believe that this document should be delayed until the entire report is available for review by the taskforce and then submitted for public review in accordance with CEQA.

1.3. Task Force Members, Structure and Meetings

The Task Force membership, appointed by Mayor Hahn and Councilwoman Hahn, included representatives from regulatory agencies, various community stakeholders, Port customers, Harbor Department staff and environmental experts. The Task Force was chaired by Harbor Commissioners Camilla Townsend and Thomas Warren. A list of the Task Force members and their respective affiliations is provided in Table 1-1.

The first meeting of the Task Force took place on October 7, 2004. The Task Force established a schedule of meetings and identified the milestone accomplishments for those meetings. Meetings were open to the public for observation. Minutes were kept for all Task Force meetings and are available for review upon request.

***Stakeholder Comments Received*:**

Rail Industry

1.3 Task Force Members, Structure, and Meetings - While general Task Force meetings were open to the public for observation, much of the work was performed in a subgroup, the Technical Working Group ("TWG"), open for neither observation nor input by the public or affected stakeholders. While minutes were kept for all general NNI Task Force meetings and are available for review upon request, no such minutes were kept or exist for the TWG.

Table 1-1. No Net Increase Task Force Members and Affiliation.

Task Force Members	Affiliation
Camilla Townsend ***Task Force Co-Chair***	Harbor Commissioner/Port of Los Angeles
Thomas Warren ***Task Force Co-Chair***	Harbor Commissioner/Port of Los Angeles
LaDonna DiCamillo	BNSF Railway Company.
Miguel Lopez	International Brotherhood of Teamsters
Norm Tuck	International Longshore and Warehouse Union
Gail Ruderman Feuer	Natural Resources Defense Council
Sharon Rubalcava	Pacific Energy Partners
Andrew Fox	Pacific Harbor Line
Michele Grubbs	Pacific Merchant Shipping Association
Richard Havenick	Port Community Advisory Committee/ Air Quality Subcommittee
David Howekamp	Port Community Advisory Committee/ Consultant to Air Quality Subcommittee
John G. Miller, M.D.	Port Community Advisory Committee/ Air Quality Subcommittee
Noel Park	Port Community Advisory Committee/ Air Quality Subcommittee
David Mathewson	Port of Los Angeles, Director of Planning and Environmental Affairs
Ralph Appy	Port of Los Angeles, Director of Environmental Management
Barry Wallerstein	South Coast Air Quality Management District
Peter Greenwald (alternate)	South Coast Air Quality Management District
Zorik Pirveysian (alternate)	South Coast Air Quality Management District
Peggy Taricco	State of California, Air Resources Board
Lauren Dunlap	Take Note, Inc./Air Quality Consultant to the Port of Los Angeles
Carol Harris	Union Pacific Railroad Company
John Shiner (alternate)	Union Pacific Railroad Company
Deborah Jordan	United States Environmental Protection Agency
Bill Jones (alternate)	United States Environmental Protection Agency
Ed Avol	University of Southern California, Keck School of Medicine/Port Community Advisory Committee/Consultant to Air Quality Subcommittee

1.3.1. Technical Working Group

The Technical Working Group (TWG) was established at the instruction of the Task Force Co-Chairs. The TWG provided a small group of technical experts in air quality mobile source issues, State Implementation Plans (SIP), and port-related mobile emissions sources. The TWG members included:

- U. S. Environmental Protection Agency (EPA);
- California Air Resources Board (ARB);
- South Coast Air Quality Management District (SCAQMD);
- David Howekamp, consultant to the PCAC Air Quality Subcommittee and former Director of Air Programs for the EPA-Region 9;
- Professor Ed Avol, USC Keck School of Medicine and consultant to the PCAC Air Quality Subcommittee;
- Port Environmental Management Division; and
- Starcrest Consulting Group.

The TWG agreed that the most appropriate approach to NNI was to handle the issue in a manner similar to a SIP. Complicating the process was the extremely short time schedule to accomplish appropriate technical analysis and quality assurance. Instead of a full year or two, the TWG had to meet schedules that were measured in days and at most, two months. Technical analysis was conducted from November 2004 through May 2005 at an accelerated rate. Several issues associated with a lack of data or understanding had to be resolved in order to develop these initial findings. The group agreed that for issues arising from information that was not available or not fully understood, the group would select by default the option/scenario that produced the highest emissions estimates. This is a common practice used by air quality planners and agencies to safeguard against under-predicting emissions which would lead to any plan's failure. TWG members conferred regularly, spending thousands of working hours in phone conference calls and face-to-face meetings. Due to the extensive amount of work that had to be prepared to provide materials to the greater Task Force to discuss and debate, the TWG worked on a consensus basis internally until draft materials were of sufficient quality to be presented to the Task Force for their review.

The TWG developed various preliminary draft works for the Task Force, such as extensive candidate control measure lists, emissions growth estimates, and control measure emissions reductions, that were the starting point for the greater Task Force to review, debate, and make additions and recommendations. The TWG incorporated feedback from the Task Force, adding new control measures, deleting some measures, and modifying several others. The TWG then incorporated the comments from the Task Force and prepared for a two-day stakeholder meeting to get a broader industry perspective (industry stakeholders representing the railroads, terminal operators, shipping lines, and tanker operations were members of the Task Force and had provided input through the Task Force meetings) on the candidate control measures. The TWG incorporated the feedback from the stakeholder meeting and again presented the revised control measures to the greater Task Force. Task Force comments and suggestions were again incorporated into the measures. In addition, the TWG worked with the railroads and the Alameda Corridor Transportation Authority (ACTA) and their consultants to identify control efficiencies associated with the Alameda Corridor as well as to better refine rail growth estimates (discussed in Section 2.5).

It is important that the reader understands that the work products of the TWG were prepared to the best ability of the group with respect to a limited schedule and should be considered as a starting point for further evaluation by the entities responsible for implementing the various control measures identified and evaluated. This is due to the fact that the TWG did not have the time sufficient to do the level of review and quality assurance necessary to assume each measure can be implemented as initially and finally outlined. In addition, fundamental assumptions such as the relationship between cargo growth versus emissions growth are not clearly understood at this time and there are several sources that have their emissions growth tied to unrelated cargo types. The fact is that, for many measures, there are significant technical and logistical hurdles that need to be overcome prior to implementation. Many of these issues were outlined in the Implementation Issues section that was included in the control measure narratives. In addition, further refinement and study is needed to better predict how cargo growth and emissions growth by source category and cargo type are related. Prior to implementation of any of the purposed control measures, additional evaluation and public review is necessary to ensure that the proposed approach is technically and practically feasible, able to be implemented by the adopting entity, is cost effective, and that the impacts are fully understood.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

Section 1.3.1 - The abbreviated time frame for the Technical Working Group (TWG) to complete its work cannot be used to justify the unsubstantiated conclusions included in this report. No amount of caveats will stop people from extracting inaccurate information from this report and using it to support political positions. The discussion in this section just highlights the need for much more extensive research before this report can be approved.

The TWG process was not open to the industry, nor was sufficient background information provided to properly vet the material produced. The absence of any records of the TWG did not provide insight to the decision making process and why some recommendations and comments were incorporated and others were ignored.

We would also recommend that representatives of the maritime industry and engine manufacturers be part of the TWG in the future. The TWG findings should be considered preliminary estimates that must be fully vetted by the appropriate agencies and topic experts prior to basing any public policy decisions upon their work.

Rail Industry

1.3.1 Technical Working Group - The creation of the TWG produced a team composed solely of Port management, air regulators, and two consultants who represented only PCAC. The TWG isolated itself from other Task Force members and did not consult them on technical matters. Industry stakeholders were not permitted to participate in the deliberations or to have input on technical or policy matters.

South Coast Air Quality Management District
Section 1.3.1 - Suggest to revise the last sentence to state that "Prior to implementation of any of the proposed control measures, additional review will be conducted to further refine the technical feasibility and cost analysis conducted by the TWG and FWG and address the implementation issues."

Ed Avol
Section 1.3.1, last paragraph (p.6) – This paragraph seems overly and unnecessarily apologetic, almost defensive, for attempting to deliver on the charge to develop a No Net Increase plan. While it is certainly true that there was very limited time and that additional review would be valuable, and that improved information will improve the product, the fact remains that at this point in time, we did what we could.

I think it would be best to just delete the last paragraph (beginning with "It is important that the reader understands...") entirely. Section 1.5 (Intended Use of the Report) talks about updating as improved information becomes available, so I think the dynamic nature of the document is conveyed.

My concern is that the current Section 1.3.1 final paragraph makes it sounds as if this exercise was worthless because nobody knew what they were doing and did not have the time needed to figure out what to do...and that misrepresents and distorts the actual situation.

1.3.2. Stakeholder Meeting

The TWG conducted a stakeholder meeting on January 25-26, 2005 to provide a discussion forum for interested parties regarding the development and proposed implementation of NNI. Task Force members invited subject matter experts to discuss implementation of the individual draft control measures during the two-day meeting. Members from PCAC, San Pedro and Peninsula Homeowner's Coalition, the Pacific Merchant Shipping Association (representing terminal operators and shipping companies), the Natural Resource Defense Council (NRDC), the Coalition for Clean Air, the Association of American Railroads, Union Pacific Railroad, BNSF Railway Company, and Pacific Energy Partners (pipeline transporter of crude oil), along with other interested participants – including an independent trucking operator and harbor craft companies and operators – attended this meeting. Meeting participants freely exchanged ideas and provided information to the TWG about actual operations experience, as well as potential obstacles and solutions for implementing the control measures in the Plan. In addition, the meeting provided an opportunity for all participants, who will play a major role in the implementation phase, to fully understand the scope and impact of the NNI strategy.

Stakeholder Comments Received:

Pacific Energy Partners
Section 1.3.2. Pacific Energy Partners should be described as a "proposed marine terminal operator, crude oil storage and transportation by pipeline".

Rail Industry
1.3.2 Stakeholder Meeting - Stakeholders' concerns regarding technological infeasibility, lack of jurisdiction, lack of cost effectiveness, and potential for adverse unintended consequences of control measures went unheeded. At the conclusion of the Stakeholders Meeting, the TWG recessed into closed session and revised and developed additional and even more extreme and controversial measures. The

new measures were presented for the first time at the general Task Force meeting on March 2-3, 2005. They were included in the draft NNI Plan without any opportunity for review or comment.

1.3.3. Financial Working Group

During the March 2-3, 2005 Task Force Meeting, the Task Force Co-Chairs established an additional working group, the Financial Working Group (FWG). The FWG was established to conduct a financial analysis of each TWG control measure. The FWG includes participants from the Task Force and their respective stakeholder group(s), Port staff and expert consultants. During the initial meeting of the FWG, the participants decided that an additional subgroup should be formed in order to develop a preliminary analysis of the health-related cost benefits associated with implementation of the Plan. The Benefit Analysis Subgroup was then created to conduct this specific analysis. The financial analyses completed by the FWG and the Benefit Analysis Subgroup are provided in Section 4.

Similar to the TWG, the FWG had very limited time to compile cost data, and therefore it is important that the reader understand that the cost estimates should be considered as a starting point for further evaluation by the entities responsible for implementing the various control measures identified and evaluated. This is due to the fact that the FWG did not have the time sufficient to fully evaluate the cost impacts and implications for these measures. The costs are built on fundamental growth assumptions such as cargo growth that are not clearly defined at this time. The cost estimates should be viewed as order-of-magnitude preliminary estimates.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 1.3.3 - This section must be rewritten to indicate that at the time of this draft report none of the Financial Working Group (FWG) sections have been completed or submitted for review by the taskforce. There remain significant questions and issues associated with the Benefits Analysis. The financial analysis is still undergoing fundamental revisions and even the metric to describe the cost of the measures is uncertain but clearly is not a traditional cost/benefit analysis. Once completed the findings of the financial working group should be considered preliminary estimates that must be fully vetted by the appropriate agencies and topic experts prior to basing any public policy decisions upon their work.

Rail Industry
1.3.3 - Financial Working Group **-** *During the initial meeting of the FWG, at the urging of PCAC representatives and over the stated concerns of other affected stakeholders regarding lack of expertise within the Task Force and lack of adequate time for a credible effort, the Port formed an additional subgroup regarding the alleged health-related costs associated with air contamination. It should be noted that as a result of pending and threatened litigation, any attempt to identify health-related costs should clearly contain disclaimers that the views expressed do not represent a consensus on the part of the NNI Task Force or an admission on behalf of any Task Force member.*

Dave Howekamp
Section 1.3.3 - A paragraph should be added that describes the process for developing the benefits. This would parallel the paragraphs detailing how measure costs were developed. The paragraph would best be developed by CARB since they apparently are now going to produce the report on their letterhead.

Ed Avol
Section 1.3.3 – This paragraph seems overly and unnecessarily apologetic, almost defensive, for attempting to deliver on the charge to develop a No Net Increase plan. While it is certainly true that there was very limited time and that additional review would be valuable, and that improved information will improve the product, the fact remains that at this point in time, we did what we could.

1.3.4. Legal Working Group

The Legal Working Group (LWG) was also formed during the March 2-3, 2005 Task Force Meeting to address concerns raised about the scope of the Port's authority to regulate or require customer implementation of the control measures discussed herein. Created from Task Force members and stakeholder counsel firms, the LWG collectively identified jurisdictional issues and issues relating to authority to implement the identified measures. Section 5 of this document contains a more complete discussion, including the work that has been completed thus far regarding the legal ramifications around the implementation of the draft Plan.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 1.3.4 - The draft legal analysis has only been made available to the Legal Working Group (LWG) and not to the full Taskforce for review and comment. We recommend that the Taskforce postpone any action on this report without at least having the opportunity to review and comment on this critical section. The results of this subgroup will almost certainly impact the list of measures that can be implemented and therefore the inclusion of the measures under review of the LWG should be withdrawn until this work is completed and incorporated into the report. The LWG findings should be considered preliminary and until they are fully vetted by the appropriate agencies and topic experts.

1.4. Methodology Used to Develop Report

The Task Force was presented with draft work products developed by the TWG. The subsequent discussions developed the content and implementation strategies for the Plan while providing a venue for resolution of difficult issues. During the meetings, Task Force members identified and discussed elements of the Plan. During the interim between meetings, the TWG worked through the steps necessary for development of the Plan. The Task Force members, representing the various stakeholder groups, worked to discuss issues and control strategies, provided feedback to the TWG, and invited others to the meetings for discussion of draft control measures –to expeditiously create a Plan while functioning in the most transparent process possible.

Subsequent to the stakeholder meeting in January 2005, the TWG revised the draft control measures. These were then presented a second time to the Task Force members for review, discussion, consensus and recommendations. The FWG and LWG then took this recommended work product of the TWG and developed the financial and legal analyses, as discussed in Sections 4 and 5, respectively. Minority and dissenting views expressed to Task Force are provided in Section 9, and the remaining unresolved issues and areas of concern are presented in Section 10.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section1.4 - This section needs to be revised to indicate the lack of Section 4 (Financial Analysis), Section 9 (Legal Analysis) and the incompleteness of Section 10. It is also our understanding that there will be no minority reports and reference to that section should be deleted. As stated at the last Taskforce meeting, all Taskforce comments are expected to be included in the body of the report.

Rail Industry
1.4 - Methodology Used to Develop Report - From Rail's perspective, there was absolutely no transparency in the TWG proceedings. They were conducted behind closed doors. There was also no effort made to address the very significant procedural and substantive concerns that had been raised in the industry comments and at the Stakeholders Meeting.

1.5. Intended Use of Report

The draft Plan is intended to provide the Port of Los Angeles with a plan of defined implementation steps and goals to reduce emissions to 2001 levels, and ensure that future growth in Port operations is undertaken in compliance with the Plan. The Plan provides a roadmap of the identified measures potentially available to offset emissions related to Port operations, along with an estimate of the expected benefits associated with each measure.

This draft Plan is the first installment, initiating a systematic way to begin reducing emissions at the Port of Los Angeles. In order to remain effective, continual assessment will be required to check progress and improve the plan to ensure reductions are both achieved and then maintained. Revisions of the Plan will occur periodically to allow for adjustments based on current technology, new information and new emissions knowledge, as well as Port growth and the associated projections and emissions reductions.

This Plan is designed to respond to the changing climate and encourage innovation and technological development. An anticipated benefit is that the implementation of the Plan will also trigger operator innovation – that others will develop new methods, control techniques, or other ways to achieve the goals of the Plan.

The NNI initiative also has the potential to serve as a complementary effort to work underway by the Harbor Department, regulatory authorities and other governmental entities to reduce port-related pollution. Lastly, it is the hope of the Task Force that this Plan become a legacy document for the community and maritime industry, and chart the course for environmental stewardship in the Port.

Stakeholder Comments Received:

Pacific Energy Partners
Introduction, Section 1.5. Replace first sentence with the following: The NNI Plan is the task force's response to Mayor Hahn's letter of August 26, 2004, asking the task force to "build consensus on an

innovative and realistic strategy to achieve "No Net Increase" " and to include "specific initiatives and technologies". I think the report should use the Mayor's language in the letter. In the second sentence substitute "list" for "roadmap".

Pacific Merchant Shipping Association

Section 1.5 - The statement that the NNI Plan is intended to provide "a plan of concrete implementation steps" should be followed by acknowledgement that no implementation steps have been completed to date. In order to remain effective, continual assessment will be required to identify errors, incorrect estimates or assumptions, check progress and improve the plan to ensure reductions are both achieved and then maintained.

Rail Industry

1.5 - Intended Use of Report - The primary intended use of the draft NNI Plan is to respond to Mayor Hahn's request for no net emission increase goals which may be submitted to the City Council for its determination as to the next step to be taken, including CEQA.

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[i] The TEU is the standard metric utilized in the container industry. It represents a twenty-foot container. Containers generally come in two sizes, twenty and forty feet. Therefore, a forty-foot container is equivalent to two TEUs. Approximately 20.5 percent of the containers are twenty foot. Therefore, 7.3 million TEUs is equivalent to 4 million containers.

[ii] Port of Los Angeles Press Release. October 10, 2001.

[iii] Letter to Mr. Larry A. Keller, Executive Director, Port of Los Angeles from Mayor James Hahn and Los Angeles City Councilwoman Janice Hahn, District 15. August 6, 2004.

2. BACKGROUND INFORMATION

This section presents the background information or context for which the Plan was developed including a summary of the air quality of the local air basin, growth projections for cargo throughput for the Port, and projected emissions associated with these growth scenarios.

2.1. Statement of Air Quality Problem and Existing Conditions

The Port is located within the South Coast Air Basin (SoCAB). The SoCAB consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties and all of Orange County. The SoCAB covers an area of approximately 6,000 square miles and is bounded on the west by the Pacific Ocean; on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains; and on the south by the San Diego County line.[i]

Air quality at a given location can be characterized by the concentration of various pollutants in the air. Units of concentration are generally expressed as parts per million by volume (ppm) or micrograms per cubic meter of air ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate national or state ambient air quality standard. These standards represent the allowable atmospheric concentrations determined to be protective of public health and welfare, on the basis of recent available information. They include a reasonable margin of safety to protect the more sensitive individuals in the population, and are required by law to be periodically reviewed and updated.

The EPA establishes the National Ambient Air Quality Standards (NAAQS). The ARB establishes the California Ambient Air Quality Standards (CAAQS), which are generally more stringent and include more pollutants than the NAAQS. Pollutants that have corresponding national or state ambient air quality standards are known as criteria pollutants. The criteria pollutants of primary concern include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and particulate matter less than 10 microns in diameter (PM_{10}). PM_{10} produced by diesel fuel combustion is also important because of its toxicity in humans. Other criteria pollutants include, lead (Federal and California standards), vinyl chloride and sulfates (California standard only).

Local Air Monitoring Levels

The EPA designates all areas of the United States according to whether they meet the NAAQS. A non-attainment designation means that a primary NAAQS has been exceeded more than once per year in a given area. The EPA currently designates the SoCAB as an "extreme" non-attainment area for 1-hour O_3 "severe 17" for 8-hour O_3 and a "serious" non-attainment area for both CO and PM_{10}. The SoCAB has also recently been designated a non-attainment area for $PM_{2.5}$. The SoCAB is in attainment of the NAAQS for SO_2, NO_2 and lead. The SCAQMD recently requested the EPA to redesignate the SoCAB from non-attainment to attainment of the federal 1- and 8-hour average CO standards. ARB also designates areas of the state according to whether they meet the CAAQS. A non-attainment designation means the CAAQS has been exceeded more than once in three years. ARB currently designates the SoCAB as a non-attainment area for ozone and PM_{10}. The SoCAB is in attainment of the CAAQS for CO, SO_2, NO_2 and lead.

Stakeholder Comments Received:

Pacific Energy Partners

Background, Local Air Monitoring Levels. I think the second sentence would be more accurate if it read as follows: The SCAQMD has 28 permanent monitoring stations in the South Coast Air Basin. A non-attainment designation means that a primary NAAQS has been exceeded more than once a year at any one of these monitoring stations. The fourth full paragraph on page 10 might be a better fit if it appeared in the section above (it doesn't relate to TACs). On page 10, the last paragraph seems to duplicate the first two paragraphs of this section. I'd considered deleting it.

Toxic Air Contaminants

Toxic air contaminants (TACs) include air pollutants that can produce adverse human health effects, including carcinogenic effects, after short-term (acute) or long-term (chronic) exposure. In 1998, ARB identified diesel particulate matter as a toxic air contaminant and initiated a statewide risk management process with the publication of the Diesel Risk Reduction Plan in 2000.[ii] Emissions from diesel-fueled engines contain potential cancer-causing substances such as arsenic, benzene, and formaldehyde, among others. Research studies show that exposure to emissions from diesel fueled engines may cause negative health effects including cancer in humans and animals, and other non-cancer damage to the lung.[iii] A report entitled "Health Effects of Diesel Exhaust Air Pollution," by Dr. John Miller for the Environmental Subcommittee/Air Quality Group was forwarded to the Board of Harbor Commissioners via the PCAC August 28, 2003. This report is included as Appendix E.

In 2000, the South Coast AQMD released the results of MATES II. This study estimated that the average excess cancer risk in the SoCAB was 1,400 per million, with 71percent of all risk attributable to DPM. The highest excess cancer risk levels were calculated for Wilmington at 1,531per million. This study made exposure measurements of several identified air toxics in ambient air at multiple locations across the Los Angeles Basin and developed exposure risk isopleths (geographical plots of concentration) to estimate cancer risk, based on cancer risk factors provided by the State of California. Modeling conducted for MATES II showed the Port area to be one of the areas of highest estimated risk and significantly impacted by DPM.

The federal Clean Air Act requires all areas that are classified as non-attainment for the NAAQS to develop a plan for implementing standards for achieving attainment of non-attainment pollutants. As discussed above, the SoCAB is considered a non-attainment area for the NAAQS for O_3, CO, PM_{10} and $PM_{2.5}$. The plan, known as the SIP, requires a full accounting of all emissions of non-attainment pollutants in the air basin, and presents proposed plans, programs, and strategies to meet the NAAQS. The California SIPs have been accounting for the emissions from the Port's emissions sources. Emission inventories that are compiled for the SIP report SoCAB-wide emissions for mobile sources. These inventories do not disaggregate or separate out the emissions from trucks, rail and cargo equipment that stem from Port-related activity. The latest 2003 Air Quality Management Plan for SoCAB indicates that significant reductions from both on-road and off-road mobile sources, including the ports, are needed for this region to demonstrate attainment with ozone and $PM_{2.5}$ ambient air quality standards.

In 1998, ARB formally identified DPM as a TAC, after ten years of study. Following this action, the air toxics problem from diesel exhaust emissions was tied to multiple locations in the air basin, including the San Pedro Bay ports – the Port of Los Angeles and the Port of Long Beach. MATES II findings linked San Pedro Bay activity with a higher than (basin-wide) average cancer risk based on models that evaluated sources of TAC emissions and potential impacts associated with those emissions.

Stakeholder Comments Received:

Rail Industry

2.1 Statement of Air Quality Problem and Existing Conditions - Toxic Air Contaminants - The MATES II Report estimated the potential health risks of air toxics, including diesel particulate matter (DPM). The DPM numbers used were derived from either measured elemental carbon used as a surrogate for DPM at several sites, or dispersion modeling of estimated DPM emissions, and were not derived from actual DPM monitoring data. The methodology employed resulted in DPM being identified as the largest potential contributor and resulted in many sources, including those in and around the Port, being identified as opportunities for DPM emissions reductions in the air basin. Furthermore, the risk estimates derived using modeled DPM concentrations in the MATES II Report were greater than those derived using the "measured" values and the modeled risk estimates were the primary focus by stakeholders and the media. The MATES II results, and the reaction to them, became one of the initial reasons for developing the NNI policy and the NNI report.

Given the goal of the NNI to serve as an accurate and effective tool for developing reasonable emissions goals for the port, the methodology, the accuracy, and uncertainty of the MATES II Report with respect to estimates of Port emissions must be critically evaluated. In the MATES II Report, the concentration of DPM was derived from estimates of a surrogate, elemental carbon, from very limited, offsite air monitoring data measurements. Estimated emissions for DPM were calculated in a different part of the study area and input into an air dispersion model to estimate potential air concentration of DPM. The calculated values should have been then compared to the measured values, but they were not. Had they been compared, the report would have noted the very large difference in modeled versus measured values. The use of two different methods to estimate DPM air concentrations resulted in two very different answers.

The monitoring data utilized in the MATES II report did not indicate the Port is the primary source of DPM in the basin. The MATES II site with the closest proximity to the POLA/POLB complex is the Long Beach site, and that site reported one of the lowest concentrations of overall risk and DPM related risk, as compared to the other 7 sites that measured elemental carbon.[1] This should be contrasted with the modeled data that indicated that predicted higher concentrations of DPM near the Port area than that modeled at most all of the other sites. In fact the modeled data gives the opposite results of the monitoring data, with the highest levels found in the northern, not in the southern part of the basin. The different methodologies result in opposite conclusions.

There are two likely reasons for these confounded results: 1) the modeled results are based on data that is highly uncertain, such as source emission rates and meteorology, and/or inaccurate assumptions; or 2) the monitoring data lacked the spatial resolution to describe the emissions/dispersion complexities.

[1] The two sites with lowest estimated potential cancer risk based on monitoring data are Anaheim and Long Beach and these estimated risk values are virtually identical as shown in Figure 3-4.

In order for the NNI policy to be effectively designed to achieve a reduction in air toxics emanating from the Port, it is critical to accurately identify and describe the sources of air toxics, including as appropriate DPM, contributing to the Port's emission inventory. Second, the modeling approach used to predict the concentration of air toxics in the air in and around the Port now and into the future, with a reasonable degree of certainty, must incorporate accurate data and representative assumptions. Lastly, actual monitoring data must be collected to validate the accuracy of the modeled estimates to determine whether the control strategy as developed and implemented is effective in achieving the predicted results. If actual monitoring data vary from modeling input, refinements to the modeling and control strategy will be warranted.

The TWG has employed a variation of the SIP methodology (using an air toxics adaptation of the UAM-4 photochemical model), which is useful in predicting approximate air concentrations from large source inventories in large geographic areas. However, this methodology, as applied by the SCAQMD, has significant limitations in estimating exposure or potential risks to any person or discrete location within the discrete Ports area. The UAM-4 model is old and out-of-date, and does not incorporate the latest advection and dispersion science. Other, recently developed, dispersion modeling treatments, such as CAMx (with integrated air toxics and plume resolution treatment), would be more appropriate for more refined assessments. As detailed, near-field (less than 2 km) assessment of air toxics impacts is best carried out by a combination of a CAMx level regional model and a sub-grid scale model such as the plume-in-grid technique embedded in CAMx, or the ISC series of models. Such an approach is more likely to have the ability to serve as an appropriate basis for a definitive planning tool for NNI.

Finally, the MATES II Studies have received extensive comments questioning the protocols used and the findings. Industry and business representatives believe, for instance, that the attribution to the Ports of Los Angeles and Long Beach of the emissions associated with movement of global, national, state, and local goods 50 miles out to sea and emanating from the entire South Coast Air Basin is both inappropriate and inconsistent with the analysis performed for other sources in California. Analytical approaches such as these have resulted in the misidentification of emissions associated with global consumer goods movement to single points in a complex and extensive goods movement system. As a result, a MATES III Study is underway which will, hopefully, address and allay those issues and concerns. A draft, however, is not due until January, 2006. It is premature, therefore, to include or rely on information presented in MATES II in the NNI report, until the stated concerns are addressed.

South Coast Air Quality Management District

Response to Industry Comments Regarding MATES-II Results

Rail has filed a comment letter stating that the SCAQMD did not, as part of MATES II, compare the monitored and modeled ambient levels of elemental carbon. This is not correct. As shown in Tables 5-1 and 5-3 of the MATES II report, the modeling results were compared with monitored data. Contrary to Rail's assertions, this comparison showed, relative to diesel particulate emissions on a region-wide basis, that the modeled risk is somewhat lower than the monitored risk. Given the uncertainties in emissions inventory (in particular, speciated particulate matter emissions), the elemental carbon modeled result may be higher or lower than measured data on an individual site basis. The modeling analysis underestimated elemental carbon at six of the eight sites that have elemental carbon measurements. Although the model overestimated elemental carbon at the Long Beach site, the modeling result is within 17 percent of the monitored value. While we do not expect the model results to agree at every location, the relative risk is the more important result. The relative risk of diesel emissions at the Long Beach site to the overall modeled risk is 76 percent compared to about 70 percent based on monitored data.

The monitoring and modeling analyses conducted for MATES-II represented the state-of-knowledge at the time. Measurement and modeling methodologies are continually enhanced. As such, the monitoring and modeling analyses for MATES-III will be based on the most current state-of-technology, which includes new laboratory methods and newer computer simulation models. The newer methodologies may give different values, but we have no reason to believe that they will alter the validity of the overall conclusions of MATES-II.

Action Required

With the release of the MATES II findings, the local communities of San Pedro and Wilmington began lobbying for action to be taken to reduce the risks associated with exposure to DPM. In response to concerns raised by the local communities, Mayor Hahn responded when he declared the NNI Policy and directed the Board of Harbor Commissioners to take the necessary steps to meet that goal.

To initiate action on meeting the NNI goal, the Board directed Port staff to plan, schedule and carry out several environmental baseline studies on the impact of Port operations on the surrounding communities[iv]. Staff prepared the Concept Plan for the Port-wide Environmental Studies in December 2001. This Concept Plan combined several of the original air quality initiatives into a single Air Studies Program to be implemented, including:

- Preparation of a baseline air emission inventory;
- Preparation of a health risk assessment of Port emissions on local communities, based on monitoring for ambient levels of particulate matter, specifically diesel particulate matter;
- Implementation of a Port-wide monitoring system to more accurately document ground level concentrations of pollutants; and
- Development of diesel emission control mitigations necessary to achieve the Board's goal of no net increase in Port emissions.

The Port, in coordination with the PCAC Air Quality Subcommittee, then began to develop a Port-wide Baseline Air Emission Inventory. The Port had to definitively clarify what sources were present, how much of each type, then quantify their emissions and respective contributions to the sum of Port-wide emissions. This was a necessary step in order to develop the proposed control measures contained in this report.

To date, the first ever Port-Wide Baseline Air Emission Inventory is completed, the Board of Harbor Commissioners has implemented several diesel emission control mitigation measures, and is ready to initiate the health risk assessment. Ambient air monitoring has commenced and will be carried out for a one-year period.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

Section 2.1 **-** *While we acknowledge the ground breaking MATES II study, we also understand the limitations of that work in the absence of Port specific inventory information. Clearly there is a need for a more focused approach to identify the health impacts of Port operations. The Port should be commended for its efforts already underway to give this more detailed assessment using site specific monitoring and a future health risk assessment based on the Port's emission inventory. Until this work is completed we believe it is premature to draw conclusions from the broader MATES II study.*

Rail Industry

Action Required - Given California's unique emphasis on environmental protection, California is the first and only State to identify diesel exhaust as a toxic air contaminant and to adopt control measures designed to reduce potential exposure to and corresponding health risks from diesel exhaust. In conjunction with *these actions, the SCAQMD conducted MATES II which included monitoring data indicating measured levels were much lower in some locations than that predicted by the air models and subsequently used to derive estimates of potential cancer risk.*

2.2. Emissions Inventory

Until the Port-wide Baseline Emissions Inventory was completed, there were no previous studies tracking emissions from rail, trucks and cargo handling equipment tied directly to the Port sources. The closest study in existence at that time is the Arcadis Marine Vessels Emission Inventory 1999 Update (prepared for the SCAQMD). This report, completed for California's SIP, compiled a marine emissions inventory for ocean going vessels and commercial harbor craft.

The Port-wide Baseline Emissions Inventory (Inventory) is a comprehensive activity-based inventory that estimates emissions (associated with Port operations), focusing on emissions of DPM. The baseline calendar year for the emissions inventory is 2001, concurrent with the NNI Policy adopted by the Board of Harbor Commissioners. The Inventory does not include stationary sources, as these are included and monitored in the stationary source permitting programs administered by the SCAQMD[v]. Annual baseline emissions estimates for 2001 were developed for:

- Oxides of nitrogen
- Total organic gases (TOG)
- Carbon monoxide
- Particulate matter less than 10 microns in diameter
- Particulate matter less than 2.5 microns in diameter
- Diesel particulate matter
- Sulfur dioxide

The Inventory provided the Port with a planning document for development, prioritization and implementation of emissions control strategies. Completed in June 2004, development of the Inventory was coordinated with the EPA, ARB and SCAQMD and has been extensively reviewed by the PCAC Air Quality Subcommittee and their technical consultants. The Inventory has been used as the basis for projecting emissions growth for the NNI program.

NOx and PM were originally tracked in projections and reductions strategies because of their importance to the Task Force. It was decided by the TWG that if time allowed, the other pollutants would be tracked; time was not available during this process to add the other criteria pollutants,

The Port will move forward in July 2005 to start the 2004 update to the inventory with the intent on gathering data to better resolve several assumptions and issues that were identified during the inventory development (and documented in the report) and post report publishing comments. There are several areas of interest that will be improved. For example, ocean-going vessels (OGV) transit emissions are based on the conservatively high assumption that all ships transit the fairway (between the study area and the precautionary zone) at sea-speed (97percent of the Lloyd's published speed).

This condition did not exist in 2001 as not all ships transited at sea-speed (a physically impossible condition) and in the 2004 update actual radar speeds from the Marine Exchange will be used for every ship calling on the Port. Therefore, the over-estimated transit emissions will be corrected by the use of actual speeds, which will have a significant effect. Another area of interest is reviewing the rail emissions within the South Coast Air Quality Basin, as the data provided for the 2001 baseline did not include "throttle-notch" data (activity was provided in a "ton-mile" format) which is the preferred agency method for estimating rail locomotive emissions. The resulting estimated rail emissions in the baseline inventory appear to under-estimate the emissions when compared with the Air Quality Management Plan developed by SCAQMD. Other examples to be better defined include OGV hotelling engine loads, heavy-duty diesel truck speeds on Port and nearby highways, load factors, and emissions factors.

Stakeholder Comments Received:

Rail Industry
2.2 - Emissions Inventory - The Port-wide Baseline Emissions Inventory (Inventory) is an inventory that estimates emissions for the entire South Coast Air Basin and emissions 40-50 miles out to sea. This approach misrepresented actual Port emissions that should be addressed by this NNI effort.

Ed Avol
Section 2.2, paragraph 4 and elsewhere – In several locations in the text, reference is made to a 2004 Inventory that will be initiated in July (2005). It would be clearer to the reader to describe this as "…an updated inventory, based on 2004 activities…" or some similar manner.

2.3. Emissions Source Categories

Emission source categories for the draft Plan mirror those developed for the Inventory and include five source categories:

- Ocean-going vessels,
- Harbor craft,
- Off-road cargo handling equipment,
- Railroad locomotives, and
- On-road heavy-duty vehicles (trucks).

Emissions estimates were developed for these sources occurring within Port boundaries and within the SoCAB. For purposes of the Inventory, the truck emissions are included to the first cargo delivery drop-off location beyond the Port. This section presents a brief description of the five source categories.

Ocean-Going Vessels

This category consists of vessels that regularly transit to and from international waters, usually flag of convenience (foreign-flagged) cargo vessels. OGV emissions are included out to the SoCAB boundaries of the California coastal waters. The types of vessels that call at the Port include: auto carriers, bulk carriers, containerships, cruise ships, general cargo ships, ocean-going tugboats, refrigerated cargo vessels, roll-on roll-off ships, and liquid bulk tankers.

Stakeholder Comments Received:

Pacific Energy Partners
Section 2.3, under OGV. Please add explanation of the geographical extent of "California Coastal Waters" to point out how to far to sea the CCW extends. SCAQMD should have something.

Harbor Craft –(HC)
The harbor craft category consists of vessels that operate almost exclusively in US waters, including tugboats, ferries, commercial fishing vessels, excursion boats, pilot boats, etc. Initially Port harbor craft operators and marina managers were interviewed to develop a harbor craft list. Subsequently, ARB's 2002 Statewide Commercial Harbor Craft Survey and Pleasure Craft Exhaust Emissions Inventory were relied upon as a supplement to this information. The harbor craft were separated into the following categories: assist tugboat, towboats and push boats, ferries, excursion vessels, crew boats, work boats, government vessels, dredges and dredging support, commercial fishing vessels, and recreational vessels.

Cargo Handling Equipment –(CHE)
The equipment in this category is dedicated to a specific terminal for cargo transfer purposes. CHE moves cargo within terminals and other off-road areas. CHE are considered off-road equipment and are therefore covered by off-road standards. Included in this category are yard tractors, top-picks, side-picks, rubber-tired gantry cranes and forklifts.

Railroad Locomotives
The rail category includes both mainline and long haul "Class A" railroad locomotives transporting Port-related cargo within the SoCAB, as well as in-port switching operations. It is important to note that railroad operations are typically described in terms of two different types of operation - line haul and switching. Because of different types of information provided by the railroad companies, emissions were estimated using two basic methods. For most of the switching activities, emissions estimates were based on the percentage of time spent in the different throttle-notch settings. For line haul activities (and a limited amount of switching activity), fuel usage was used as a surrogate measure of the level of activity of the locomotives.

Stakeholder Comments Received:

Rail Industry
Railroad Locomotives (R) - *The rail category includes locomotives operated by the two Class 1 railroads, BNSF Railway (BNSF) and Union Pacific Railroad (UP), to transport Port-related and other freight traffic within the Basin as part of performing interstate rail service on their respective rail systems which extend throughout the western United States and into Canada and Mexico.*

Heavy-Duty Vehicles –(HDV)

This category is used for diesel-fueled on-road trucks, including those trucks that carry Port related cargo throughout the SoCAB. A Port-specific HDV model year distribution was developed by ARB and the SCAQMD by querying over 7,000 license plate numbers obtained from local terminals against the California Department of Motor Vehicles (DMV) registration database. For estimating on-terminal HDV emissions, terminal operators were interviewed regarding on-terminal traffic patterns, including time spent waiting at the entry gate, time and distance on-terminal while dropping off and/or picking up cargo, and time spent waiting at exit gates. Off and on-terminal emissions were estimated by multiplying the appropriate emission factor by the time and distance parameters established for the terminal operators. Truck emissions are included to the first cargo delivery drop-off location beyond the Port

Other

The TWG also created an "Other" category with draft control measures that do not fit into the five categories listed above. These Other draft control measures represent additional strategies that may be enacted in the event NNI is not being achieved; however, they are policy decisions and are not included as part of the Plan's draft control measures. Examples of draft control measures for the Other category include emissions related to construction and terminal reconfiguration within the Port. There were no credits taken and no emissions reductions modeled for the Other measures.

Estimates were developed for emissions from all sources (excluding Other) occurring within Port boundaries and within the South Coast Air Basin. Inventory estimates for NO_X and PM_{10} are shown in the Table 2-1 below:

Table 2-1. NOx and PM_{10} Emissions by Source Category, tons per year (2001 Inventory Estimates)

	NO_X		PM_{10}	
	In-Port	**Regional**	**In-Port**	**Regional**
Ocean-Going Vessels	1,967.6	6,922.7	68.8	560.9
Harbor Craft	1,968.0	3,530.7	99.7	178.0
Cargo Handling Equipment	1,862.6	1,862.6	111.6	111.6
Railroad Locomotives	445.9	2,465.8	9.9	60.1
Heavy-Duty Vehicles	872.5	4,463.5	24.4	87.9
Total Port-Related	**7,116.6**	**19,245.3**	**314.4**	**998.6**

Stakeholder Comments Received:

South Coast Air Quality Management District

Table 2-1 - Please double check the OGV emissions. Based on the "calculator", the region wide emissions should be 6898 and 558 tons per year of NOx and PM10, respectively (unless we do not have the latest version).

The Inventory percentage of total emissions by source category is shown below for NOx in Figure 2-1 and for PM_{10} in Figure 2-2:

Figure 2-1. Percentage of Port NOx Emissions by Source Category (2001 Inventory Estimates)

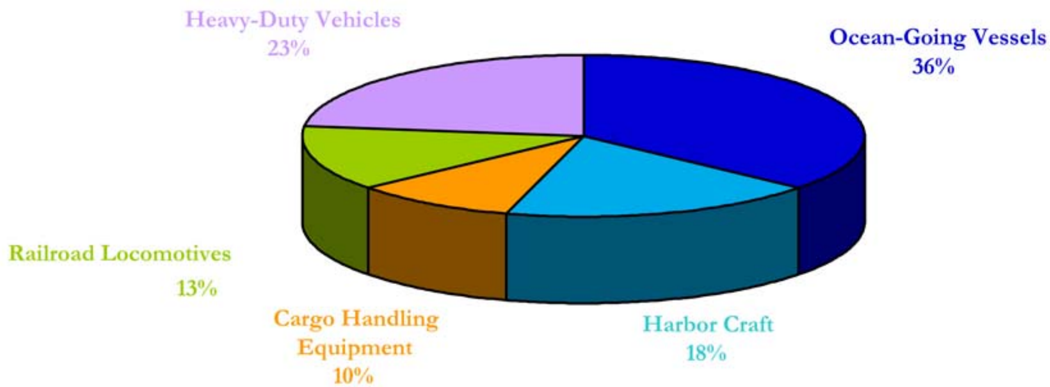
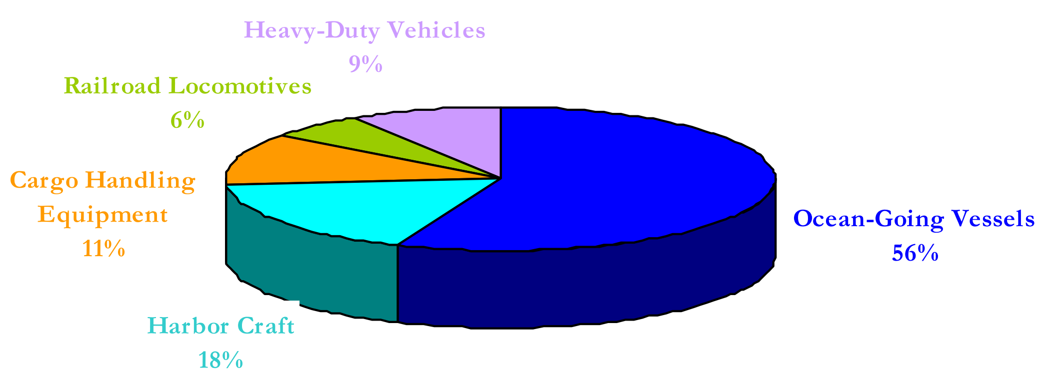


Figure 2-2. Percentage of Port PM_{10} Emissions by Source Category (2001 Inventory Estimates)



2.4. Port and Emissions Growth Projections[vi]

There are two critical principles that govern all TWG and FWG work: 1) future growth in cargo activity, and 2) the relationship between growth in cargo activity and emissions levels. Both of these principles are extremely complex and include numerous variables, which at this time are not completely understood. The assumptions made regarding these two principles are the most critical for this evaluation because they directly impact how and when NNI can be achieved and the cost to achieve it.

Cargo volume growth at the Port is projected to steadily increase over the next 20 years. This increase is a result of the Port's existing infrastructure, rising consumer demand for globally manufactured products, and increases in regional/national population. Increases in global trade have created an influx of imported products and a correlating increase in raw material export for California and the United States.

The Port has provided future container cargo volume demand estimates via the development of both unconstrained cargo growth projections (the "Mercer Report") [vii] and future terminal throughput capacity estimates (the "JWD Study").[viii] Container-related emissions sources represent the dominant cargo-related emissions type at the Port. The Mercer Report is based on unconstrained container cargo volume growth, which means it estimates container cargo volume growth without taking into consideration any landside infrastructure constraints or "bottle-necks" in moving cargo into and out of the Port. Using the Mercer Report container cargo volume growth projections represents the highest emissions estimate scenario, from an aggregate emissions perspective. The JWD Study looks at the Mercer Report growth projections and then takes into consideration the landside constraints that would currently limit growth, resulting in an adjusted constrained growth estimate.

Its important to note that growth forecasting into the future is only as good as the assumptions used at the time of the forecast. These assumptions must be checked and updated, and forecasts need to be checked against actual growth conditions. The TWG agrees that as actual data becomes available it should be incorporated into the process, replacing forecasted estimates. Since growth forecasting is not an exact science, the TWG decided that by using the unconstrained Mercer Report growth projections (highest growth projection) that the NNI program would have a greater chance of success, especially if the actual growth in cargo volume turns out to be less. This highlights the need for constant update and review of base technical documents and studies so that forecasting methodologies can be improved to provide more accurate projections.

There were no cargo growth projections for the other cargo types (bulk liquids, cruise lines, autos, general cargo, dry bulk, etc.) that call at the Port. The TWG recommends that growth projections be developed to provide a clearer picture of the other cargo types that are handled at the Port. To consistently be conservatively high on emissions estimates, the TWG agreed to use container cargo growth levels to represent all cargo growth types and related emissions sources.

The Port is currently working towards an update to the Mercer Report late in 2005-06. The results will be incorporated into the out year projections.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

Section 2.4 - We agree that growth forecasting is not an exact science and understand that the TWG decided to use the unconstrained Mercer growth projections in the absence of any better information. However, allocating public funding, or establishing command and control requirements based on faulty estimates could invite legal challenge. This highlights the need for the full review under CEQA and constant review of technical documents so that forecasting methodologies can be improved to provide more accurate projections prior to the adoption of public policy based on these estimates.

For all ocean going vessels the growth is tied selectively to the Mercer container cargo forecast even though it is clear from the Mercer study and historical data that other types of cargo including, liquid bulk, dry bulk and break bulk are not expected to grow at anywhere near the rate of container growth. In some cases the growth is actually predicted to be negative. This results in a major overestimation of ship emissions since roughly fifty-percent of ships calls are not container ships.

Rail Industry

2.4 - Port and Emission Growth Projections - Early in the NNI process, the Task Force recognized it was essential to gain consensus on activity growth levels and supporting assumptions. These assumptions are used to project growth in emissions as the assumed growth emissions dictate: 1) the magnitude of control measures necessary to return to the 2001 baseline, and 2) the resulting burdens and costs of achieving NNI. However, in each instance the TWG chose the scenario that was most extreme and produced the most adverse emissions impacts without consulting the involved industry stakeholders.

South Coast Air Quality Management District

Section 2.4 - Port and Emission Growth Projections - In this sections and several other sections, it is incorrectly stated that the TWG decided to use the unconstrained Mercer growth projections. Our understanding was that the 422% TEU growth projection (2001 to 2025) was based on a hybrid of two studies namely Mercer and JWD (with JWD considering the landside constraints). Therefore, these statements should be corrected or clarified. Same type of language is also mentioned in Section 2.5 (first sentence), Section 3.7 (second paragraph), Section 6.4.2 (second paragraph), and Section 10.

2.5. Development of Emissions Growth Scenarios by Source Category

As discussed above, the TWG decided on using the Mercer Report's unconstrained container cargo volume growth projections for all cargo types, and then evaluated each source category as how to project emissions in the out-years. It's important to note at this time that, like cargo growth forecasting, it is not clear how growth (especially container cargo growth) will affect emissions in the future. This is further complicated by not knowing exactly what size ships will be calling at the Port in the future, what specific modifications the Port's terminals are planning in the future to accommodate cargo throughput increases, what engine technologies will be coming online, and how the entire cargo movement system will become more or less efficient (i.e., to what degree will bottle-necks bring inefficiencies). There are a number of overarching, specific, interrelated, and independent variables that can all play a role in the future emissions profile. The first opportunity to look at this issue in a detailed manner will occur when comparing the 2001 baseline inventory with the 2004 Port-wide inventory update, expected to be completed in 2006. With an understanding of what is not known at this time, the TWG used the same approach as it did in for future cargo growth - select the highest related (where possible) growth rate until better data is available.

The TWG developed future activity growth scenarios for each source category identified in the inventory in order to model projected emissions growth. The future activity growth scenarios are described briefly below, and accompanying figures illustrate the final activity growth projections and the relative PM_{10} emissions growth for each scenario by source category for 2005, 2010, 2012, and 2025. The projected emissions growth rates incorporate emissions reductions that will be realized through almost all of the regulatory measures that have already been adopted to date (this is represented by the green line in the figures).

Stakeholder Comments Received:

Ed Avol

Section 2.5, paragraph 2, last sentence – "…realized through almost all the regulatory measures that have already been adopted…" is a meaningless and confusing description. If all regulatory reduction measures were not estimated and accounted for, say this explicitly.

The TWG analyzed growth rates based on three different scenarios for each emission source category. The scenarios within each source category varied depending on the assumptions for growth projections unique to that source category. It is important to recognize that two primary approaches were utilized for growth projections: those of published studies, and the actual cargo growth change over time for the last few years. Ultimately, the TWG used the higher of those two projections as a conservative basis for necessary emissions estimations.

Stakeholder Comments Received:

Pacific Energy Partners

Section 2.5, first paragraph, last sentence. This sentence is confusing. I'm not sure what you're trying to say. Page 19, under OGV discussion, add at the end: Based on the California Energy Commission report, Pacific Energy Partners believes that the growth in crude oil imports will be substantially less than the 422% assumed growth factor.

Pacific Merchant Shipping Association

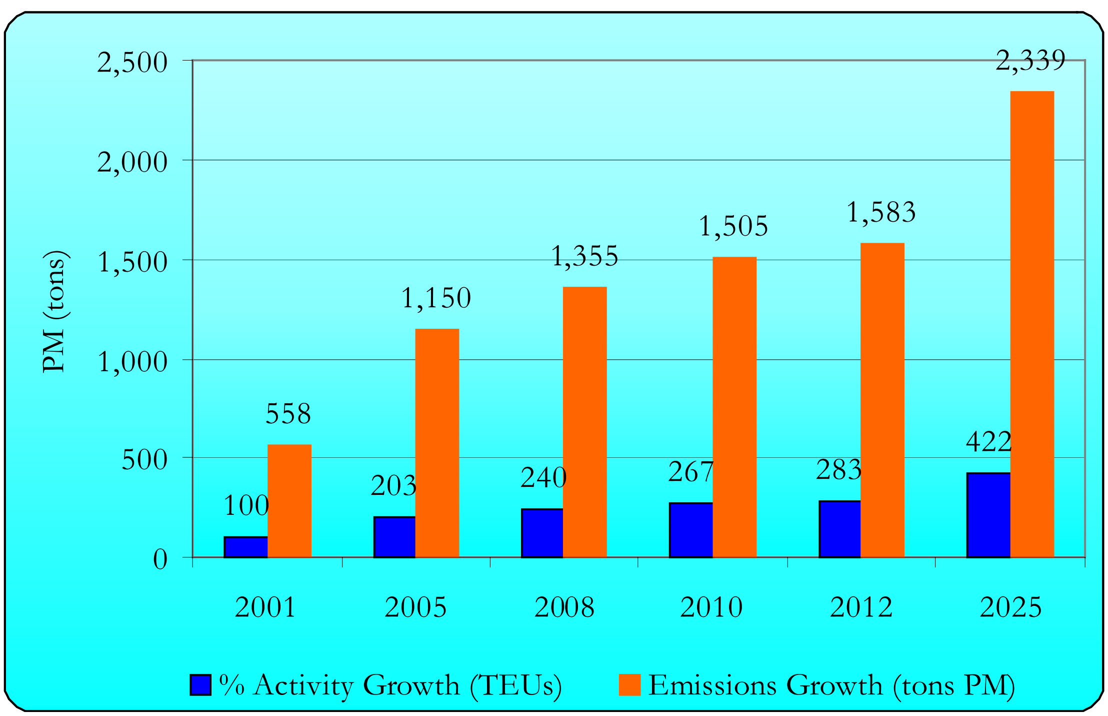
Section 2.5 - The use of the highest estimated growth for each source category until better data is available is a weak justification. In some cases better data was ignored, such as the Mercator vessel forecast study, in other cases growth predictions were just made up with the only objective being to maximize the level of estimated emissions. The approach taken should be revised to use the best information available and to provide a discussion of the weakness of the methods used and a clear course of action to address those weaknesses.

The text in this section does not match the discussion in other sections. The years assessed does not include 2008 although that year is used in every subsequent analysis. The discussion states that three scenarios were developed for each source category but then later refers to two primary approaches that were utilized and that the higher of the two projections was used. This discussion needs to be clarified.

There is no evidence to correlate container growth as a metric to other types of cargo. The Mercer growth forecast shows that the rate of growth of containers does not apply to liquid bulk, dry bulk and break bulk cargos. For most source categories this will have little effect but for Ocean Going Vessels this results in a *huge overestimate of ship emissions since non-container vessels make up approximately half of the ship calls at the Port. The inherent overestimation of applying TEU growth to all source categories must be discussed in full or the reader will be led to believe that it is an accurate surrogate for all activities in the Port which is clearly not true.*

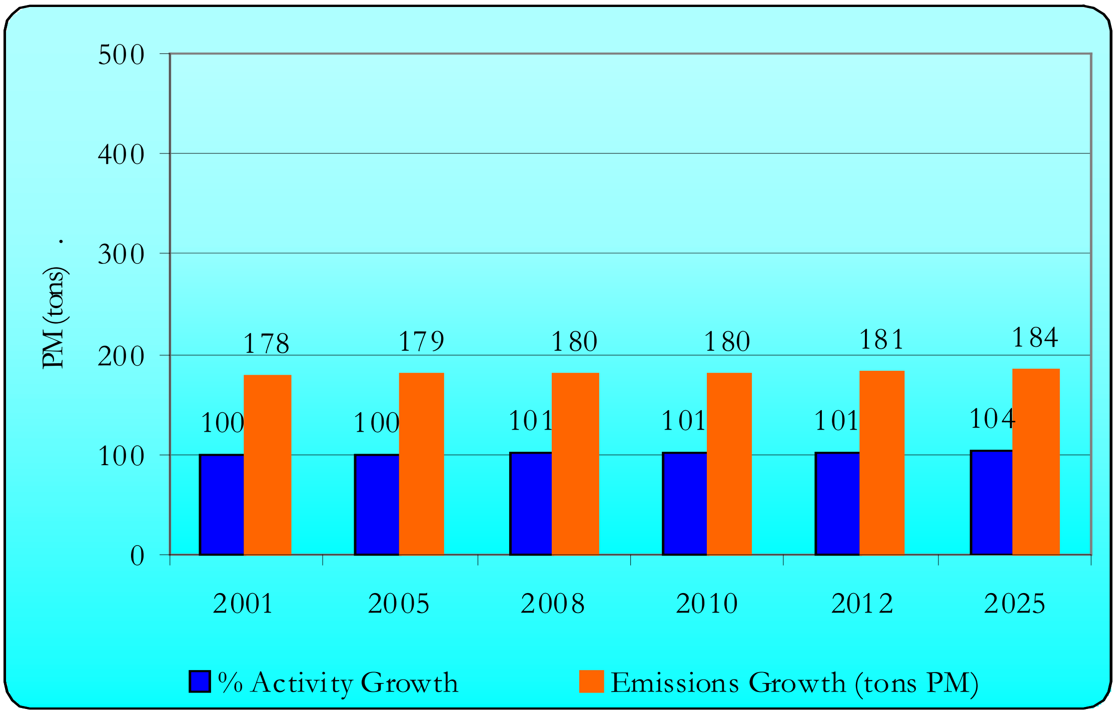
Ocean Going Vessels. Scenario 1 for this source category uses the Arcadis Marine Vessels Emission Inventory 1999 Update (prepared for the SCAQMD) with annual growth estimated at approximately 2% per year for vessel visits. Scenario 2 recognizes that the size of ships will increase over time and attempts to incorporate the effects of the associated increase in engine size. Scenario 2 utilizes the Scenario 1 growth rate, and increases projected emissions using growth in deadweight tonnage as the surrogate for increase in engine size and the associated increase in emissions. Scenario 3 reflects the forecast four-fold (422% growth factor) increase in TEU throughput between 2005 and 2025 and increased emissions consistent with TEU growth. Scenario 3 has been used as the basis for the NNI evaluation presented in this draft report, although revisions may be made after further evaluation of technical studies. Figure 2-3 depicts the projected activity growth under Scenario 3 and the PM_{10} emissions growth scenarios developed for ocean going vessels.

Figure 2-3. Ocean-Going Vessels Activity and Emissions Growth Projections



Harbor Craft. Growth in harbor craft activity was initially assumed to be flat and, therefore, emissions growth was assumed to be flat. This was based on interviews with ferryboat operators, tow operators, and assumptions on the commercial fishing fleet – all operator feedback indicated that ferry and excursion activity was facing a decline. Line haul tow operators also indicated that they did not anticipate an increase in activity. Subsequently, the activity assumption for assist tugs was modified to increase in proportion to the forecast 2% per year increase in vessel visits. Implementation of EPA engine standards was not incorporated into the emission growth projections. Figure 2-4 depicts the projected activity and PM_{10} emissions growth developed for harbor craft.

Figure 2-4. Harbor Craft Activity and Emissions Growth Projections



Stakeholder Comments Received:

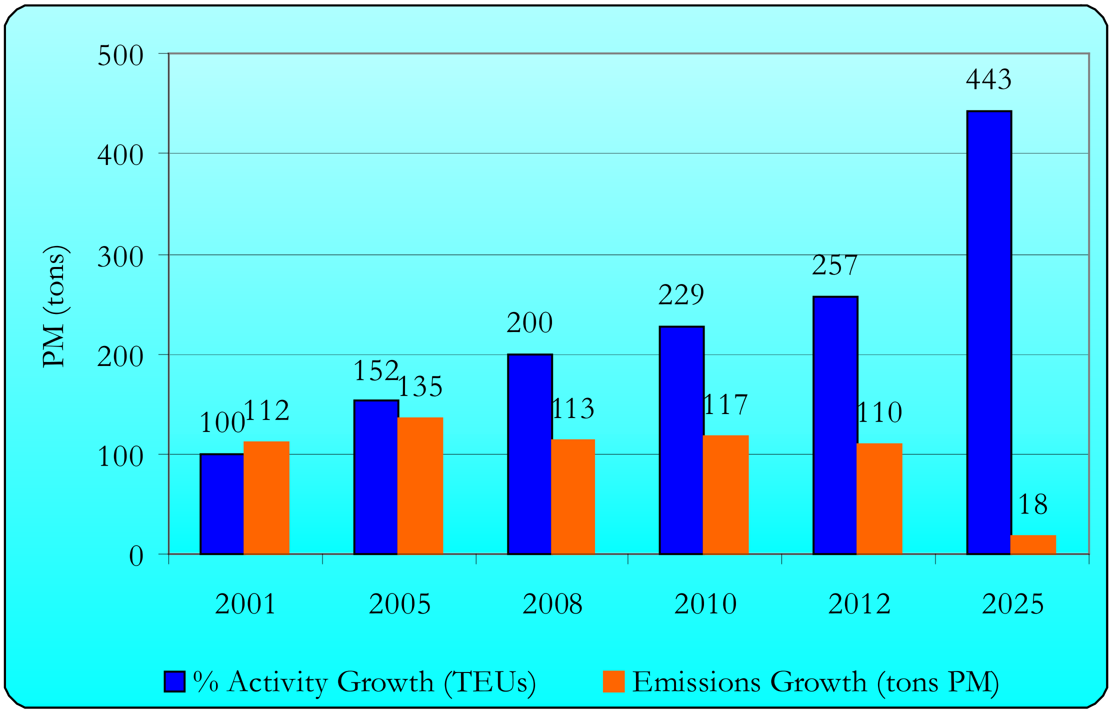
Pacific Merchant Shipping Association

Harbor Craft - The two-percent rate of growth used for assist tugs by the admission of TWG is not supported by any data. Discussion with industry experts indicated that there would be no growth but the TWG decide to apply two-percent without any explanation.

In addition, the omission of adjusting the emissions growth of this category for the EPA harbor craft emission standards is unacceptable. If a guess can be made to increase the rate of growth then clearly an adjustment can be made for regulatory controls that are in place. Adding to the confusion is that Tables 3-8 and 3-9 have quantified the emissions for the EPA standards. Therefore, it is impossible to tell if the emission benefits from the standards have been included. Please resolve this confusion in the next draft.

Cargo Handling Equipment. Forecasted TEU growth was used to project CHE activity on a 1:1 basis. Scenario 1 reflects a 422% increase based on a blended forecast of throughput growth used by the Port that combines market demand projections and capacity constraints. Scenario 2 uses actual throughput activity for 1999-2005 and extrapolates that growth rate out into the future to produce a 443% increase. Emission reductions in 2025 reflect the implementation of Tier 3 and Tier 4 off-road emission standards. Figure 2-5 depicts the projected activity growth under Scenario 2 and the PM_{10} emissions growth scenarios developed for cargo handling equipment.

Figure 2-5. Cargo Handling Equipment Activity and Emissions Growth Projections

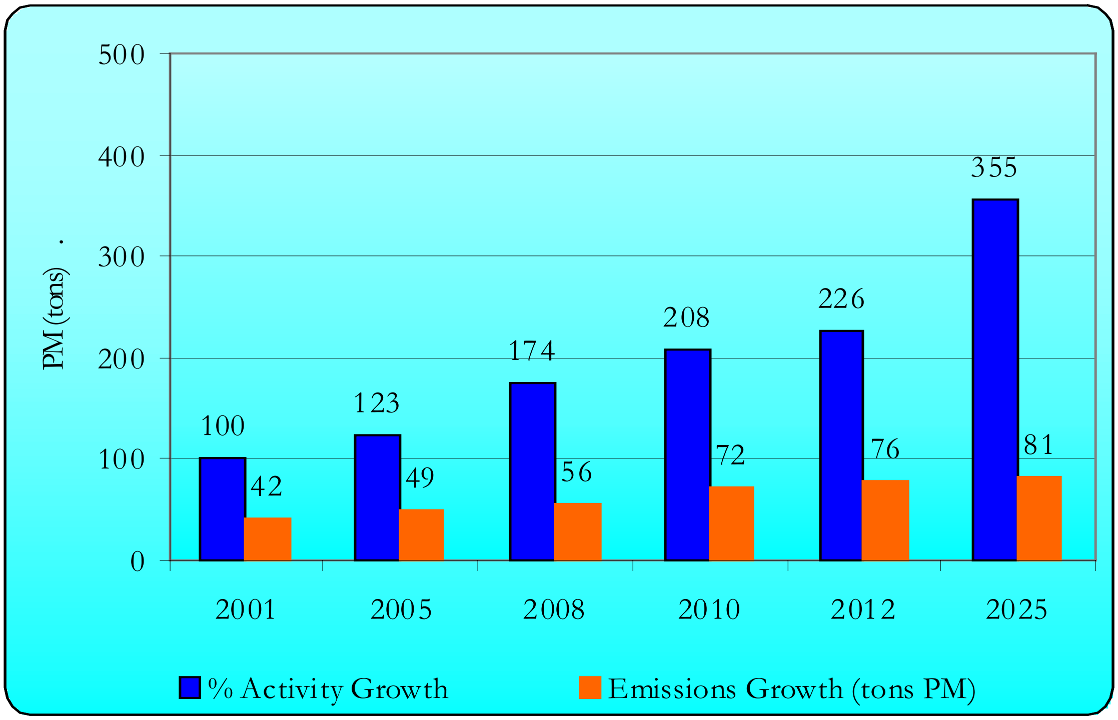


Rail. Scenario 1 represents a 403% emissions growth factor based on the Port's Rail Synopsis Study (2004). A key assumption in the forecast is the rail versus truck mode split with 32% of TEUs shipped by rail in 2025. Scenario 2 is based on a straight-line extrapolation of actual data from train trips on the Alameda Corridor from April 2002 to September 2004 (annualized to 39, 40, and 44 trains per day, respectively), which results in a growth factor of 240% between 2001 and 2025. A third scenario has been based on projected increases in the throughput of the Alameda Corridor, resulting in a growth factor of 355%. In addition, an adjustment for the emission reduction benefit of the Alameda Corridor has been made to the future projected emissions. This reduction, estimated to be 12%, is brought about by the shorter distances trains must travel from the ports to central Los Angeles, as well as by reduced idling made possible by the grade-separated portions of the corridor. The adjustment is warranted because the corridor was not in operation during the 2001 baseline period. This third scenario has been used as the basis for the NNI evaluation presented in this draft report.

For the emissions growth projections, the 2010 modeling assumes full implementation of the Memorandum of Understanding (MOU) with long-haul rail companies, wherein the 2010 fleet will achieve Tier 2 locomotive engine standards on a fleet average basis. Prior to 2010, the Class 1 locomotive fleet turns over in accordance with the Regulatory

Support Document developed for 1998 EPA locomotive standards. There is no change assumed in the Pacific Harbor Line locomotive fleet. Tier 3 locomotive engine standards, when adopted, will act to reduce the emissions growth shown, but the effects of these standards have not been included due to uncertainty over what standards will eventually be promulgated. Figure 2-6 depicts the projected activity growth under Scenario 3 and the PM_{10} emissions growth scenarios developed for locomotives.

Figure 2-6. Locomotive Activity and Emissions Growth Projections



Stakeholder Comments Received:

Rail Industry

Rail - Without consulting BNSF/UP, the TWG developed its new third scenario based on discussions with ACTA officials as to the range of anticipated future train traffic that it is likely to move through the Alameda Corridor. ACTA supplied a range for 2025 of between 117 and 142 trains per day, of which 17 trains were estimated to carry non-containerized freight, including bulk commodities, automobiles, tanks, heavy equipment, etc. The TWG took ACTA's high estimate -- 142 trains per day. The TWG than calculated an emissions growth factor of 355 percent for the period from 2001 to 2025.

A major problem with the TWG's approach lies in the fact that the Alameda Corridor is only one piece of a complex goods movement system. In order to arrive at a realistic estimate of future growth at the Port, the TWG must look at both ports, make reasonable assumptions for allocation of traffic between trucks and rail, and apply those assumptions consistently using the same methodology and the same input variables for both modes. That was not done here.

In addition, the TWG improperly reduced the emissions benefits from the Alameda Corridor that were developed by ACTA from 18 percent to 12 percent. These air quality benefits represent the reductions in emissions over the emissions that would have occurred if rail freight had continued to be transported over the existing rail lines. The full 18 percent reduction in PM emissions that is attributable to the Alameda Corridor should have been applied to reduce the emissions growth projections for rail in Figure 2-6.*

It should also be noted that credit was given only for reductions in NOx associated with the introduction of the newer lower emitting locomotives under the railroad's 1998 MOU with ARB, but not for PM. Although the MOU is projected to produce an estimated reduction in PM of about 47 percent for rail, these very significant air quality benefits were not credited at all by the TWG's in estimating the reductions needed to attain NNI.

Heavy Duty Vehicles (Trucks). The Baseline Transportation Study completed for the Port of Los Angeles and the Port of Long Beach in 2004 used the Quick Trip model to generate heavy duty vehicle (truck) trips. There were two versions of projected daily truck trips representing different assumptions for operational efficiencies at the terminal level (e.g., expanded gate hours, expanded weekend operations, increased on-dock rail, scheduling of truck transport during off-peak traffic periods). Scenario 1 is based on 121,395 daily truck trips, a 372% growth factor. Scenario 3 assumes 110,955 truck trips per day, a 349% growth factor. It was anticipated that Scenario 2 would be based on actual truck trips, but sufficient data was not obtained in a timely manner for use in the modeling. Scenario 1 has been used as the basis for the NNI evaluation presented in this draft report.

Figure 2-7 depicts the projected activity growth under Scenario 1 and the PM_{10} emissions growth scenarios developed for trucks. The visibly distinct declining pattern is a function of increasingly stringent standards for on-road truck engines, and normal turnover in the truck fleet which results in more and more of the cleaner trucks as time passes.

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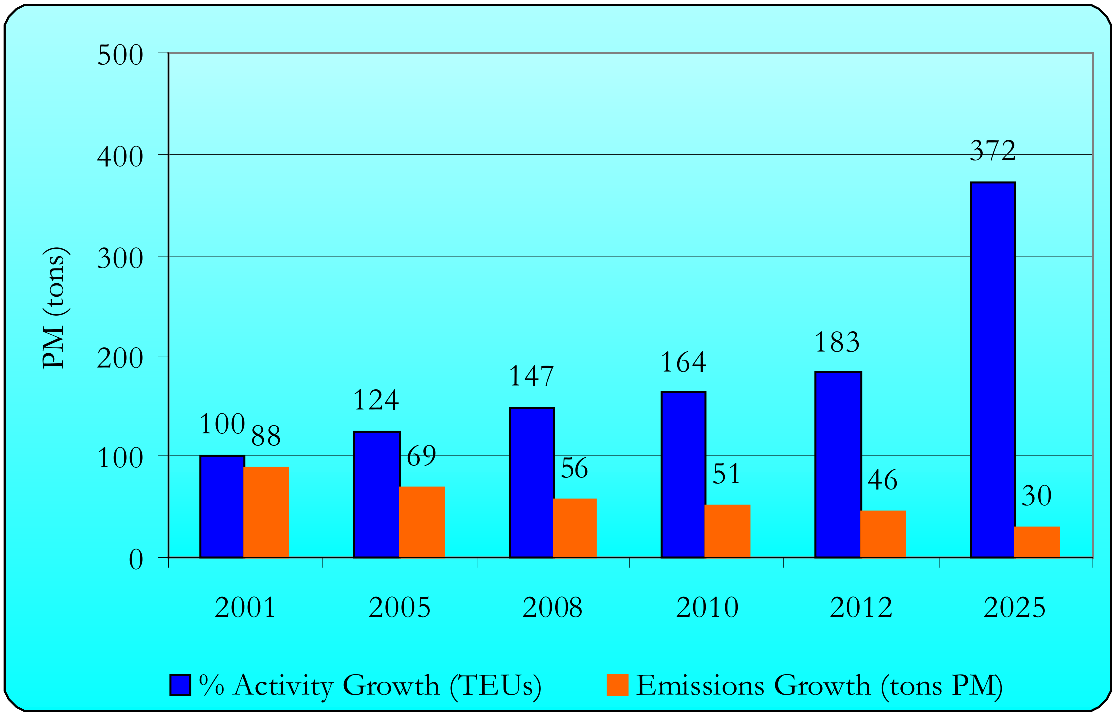
* *Alameda Corridor Air Quality Benefits Report, Weston Solutions, April 13, 2005.*

Figure 2-7. Heavy-Duty Vehicle (Trucks) Activity and Emissions Growth Projections



Stakeholder Comments Received:

Pacific Merchant Shipping Association

Rail and Trucks - The estimates should be reconciled to match the projected TEU volumes projected. Currently it appears that the combined estimation of Rail and Trucks will accommodate many more TEUs then are projected.

From the analysis it is not clear how the benefits from the Alameda Corridor or the Memorandum of Understandings and Agreements are included. In the emission estimate tables these measures are not quantified making it impossible to evaluate if they were incorporated correctly. Another element of Figure 2-6 that requires explanation is how emissions can increase by 240-percent when activity increases by only 54-percent between 2008 and 2010, especially when 2010 is the year of full implementation of the locomotive MOU.

Rail Industry

Trucks - It is not possible to compare trucks to rail on an "apples to apples" basis because the activity growth rates and emissions growth rates that were imputed for trucks were derived from an entirely different source and employed entirely different methodologies and assumptions than the TWG employed for rail. For example, whereas rail activity and emissions were calculated on trains operating to the perimeter of the Basin, for trucks the calculations were only carried out to the point of first drop-off. This would include truck drayage moves to UP's near dock facility located within five miles of the Port. It does not appear that trucks hauling Port-related traffic between inland distribution centers and to and from points outside the Basin were even considered.

2.6. Aggregated Emissions Growth

Subsequent to presenting the source category emissions growth scenarios to the Task Force, the TWG adopted two principal criteria in selecting which scenarios should comprise the aggregated emissions growth. In recognition of the significant schedule constraints and based on the understanding that the Plan is intended to be a dynamic or "living" document that incorporates new information as it becomes available and revises the emissions growth projections accordingly, the TWG developed the following conservative approach for the Draft Report:

- Focus on the emissions projections for the near-term years of 2005-2010; and
- Select the worst-case or highest impact scenario, the mitigation of which would be most protective of public health.

For ocean-going vessels, Scenario 3, representing a 422% growth rate in emissions (out to 2025), was selected. For harbor craft, a 2% per year emissions growth rate was applied to assist tugs only. For cargo handling equipment, Scenario 1 showing a 422% growth rate was selected because, in the near-term years, the rate of forecasted TEU throughput was approximately 30% higher than a projection of actual throughput activity. For rail, Scenario 2 at 450% estimated emissions growth was selected and Scenario 1 at 272% was selected for trucks. The modeled aggregated emissions for all source categories are shown in Figure 2-8 for NOx and Figure 2-10 for PM_{10}. The red line (solid) depicts 2001 Total Baseline Emissions and the green line (dashed) depicts Total Projected Emissions. Figures 2-9 and 2-11 depict the estimated emissions reductions in blue lines (dotted) through implementation of the control measures, as discussed in Section 3 and provided in Appendix B.

Figure 2-8. Total NOx Emissions

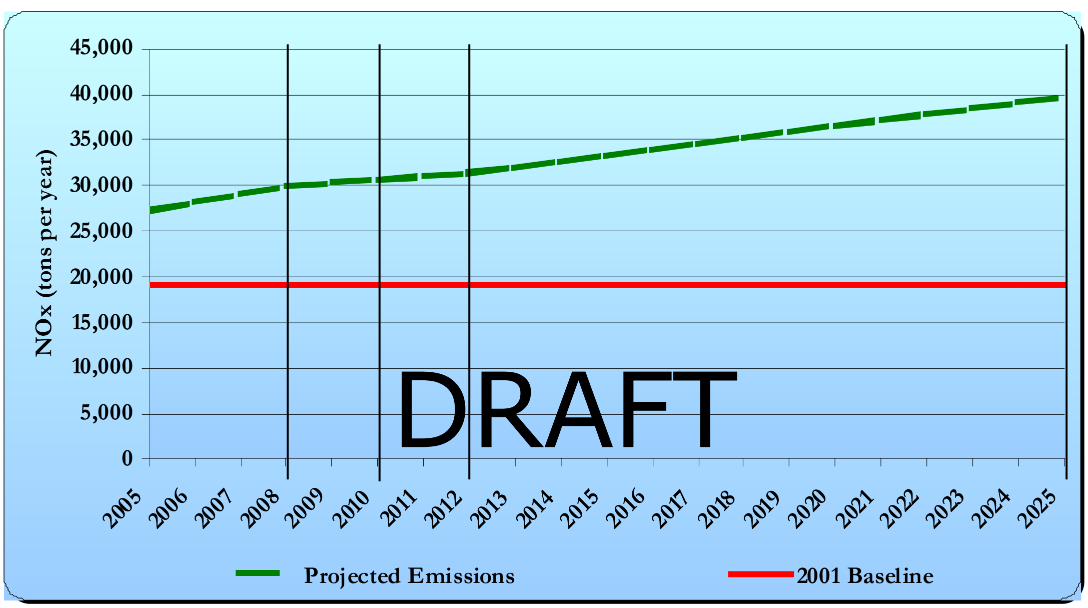


Figure 2-9. Total NOx Emissions, Adjusted For Implementation of Control Measures

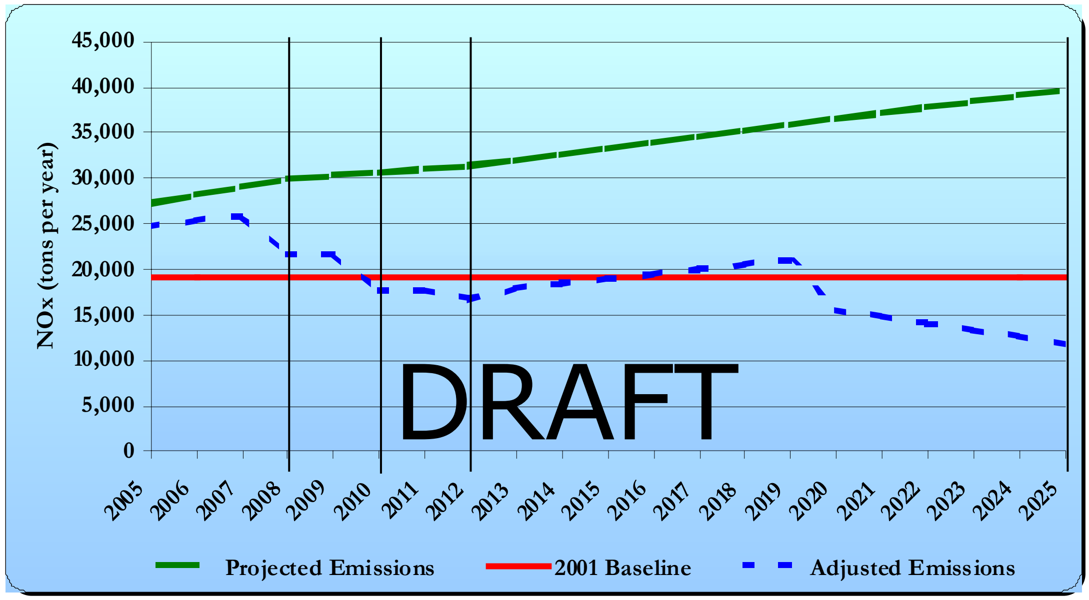


Figure 2-10. Total PM_{10} Emissions

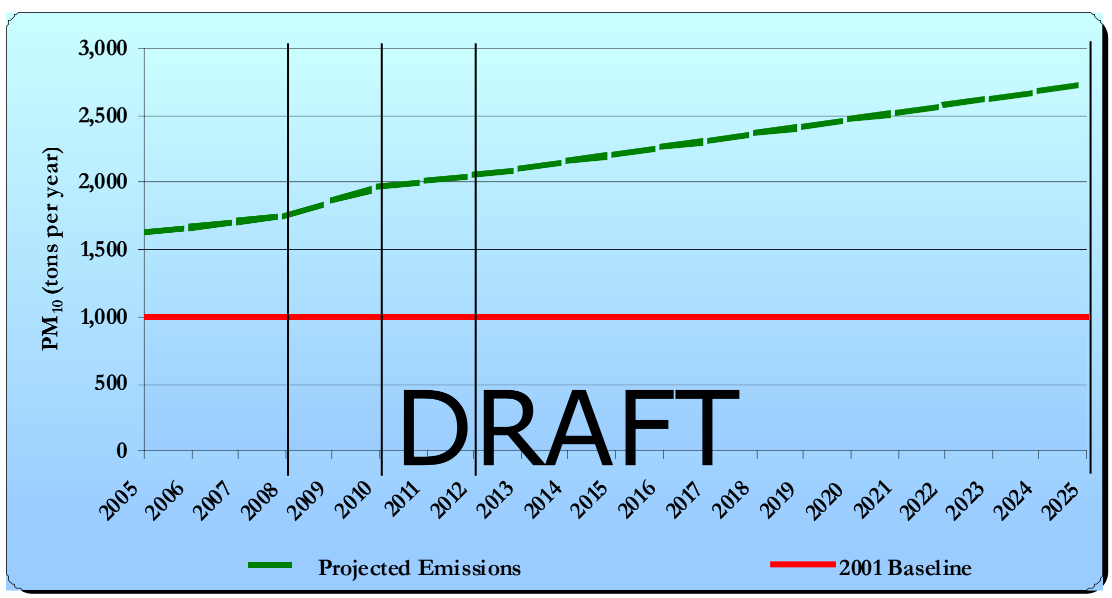
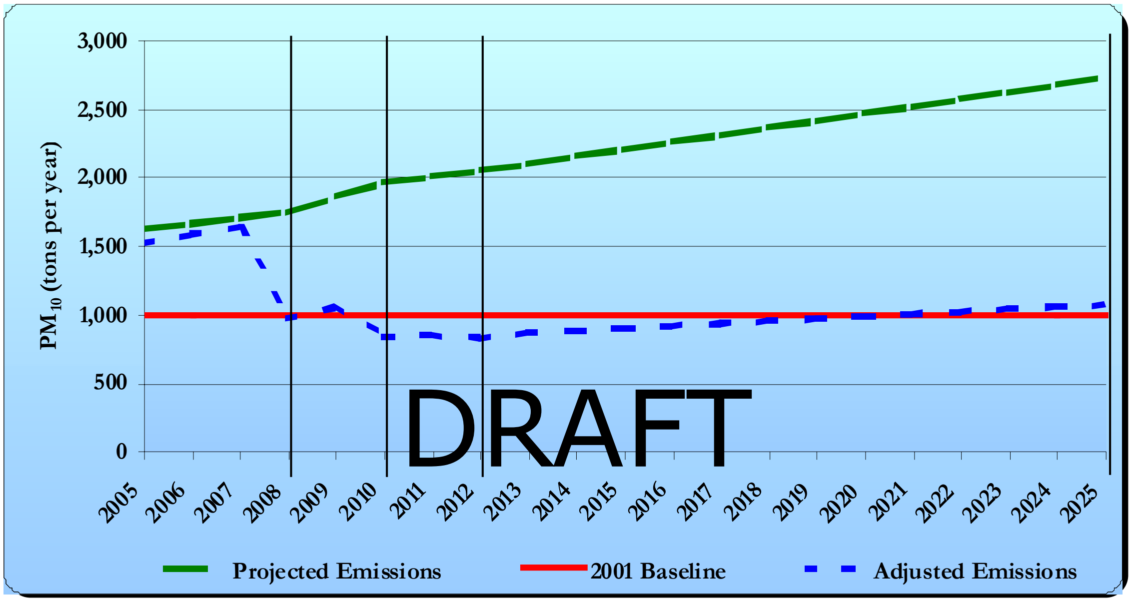


Figure 2-11. Total PM_{10} Emissions, Adjusted For Implementation of Control Measures



Stakeholder Comments Received:

Rail Industry

2.6 - Aggregated Emissions Growth - The inclusion of emissions beyond those derived from operations in the immediate vicinity of the Port distorts emission growth calculations and attempts to extend the regulatory reach of the Port far beyond the "footprint" of the Port. This approach is without precedent and is unsupportable.

2.6.1. Need for Updates

Ocean-going vessels represent the dominant share of total Port emissions, and the Task Force acknowledged the need to revisit as soon as possible the emissions growth for this source category in order to incorporate more realistic assumptions on the increase in per vessel TEU capacity and the probable effect this would have on reduction in projected vessel visits, as well as potential increased emissions from larger engines. This additional analysis must also address the impact on hotelling times for larger vessels and the ability to accommodate multiple larger vessels at existing berths[ix]. Rail locomotive emissions estimates need to be updated with actual throttle-notch data for locomotives serving the Port within the South Coast Air Basin.

It is critical to emphasize that the most accurate estimate of projected emissions growth for all source categories must be a top priority and ongoing goal of the NNI program. This is essential to ensure that appropriate, properly balanced and feasible control measures are identified and implemented.

The Port has recently approved moving forward with a Port-wide Emissions Inventory Update in 2005/2006. The updated information resulting from the completion of the 2004 Emissions Inventory will significantly benefit the technical work contributing to the Plan and the evaluation process.

Stakeholder Comments Received:

Pacific Energy Partners
Section 2.6.1. Before last sentence add: Since vessel emissions while in California Coastal Waters have less of an impact on onshore air quality than vessel emissions while in port, additional research is needed to determine how effective reductions from OGVs while at sea will be in improving onshore air quality.

Pacific Merchant Shipping Association
Section 2.6.1 - The Taskforce acknowledgment of the inadequacy of the current growth projections for OGVs, which represent the dominate share of total port emissions, underscores the need for full CEQA review prior to the development of policy decisions directing the expenditure of public funds.

2.7. Limitations and Constraints

Nationally-recognized expert scientists and technicians in the field of air quality assessment, projection and modeling developed this iteration of emissions growth projections for the draft Plan. These projections are based on the best information readily available for forecasting within the required time constraints of the Task Force and TWG, but as previously noted, the scenario that predicted the most adverse air quality impacts was selected for each source category.

Two main limitations were accepted during this process: the time constraints and the current limited understanding of the correlation of emissions growth to cargo volume growth. Stakeholder objections to the limitations inherent in the TWG's assumptions are well documented in the Task Force Meetings minutes and handouts. It was ultimately decided by the Task Force Co-Chairs that the process should progress despite these limitations; however it is worth reiterating that these estimations must be re-evaluated, refined and changed over time as warranted by improved or updated information.

[i] Administrative Draft EIR Document. Berths 97-109; Administrative Draft; Chapter 3.1. December, 2004.

[ii] Starcrest Consulting Group. Final Draft Port-Wide Baseline Air Emissions Inventory. June 2004.

[iii] California Air Resources Board. Fact Sheet – The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines. October, 1998.

[iv] Starcrest Consulting Group. Final Draft Port-Wide Baseline Air Emissions Inventory. June 2004.

[v] Starcrest Consulting Group. Final Draft Port-Wide Baseline Air Emissions Inventory. June 2004.

[vi] Port of Los Angeles. No Net Increase Status Update to Mayor James K. Hahn, December 2004.

[vii] Mercer Management Consulting. San Pedro Bay Ports Long-Term Cargo Forecast. July 2001.

[viii] JWD Group. Capacity Analysis Report. November 2002.

[ix] The TWG is currently evaluating new data provided in the *"Forecast of Container Vessel Specifications and Port Calls Within San Pedro Bay".* Mercator Transport Group. February 2005.

3. CONTROL MEASURES

The Port prepared the Inventory in response to public concerns about potential impacts to health of the surrounding community and environment from Port operations. The Inventory serves as a planning document for development, prioritization and implementation of emissions control strategies. The various control measures for each source category were developed to reduce air emissions and achieve the NNI goal for NOx and PM_{10} emissions. Control measures include the use of cleaner engines (e.g., newer model engines with lower emissions), cleaner fuels and electrification (e.g., low-sulfur diesel fuel, alternative fuel or power), post-combustion treatment technologies (e.g., particulate filters and catalytic oxidation or reduction), and operational efficiencies or improvements (e.g., increase the compliance zone for the voluntary vessel speed reduction program). The Compendium of Control Measures is provided in Appendix B.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

3 Control Measures - PMSA has previously submitted comments on the control measures. While we agree that with the discussion of the importance of the growth forecasts on the estimated effectiveness of the control measures there are still significant issues that must be resolved for this document to move forward. Many of the measures listed are not quantified (CHE-4, R-12, HDV-11, HDV-16 through HDV-19) and therefore it is unclear why they are included. Other measures are missing entirely (CHE-1, R-1, R-4, and HDV-1 through HDV-9) and it is even more confusing why they are included. For other measures it is not clear how they were quantified. For example OGV-1 is an oxide of nitrogen measure that was never intended to reduce particulates and without the actual methods to calculate the benefits the results are suspect. Accordingly, the next draft of the report should include a comprehensive appendix of the assumptions used to calculate the emissions benefits and full disclosure spreadsheets that can be checked for accuracy.

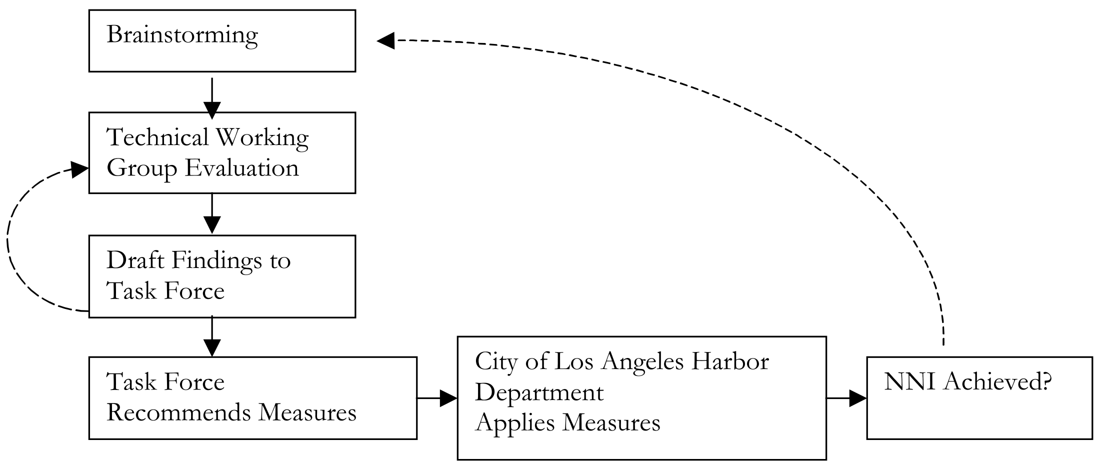
It is also important to note that many of the proposed control measures that are currently subject to regulatory development by the California Air Resources Board have undergone changes that are not reflected in the list of Control Measures. For example the provision for ships that call five or more times has been removed from OGV-8, current technology cannot meet the performance standard listed in CHE2 and the time frames for yard tractor turnovers have been modified for CHE-9. All measures should be reviewed for consistency with the underlying assumptions on which they are based and modified as appropriate in the next draft.

3.1. Control Measures Development and Evaluation

As displayed in Figure 3-1, the control measure development and evaluation process began with the TWG members individually brainstorming to list potential reduction strategies. The strategies were based on TWG members' knowledge of existing and emerging technologies and other approaches that have been discussed as having the potential to reduce emissions from Port-related sources. Favorable ideas were ultimately submitted to the TWG for discussion and evaluation. The TWG then reviewed the recommendations and conducted model simulations, calculated potential emissions reductions, evaluated implementation feasibility, collected input from stakeholders, and presented their draft findings to the Task Force for review and recommendation.

The Task Force then recommended control measures based on the draft findings to be implemented by the Port's tenants and/or operators. A validation process will be employed to document the surplus, quantifiable, sustainable emissions reduction to be used to offset the projected emissions growth to achieve NNI. If NNI is not achieved, then the entire cycle will be repeated to select other options.

Figure 3-1. Control Measure Evaluation Process



<u>Stakeholder Comments Received</u>:

<u>Pacific Energy Partners</u>
Section 3.1, second paragraph. The sentence "[a] validation process will be employed to document the surplus, quantifiable, sustainable emission reduction to be used to offset the project emission growth to achieve NNI." Such a process has never been discussed by the task force to my knowledge and the terms used in this sentence are defined terms from the new source review/emissions banking provisions of the Clean Air Act that are not applicable in this context. This sentence should be deleted. If not deleted, the sentence should be changed to read: A validation process will be developed to determine if NNI in emissions growth has been achieved and is being maintained.

<u>Pacific Merchant Shipping Association</u>
Section 3.1 - We believe that it is premature to specify that the Port's tenants and/or operators can implement all of the Taskforce's recommended control measures at this time.

<u>Ed Avol</u>
Figure 3.1 – This figure is incomplete, in that it does not include evaluation boxes for Legal or Financial Reviews which are part of the Evaluation Process presumably between "Task Force Recommendations" and "Harbor Department Application of Measures".

3.2. Control Measure by Emissions Source Category

Control measures are organized according to their respective emissions source category. Control measures are further categorized into five categories - adopted measures, engine standards, fuel requirements, retrofit/repower, and operational efficiencies or improvements.

Adopted control measures refer to measures that have been adopted by regulatory agencies or the Board of Harbor Commissioners. Such regulatory measures are included in the baseline growth projection modeling performed by the TWG.

The remaining control measure categories are also subcategorized as *Proposed* and *Additional*. *Proposed* control measures offer defined emissions reductions and strategies to achieve the stated reductions. Reductions from these measures will be deducted from future baseline emissions. These measures will be further defined as either regulatory or Port measures. *Regulatory proposed* measures have SIP commitments by regulatory agencies and defined emissions reductions from sources associated with the Port, or are probable rulemaking actions by regulatory agencies that are currently underway with defined emissions reduction goals. *Port proposed measures* are measures formally proposed by the Port subject to approval by the Board of Harbor Commissioners.

Additional control measures refer to measures that are proposed by the NNI Task Force for implementation by the Port to achieve NNI. These additional measures may also include regulatory measures that require more extensive emissions reductions estimates and referral to EPA or ARB. These measures are categorized as those needed in the Near-Term or Long-Term.

Tables 3-1 to 3-5 list control measures for each emissions source category. Each control measure is assigned with a code for easy cross-reference and followed by the title of the control measure, the name of the lead agency, and a note describing the status of that measure. These measures are briefly discussed in the following sections. The detailed technical descriptions of each control measure are presented in Appendix B, the Compendium of Control Measures. The implementation schedule for each class of the control measures is described in Section 6.

Table 3-1. Control Measures for Ocean Going Vessels

No.	Title	Lead Agency	Note (Modeling Color Code)
OGV - Adopted Measures			
OGV-1	New Engine Standards for Ships	IMO/EPA	Engine Standards (Green line)
OGV-2	Vessel Speed Reduction (VSR), MOU	Port	Operational Efficiencies and Improvement; an existing program (Blue line)
OGV-3	Alternative Maritime Power (AMP)	Port	Operational Efficiencies and Improvement; an existing program (Blue Line)
OGV-4	Auxiliary Engine Fuel Improvement Program	Port	Fuel Requirement; a near-term program (Blue line)
OGV - Engine Standards			
OGV-5	New Engine Standards for Category 3 Marine Engines	EPA	Additional measure (Green line)
OGV-6	Reroute Cleaner Ships	Port	Additional measure (Blue line)
OGV-7	Low Emission Main Propulsion Engines	Port	Additional measure (Blue line)
OGV - Fuel Requirements			
OGV-8	Cleaner Fuel for Ship Auxiliary Engines	ARB	Proposed measure (Blue line)
OGV-9	Main Engine Fuel Improvement Program	Port	Proposed measure (Blue line)
OGV-10	Creation of a Sulfur Emission Control Area (SECA)	Port	Additional measure (Blue line)
OGV-11	Expanded Auxiliary Engine Fuel Improvement Program	Port	Additional measure (Blue line)
OGV-12	Expanded Main Engine Fuel Improvement Program	Port	Additional measure (Blue line)
OGV - Repower/Retrofit			
OGV-13	Additional Auxiliary Engine Reductions for Frequent Callers	ARB	Proposed measure (Blue line)
OGV-14	Retrofit/Repower Requirements for Infrequent Callers	Port	Additional measure (Blue line)
OGV - Operational Efficiencies or Improvements			
OGV-15	Expanded VSR Program	Port	Additional measure (Blue line)
OGV-16	Expanded Alternative Maritime Power Program	Port	Additional measure (Blue line)
OGV-17	Additional In-Use Measures for Ships	EPA and ARB	Additional measure (Blue line)

Table 3-2. Control Measures for Harbor Craft

HC - Adopted Measures			
No.	**Title**	**Lead Agency**	**Note** (Modeling Color Code)
HC-1	New Engine Standards for Harbor Craft	EPA	Engine Standards; adopted measure (Green line)
HC-2	Clean Fuels for Harbor Craft	ARB	Fuel Improvements; adopted measure. (Green line)
HC-3	Early Implementation of Ultra-Low Sulfur Diesel (ULSD)	Port	Fuel Improvements; adopted measure. (Blue line)
HC-4	Dredging Activities	ARB/Local Districts	Engine Standards; adopted measure (Blue line)
HC-5	Technical Advisory Committee (TAC) Harbor Control Measures	Port	Retrofit/Repower; adopted measure (Blue line)
HC - Engine Standards			
HC-6	New Engine Standards for Category 1 and 2 Marine Engines	EPA	Additional measure (Green line)
HC - Fuel Requirements			
HC-7	Emulsified Fuels	Port	Additional measure (Blue line)
HC - Repower/Retrofit			
HC-8	In-Use Harbor Craft Emission Reduction Measure/Airborne Toxic Control Measure (ATCM)	ARB	Proposed measure (Blue line)
HC-9	Repower Existing Harbor Craft	Port	Additional measure (Blue line)
HC-10	Retrofit Existing Harbor Craft	Port	Additional measure (Blue line)
HC - Operational Efficiencies or Improvements			
HC-11	AMP-ready Staging Areas	Port	Proposed measure (Blue line)

Table 3-2. Control Measures for Cargo Handling Equipment

CHE - Adopted Measures			
No.	**Title**	**Lead Agency**	**Note** (Modeling Color Code)
CHE-1	Emission Standards for Heavy-Duty Non-Road Diesel Engines	EPA/ARB	Engine Standards; adopted measure (Green line)
CHE-2	Yard Tractor Modernization and ULSD Programs	Port	Engine Standards; adopted measure (Blue line)
CHE-3	Early Implementation of ULSD for CHE (Other Than Yard Tractors)	Port	Fuel Requirements; adopted measure (Blue line)
CHE-4	Alternative Fuel Yard Tractor Resolution	Port	Engine Standards/Fuel Requirements/ Retrofit/Repower; adopted measure (Blue line)
CHE-5	Emulsified Fuels	Port	Fuel Requirements; adopted measure (Blue line)
CHE-6	Technical Advisory Committee (TAC) CHE Measures	Port	Fuel Requirements/Retrofit/Repower.; adopted measure (Blue line)
CHE - Engine Standards			
CHE-7	Expanded Yard Tractor Modernization	Port	Additional measure (Blue line)
CHE-8	Enhanced CHE Modernization	Port	Additional measure (Blue line)
CHE - Repower/Retrofit			
CHE-9	Cargo Handling Equipment at Ports and Intermodal Rail Yards	ARB	Proposed measure (Blue line)

Table 3-3. Control Measures for Rail (Locomotives)

Rail - Adopted Measures			
No.	**Title**	**Lead Agency**	**Note** (Modeling Color Code)
R-1	Tier 0, 1 and 2 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines	EPA	Engine Standards; adopted measure (Green line)
R-2	ARB Diesel Fuel Used by Intrastate Locomotives	ARB	Fuel Requirements; adopted measure (Green line)
R-3	Federal Standards for Non-Road Diesel Fuel	EPA	Fuel Requirements; adopted measure (Green line)
R-4	MOU in the South Coast Air Basin	ARB	Engine Standards; adopted measure (Green line)
R-5	Pacific Harbor Lines (PHL) Switcher Locomotive Modernization with ULSD Programs	Port	Replace/Fuel Requirements;adopted measure (Blue line)
Rail - Engine Standards			
R-6	Ultra-Low Emission Switcher Locomotives: PHL	Port	Additional measure (Blue line)
R-7	Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1	Port	Additional measure (Blue line)
R-8	Tier 3 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines	EPA	Additional measure (Not modeled)
Rail - Fuel Requirements			
R-9	ARB Diesel Fuel for Class 1 Railroad Locomotives	Port	Additional measure (Blue line)
Rail - Repower/Retrofit			
R-10	Idling Controls for Switcher and Line Haul Locomotives	Port	Additional measure (Blue line)
Rail - Operational Efficiencies or Improvements			
R-11	Efficiency Improvements on In-Use Class 1 Rail Equipment	Port	Additional measure (Blue line)
R-12	Electrification of Alameda Corridor and Alameda Corridor East	Port	Additional measure (Not modeled)

Table 3-4. Control Measures for Heavy-DutyVehicles

Heavy-Duty Vehicle – Adopted Measures			
No.	**Title**	**Lead Agency**	**Note** (Modeling Color Code)
HDV-1	2004 On-road Standards for Heavy Duty Diesel Vehicles	EPA	Engine Standards; adopted measure (Green line)
HDV-2	2007 On-road Standards for Heavy Duty Diesel Vehicle	EPA	Engine Standards; adopted measure (Green line)
HDV-3	Gateway Cities Truck Modernization Program	Port	Engine Standards; adopted measure (Blue line)
HDV-4	Engine Software Upgrade (or Low-NO_x Software Upgrade)	ARB	Engine Standards; adopted measure (Green line)
HDV-5	Ultra-Low Sulfur Diesel Fuel (15 ppm)	ARB	Fuel Requirements; adopted measure (Green line)
HDV-6	Heavy-Duty Vehicle Inspection	ARB	Operational Efficiencies or Improvements; adopted measure (Green line)
HDV-7	Periodic Smoke Inspection Program (PSIP)	ARB	Operational Efficiencies or Improvements; a Adopted measure (Green line)
HDV-8	Augment Truck and Bus Highway Inspection with Community-Based Inspection	ARB	Operational Efficiencies or Improvements; adopted measure (Green line)
HDV-9	Reduced Truck Idling	ARB	Operational Efficiencies or Improvements; adopted measure (Green line)
HDV - Engine Standards			
HDV-10	Expanded Truck Modernization Program	Port	Additional measure (Green line)
HDV-11	California Heavy-Duty Diesel Vehicle Standards and Fleet Modernization for Mexican Trucks	ARB	Additional measure (None)

Table 3-5. Control Measures for Heavy-Duty Diesel Vehicles (Continued)

HDV - Fuel Requirements			
HDV-12	Early ULSD Implementation		Additional measure (Blue line)
HDV - Repower/Retrofit			
HDV-13	Retrofit Heavy-Duty Diesel Vehicle with Diesel Oxidation Catalyst (DOC)	Port	Additional measure (Blue line)
HDV-14	Retrofit Heavy-Duty Diesel Vehicle with Diesel Particulate Filters (DPF)	Port	Additional measure (Blue line)
HDV-15	PM In-Use Emission Control	ARB	Additional measure (Blue line)
HDV - Operational Efficiencies or Improvements			
HDV-16	On-Board Diagnostics (OBD) for Heavy-Duty Trucks	ARB	Operational Efficiencies and Improvements; proposed measure (Not modeled)
HDV-17	Transportation Refrigeration Units (TRU)	ARB	Operational Efficiencies and Improvements; additional measure (Not modeled)
HDV-18	Electrified Truck Spaces	Port	Operational Efficiencies and Improvements; additional measure (Not modeled)
HDV-19	Idling Reduction Measures	Port	Operational Efficiencies and Improvements; additional measure (Not modeled)

3.2.1. Control Measures for Ocean-Going Vessels

A total of 17 control measures were identified for ocean-going vessels, including four adopted measures, three proposed measures and 10 additional measures.

Adopted measures:

- OGV1 - New engine standards with more stringent emission standards for ships regulated by the International Maritime Organization (IMO) and/or EPA,
- OGV2 - Voluntary programs initiated by the Port, including a vessel speed reduction program to reduce emissions,
- OGV3 - Alternative maritime power (AMP) using shore power (also know as cold-ironing), and
- OGV4 - Auxiliary engine fuel improvement program using lower sulfur fuel (i.e., marine diesel oil).

Proposed measures:

- OGV8 and 9 - The use of low-sulfur marine gas oil for ship auxiliary engines and marine diesel oil for ship main propulsion engines within 40 nautical miles of Point Fermin, and
- OGV13 - Further emission reductions required for frequent callers to the Port.

Additional measures:

- OGV5 - New engine standards for Category 3 marine engines mandated by EPA,
- OGV10 - Creation of a sulfur emission control area (SECA),
- Voluntary* programs including:
  - OGV6 - Rerouting of cleaner ships to the Port,
  - OGV7 - Encouraging the use low emission main propulsion engines (i.e., Blue-Sky series/Category 3 engines),
  - OGV11 - Expanding the auxiliary engine fuel improvement program to further reduce sulfur content in the fuel (i.e., 0.2% and 0.1% sulfur in 2006 and 2008, respectively),
  - OGV12 - Expanding main engine fuel improvement (from 1.5% down to 0.2% sulfur),
  - OGV14 - Retrofitting/repowering of auxiliary engines for infrequent callers,
  - OGV15 - Expanding vessel speed reduction,
  - OGV16 - Alternative maritime power programs, and
  - OGV17 - Additional in-use measures for ships such as operational control (speed reduction or idling limits).

**Many voluntary measures will be implemented as mandatory programs if stated participation rates are not being achieved under a voluntary program. Please refer to individual measures for specific implementation schedules, participation rates and additional details.*

***Stakeholder Comments Received*:**

South Coast Air Quality Management District

Sections 3.2.1 and 3.2.3 - All of the "Additional" non-regulatory control measures for OGVs and cargo handling equipment are classified as "Voluntary" which is incorrect since some of these measures could have enforceable mechanisms. The term "voluntary" is not used for the additional non-regulatory measures for rail, trucks and harbor craft.

3.2.2. Control Measures for Harbor Craft

A total of 11 control measures were identified for harbor craft, including five adopted measures, two proposed measures and four additional measures.

Adopted measures:

- HC1 - New engine standards with more stringent emission standards for harbor craft (Category 1 and 2 engines),
- HC2 - Cleaner fuels for harbor craft by ARB,
- HC4 - The use of portable dredging equipment meeting Tier 1 or 2 standards, and the use of electric dredges.

The adopted voluntary programs initiated by the Port include:

- HC3 - Early implementation of ultra-low sulfur diesel fuel,
- HC5 - Measures adopted by the Technical Advisory Committee, including repowering/retrofitting harbor craft main and auxiliary engines.

Proposed measures:

- HC8 - Repowering or retrofitting "in-use" harbor craft to reduce emissions including airborne toxics, and
- HC11 - The use of AMP-ready staging areas.

Additional measures:

- HC6 - New engine standards for Category 1 and 2 marine engines (as mandated by EPA),
- HC7 - The use of emulsified fuels, and
- HC9 - The repower/retrofit of existing harbor craft (i.e., line hauls and fishing vessels) with new engines and after-treatment devices.

3.2.3. Control Measures for Cargo Handling Equipment

A total of nine control measures were identified for cargo handling equipment, including six adopted measures, one proposed measure, and two additional measures.

Adopted measures:

- CHE1 - New engine emissions standards for heavy-duty non-road diesel engines (EPA and ARB requirements), and
- Voluntary* programs including:
  - CHE2 - Yard tractor modernization,
  - CHE3 - ULSD programs, including early implementation of ULSD for cargo handling equipment other than yard tractors,
  - CHE4 - Use of alternative fuels in yard tractors, and
  - CHE5 and 6 - Use of emulsified fuels and measures adopted by the TAC, including:
    - the use of alternative fuel (i.e., liquefied natural gas) powered tractors,
    - the use of oxygen-diesel fuel, and
    - oxidation catalyst retrofits/repower of cargo handling equipment.

**Many voluntary measures will be implemented as mandatory programs if stated participation rates are not being achieved under a voluntary program. Please refer to individual measures for specific implementation schedules, participation rates and additional details.*

Proposed measures:

- CHE9 - The retrofit/repower of cargo handling equipment at Ports and intermodal rail yards using best available control technology (BACT).

Additional measures:

- CHE7 - The expansion of the yard tractor modernization program to use cleaner engines,
- CHE8 - Enhancement of cargo handling equipment other than yard tractors to use alternative fuel, on-road, and Tier 3 and 4 non-road engines for new purchase (upon availability), and
- CHE7 and 8 - Replacement/retrofit of existing cargo handling equipment.

3.2.4. Control Measures for Rail

A total of 12 control measures were identified for rail, including five adopted measures and seven additional measures.

Adopted measures:

- R1 - New EPA (Tier 0, 1, and 2) engine standards for new and remanufactured locomotive engines,
- R2 and 3 - New EPA and ARB standards for non-road diesel fuel used by intrastate locomotives,
- R4 - A memorandum of understanding with ARB to expedite the introduction of newer and lower emitting locomotives in the South Coast Air Basin, and

- R5 - A voluntary program initiated by the Port to modernize Pacific Harbor Lines (PHL) switcher locomotives and the use of ULSD.

Additional measures:

- R6 - New engine standards such as ultra-low emission switcher locomotives for PHL,
- R7 - Ultra-low emission for Class 1 switcher and line haul locomotives,
- R8 - Tier 3 engine standards for new and remanufactured locomotives and locomotive engines,
- R9 - The use of ARB diesel in Class 1 railroad locomotives,
- R10 - Idling controls for switcher and line haul locomotives,
- R11 - Efficiency improvements on in-use Class 1 rail equipment, and
- R12 - The electrification of Alameda Corridor and Alameda Corridor East.

3.2.5. Control Measures for Heavy-Duty Vehicles

A total of 19 control measures were identified for heavy-duty vehicles, including nine adopted measures, one proposed measures and nine additional measures.

Adopted measures:

- HDV1 and 2 - New engine standards for 2004 and 2007 on-road heavy-duty diesel vehicles,
- HDV3 - Furtherance of the Port’s voluntary Gateway Cities truck modernization program,
- HDV4 - Low-NO_x engine software upgrades,
- HDV5 - The use of ULSD,
- HDV6 - Heavy-duty vehicle inspection,
- HDV7 - Periodic smoke inspection,
- HDV8 - Augmentation of truck and bus highway inspection with community-based inspection, and
- HDV9 - Reduced truck idling by ARB.

A proposed measure includes the use of on-board diagnostics for heavy-duty trucks.

Additional measures:

- HDV10 - The expansion of Gateway City truck modernization program by the Port,
- HDV11 - New engine standards,
- HDV12 - Early implementation of ULSD,
- HDV13 and 14 - Retrofit of heavy-duty diesel trucks with after treatments such as diesel oxidation catalysts or diesel particulate filters,
- HDV15 - Additional particulate matter emissions controls with ARB-certified engines or control technology for in-use heavy-duty vehicles, and

- HDV16, 17, 18 and 19 - Equipped transportation refrigeration units (TRU) with verified diesel emissions control systems or using an alternative technology such as electrification, electrified truck space, and idling reduction measure.

3.3. Other Measures

Other measures not included in the Plan include: terminal reconfigurations, new source review (NSR) for terminals, ship emission caps and project related construction emission limitations. The first three will require policy development by the Port before the measures will be considered. No credit for any emission reduction associated with these measures is incorporated into the Plan. These measures are not part of the Plan and only listed here for information only.

3.4. Emissions Reductions by Source Category by Year

The TWG modeled emissions reductions using agreed-upon modeling approaches for five milepost years - 2005, 2008, 2010, 2012 and 2025. The first four milepost years were selected to project potential emissions reductions by implementation of selected control measures in the immediate (2005), near-term (2008) and mid-term (2010 and 2012) timeframes. The year 2025 was modeled to demonstrate the long-term benefit of control measures and the ability to maintain emission reductions with projected cargo volume growth. The emissions modeling should be considered a starting point for further evaluation by the entities that are responsible for implementing these measures.

It should be noted that NOx and PM were the two major pollutants of concern in the modeling exercise. It should also be noted that the emissions modeling is dependent on both cargo growth assumptions and assumed translations between that cargo growth and emissions growth, and thus is limited by those assumptions. Time constraints on the TWG limited the thoroughness of these initial modeling results.

The TWG also defined control factors for each measure for each respective attainment year. Particular care was taken to avoid any potential double counting of the emissions reduction benefit from the control measures. This was accomplished by stringing all the control factors together to develop the "blue" line in Figures 3-4 and 3-5 below. Sequencing of individual measures to determine their actual emissions reduction benefits was not performed due to the time limitations. Sequencing shows each measure's actual emissions reductions with consideration of the measures that precede it (i.e. the lower the measure is in the sequence the fewer emissions its reduction affects). Tables 3-6 to 3-15 list emissions reductions by source category by each measure for all five milepost years. These emissions reductions are for each measure as if it was the only measure affecting the emissions of the targeted source (i.e. does not take into account sequencing). Cost effectiveness will be set for each measure using these values, as cost effectiveness is significantly affected by sequencing. Again, the emissions reductions, in aggregate (with all of the active control factors grouped together), are presented in Tables 3-16 and 3-17 and display anticipated aggregated NOx and PM reduction per milepost year; these reductions are illustrated in Figures 3-3 and 3-4, respectively.

Figures 3-3 and 3-4 depict the estimated emissions reductions for NOx and PM for the designated attainment years with the implementation of the adopted, proposed and additional control measures. The control measures summary tables (Tables 3-1 to 3-5) list whether that measure was modeled in the green line (projected emissions) or the blue line (NNI controlled emissions), or not modeled for achievement of NNI purposes.

Stakeholder Comments Received:

Pacific Energy Partners
Second full paragraph, second to last sentence. Add to beginning of this sentence: For the purposes of this report, cost effectiveness will be set..."

Dave Howekamp
Section 3.4 -Fourth paragraph, second line refers to designated attainment year. This should be reworded to something like "the years when NNI 2001 baseline levels will be first achieved if the adopted, proposed and most additional control measures are implemented as fast as possible". Designated attainment sounds like a policy maker said we will achieve in X year – that is not how this process evolved.

Table 3-6. Emissions Reduction Estimation for Ocean-going Vessels by Year - NOx (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	Note
I													
OGV-1	NOx	2434.4	0	0	28.7	0.4	90.2	1.3	106.0	1.4	367.6	3.3	
OGV-4	NOx	2434.4	0	0	0	0	0	0	0	0	0	0	
OGV-8	NOx	2434.4	0	0	624.1	8.2	694.4	10.0	736.0	10.0	1097.5	10	
OGV-11	NOx	2434.4	0	0	0	0	0	0	0	0	0	0	
OGV-13	NOx	2434.4	0	0	0	0	1075.6	15.5	0.0	0	0.0	0	
OGV-14	NOx	2434.4	0	0	0	0	398.3	5.7	422.2	5.7	1259.1	11.5	
OGV-17	NOx	2434.4	0	0	0	0	1149.2	16.6	1580.2	21.5	2356.3	21.5	Low end estimation
II													
OGV-2	NOx	4463.6	1225.4	13.8	1428.3	11.4	1585.7	13.8	1664.7	13.8	2453.5	13.8	
OGV-5	NOx	4463.6	0	0	0	0	0	0	241.3	20.0	1244.5	7.0	Low end estimation
OGV-6	NOx	4463.6	0	0	103.5	0.8	229.8	2.0	120.6	1.0	0	0	
OGV-7	NOx	4463.6	0	0	0	0	0	0	0	0	13263.3	74.6	Low end estimation
OGV-9	NOx	4463.6	0	0	0	0	0	0	0	0	0	0	
OGV-10	NOx	4463.6	0	0	0	0	0	0	0	0	0	0	
OGV-12	NOx	4463.6	0	0	517.5	4.1	1034.1	9.0	1085.7	9.0	1600.1	9.0	
OGV-15	NOx	4463.6	0	0	2266.6	18.1	2516.4	21.9	2541.8	21.9	3893.7	21.9	
III													
OGV-3	NOx	1943.0	32.2	0.6	33.5	0.4	33.5	0.5	33.5	0.5	33.5	0.3	
OGV-16	NOx	1943.0	0	0	940.7	12.3	2093.1	30.1	3523.8	47.9	5254.6	47.9	

Table 3-7. Emissions Reduction Estimation for Ocean-going Vessels by Year - PM (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
I													
OGV-1	PM	80.7	0	0	0.4	0.2	1.2	0.5	1.6	0.5	5.3	1.2	
OGV-4	PM	80.7	1.0	0.5	0.0	0	0	0	0	0	0	0	
OGV-8	PM	80.7	0	0	136.3	55	151.7	55	160.8	55	239.7	55	
OGV-11	PM	80.7	0	0	0	0	0	0	0	0	0	0	
OGV-13	PM	80.7	0	0	0	0	42.8	15.5	0.0	0.0	0.0	0.0	
OGV-14	PM	80.7	0	0	0	0	15.8	5.7	16.7	5.7	49.9	11.5	
OGV-17	PM	80.7	0	0	0	0	1.8	0.6	4.8	1.7	7.2	1.7	Low end estimation
II													
OGV-2	PM	477.7	0	0	0	0	0	0	0	0	0	0	
OGV-5	PM	477.7	0	0	0	0	0	0	0	0	0	0	Low end estimation
OGV-6	PM	477.7	0	0	0	0	0	0	0	0	0	0	
OGV-7	PM	477.7	0	0	0	0	0	0	0	0	0	0	Low end estimation
OGV-9	PM	477.7	0	0	99.7	9	0	0	0	0	0	0	
OGV-10	PM	477.7	0	0	0	0	221.3	18.0	232.4	18	342.5	18	
OGV-12	PM	477.7	0	0	348.9	31.5	498.0	40.5	522.9	40.5	770.7	40.5	
OGV-15	PM	477.7	0	0	0	0	0	0	0	0	0	0	
III													
OGV-3	PM	66.2	1.3	0.6	1.3	0.5	1.3	0.5	1.3	0.5	1.3	0.3	
OGV-16	PM	66.2	0	0	37.3	15.1	83.1	30.1	139.9	47.9	208.7	47.9	

Table 3-8. Emissions Reduction Estimation for Harbor Craft by Year - NOx (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
HC-1	NOx	3530.6	106.6	3	178.5	5	465.8	13	251	7	406.4	11	
HC-2	NOx	3530.6	0.0	0	107.1	3	107.5	3	107.9	3	110.8	3	
HC-3	NOx	3530.6	24.9	0.7	0	0	0	0	0	0	0	0	
HC-4	NOx		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HC-5	NOx	3530.6	98.7	2.8	98.7	2.8	93.6	2.6	93.8	2.6	0	0	
HC-6	NOx	3530.6	0.0	0	0	0	0	0	0	0	838.2	22.7	
HC-7	NOx	3530.6	0.0	0	396.3	11.1	397.7	11.1	399.2	11.1	410.1	11.1	
HC-8	NOx	3530.6	0.0	0	0	0	788.3	22	870.3	24.2	1847.2	50	
HC-9	NOx	3530.6	21.3	0.6	78.6	2.2	100.3	2.8	100.7	2.8	103.4	2.8	
HC-10	NOx	3530.6	0.0	0	42.8	1.2	82.4	2.3	97.1	2.7	203.2	5.5	
HC-11	NOx	3530.6	0.0	0	25.0	0.7	50.2	1.4	75.5	2.1	121.9	3.3	

Table 3-9. Emissions Reduction Estimation for Harbor Craft by Year - PM (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
HC-1	PM	177.9	1.8	1	3.6	2	17.1	9.5	5.4	3	9.2	5	
HC-2	PM	177.9	0	0	14.4	8	14.4	8	14.4	8	14.7	8	
HC-3	PM	177.9	3.1	1.7	0	0	0	0	0	0	0	0	
HC-4	PM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HC-5	PM	177.9	8.9	5	8.9	5	8.6	4.8	8.6	4.8	0	0	
HC-6	PM	177.9	0	0	0	0	0	0	0	0	43.2	23.5	
HC-7	PM	177.9	0	0	68.0	37.9	68.2	37.9	68.4	37.9	69.8	37.9	
HC-8	PM	177.9	0	0	0	0	30.6	17	40.1	22.2	156.6	85	
HC-9	PM	177.9	0	0	0	0	0	0	0	0	0	0	
HC-10	PM	177.9	0	0	5.6	3.1	11.5	6.4	11.6	6.4	33.2	18	
HC-11	PM	177.9	0	0	0.9	0.5	2.0	1.1	2.9	1.6	4.6	2.5	

Table 3-10. Emissions Reduction Estimation for CHE by Year - NOx (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
CHE-2	NOx	1862.6	608.6	25	297.8	12	51	2	24.1	1	4	1	
CHE-3	NOx	1862.6	0	0	0	0	0	0	0	0	0	0	
CHE-4	NOx	1862.6	0	0	0	0	0	0	0	0	0	0	
CHE-5	NOx	1862.6	116.9	4.8	0	0	0	0	0	0	0	0	
CHE-6	NOx	1862.6	134	5.5	134	5.4	0	0	0	0	0	0	
CHE-7	NOx	1862.6	0	0	1116.9	45	1146.5	45	1034.3	43	16.1	4	
CHE-8	NOx	1862.6	0	0	124.1	5	101.9	4	72.2	3	28.1	7	
CHE-9	NOx	1862.6	0	0	0	0	611.4	24	685.5	28.5	329.2	82	

Table 3-11. Emissions Reduction Estimation for CHE by Year - PM (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
CHE-2	PM	111.6	58.1	43	20.4	18	3.5	3	2.2	2	0.2	1	
CHE-3	PM	111.6	0.5	0.4	0	0	0	0	0	0	0	0	
CHE-4	PM	111.6	0	0	0	0	0	0	0	0	0	0	
CHE-5	PM	111.6	28.9	21.4	0	0	0	0	0	0	0	0	
CHE-6	PM	111.6	6	4.4	6	5.3	0	0	0	0	0	0	
CHE-7	PM	111.6	0	0	50.9	45	46.7	40	39.4	36	0.9	5	
CHE-8	PM	111.6	0	0	6.8	6	5.8	5	4.4	4	1.5	8	
CHE-9	PM	111.6	0	0	0	0	28	24	31.2	28.5	15	82	

Table 3-12. Emissions Reduction Estimation for Rail by Year - NOx (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
R-2	NOx	2,036.1	0	0.0	0.0	32.8	1.7	34.5	2.0	31.7	2.0	58.8	
R-3	NOx	2,036.1	0	0.0	0.0	0.0	0.0	1.7	0.1	24.5	1.5	45.4	
R-5	NOx	2,036.1	35.9	2.0	77.0	4.0	120.8	7.0	111.1	7.0	206.2	7.0	
R-6	NOx	2,036.1	0.0	0.0	19.2	1.0	51.8	3.0	47.6	3.0	88.4	3.0	
R-7	NOx	2,036.1	0.0	0.0	19.2	1.0	43.2	2.5	408.1	25.7	757.3	25.7	
R-8	NOx	2,036.1	0.0	0.0	0.0	0.0	0.0	0.0	793.8	50.0	1,472.9	50.0	
R-9	NOx	2,036.1	0.0	0.0	96.2	5.0	86.3	5.0	79.4	5.0	147.3	5.0	
R-10	NOx	2,036.1	10.8	0.6	23.4	1.2	22.1	1.3	20.3	1.3	37.7	1.3	
R-11	NOx	2,036.1	12.1	0.7	20.6	1.1	21.9	1.3	0.0	0.0	0.0	0.0	
R-12	NOx	2,036.1	0	0	0	0	0	0	0	0	0	0	(Not quantified)

Table 3-13. Emissions Reduction Estimation for Rail by Year - PM (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
R-2	PM	41.6	0.0	0.0	1.8	3.2	1.0	1.5	1.1	1.5	1.2	1.5	
R-3	PM	41.6	0.0	0.0	3.3	6.0	5.1	7.0	7.6	10.0	7.9	9.8	
R-5	PM	41.6	1.0	2.0	2.8	5.0	1.4	2.0	1.5	2.0	3.2	4.0	
R-6	PM	41.6	0.0	0.0	0.6	1.0	0.7	1.0	0.8	1.0	1.6	2.0	
R-7	PM	41.6	0.0	0.0	1.1	2.0	30.1	42.0	63.3	83.0	65.3	81.0	
R-8	PM	41.6	0.0	0.0	0.0	0.0	0.0	0.0	57.2	75.0	60.5	75.0	
R-9	PM	41.6	0.0	0.0	8.4	15.0	10.8	15.0	11.4	15.0	12.1	15.0	
R-10	PM	41.6	0.78	1.6	1.55	2.8	2.2	3.1	2.4	3.1	2.4	3.0	
R-11	PM	41.6	0.4	0.7	0.5	1.0	1.4	2.0	0.0	0.0	0.0	0.0	
R-12	PM	41.6	0	0	0	0	0	0	0	0	0	0	(Not quantified)

Table 3-14. Emissions Reduction Estimation for Heavy-Duty Vehicle by Year - NOx (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
HDV-10	NOx	4463.5	0	0	229.5	6	549	16	645.6	22	164.6	11	
HDV-11	NOx	4463.6	0	0	0	0	0	0	0	0	0	0	
HDV-12	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-13	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-14	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-15	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-16	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-17	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-18	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	
HDV-19	NOx	4463.5	0	0	0	0	0	0	0	0	0	0	

Table 3-15. Emissions Reduction Estimation for Heavy-Duty Vehicle by Year - PM (tpy: tons per year; % Red.: % reduction)

Control Measure Code	Pollutant	2001 EI tpy	2005		2008		2010		2012		2025		Note
			tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	tpy	% Red.	
HDV-10	PM	87.9	0	0	12.9	23	21.8	43	22.8	50	3	10	
HDV-11	PM	87.9	0	0	0	0	0	0	0	0	0	0	
HDV-12	PM	87.9	0.1	0.2	0	0	0	0	0	0	0	0	
HDV-13	PM	87.9	1.4	2.0	0	0	0	0	0	0	0	0	
HDV-14	PM	87.9	0	0	20.2	36	6.1	12	5.9	13	0	0	
HDV-15	PM	87.9	0	0	6.7	12	12.7	25	10	22	1.5	5	
HDV-16	PM	87.9	0	0	0	0	0	0	0	0	0	0	
HDV-17	PM	87.9	0	0	0	0	0	0	0	0	0	0	
HDV-18	PM	87.9	0	0	0	0	0	0	0	0	0	0	
HDV-19	PM	87.9	0	0	0	0	0	0	0	0	0	0	

Table 3-16. Anticipated Aggregated NOx Reduction per Milepost Year

Milepost Year	2005	2008	2010	2012	2025
NOx Reduction (tons per year)	5,552.2	2,364.6	-1,591.8	-2,508.8	-7,463.1

Table 3-17. Anticipated Aggregated PM Reduction per Milepost Year

Milepost Year	2005	2008	2010	2012	2025
PM Reduction (tons per year)	528.2	-20.3	-143.8	-158.5	82.4

Tables 3-16 and 3-17 represent aggregated emissions reductions from measures, sequenced as suggested in this draft NNI Plan.

Figure 3-3. Aggregated NOx Emissions Versus 2001 Baseline

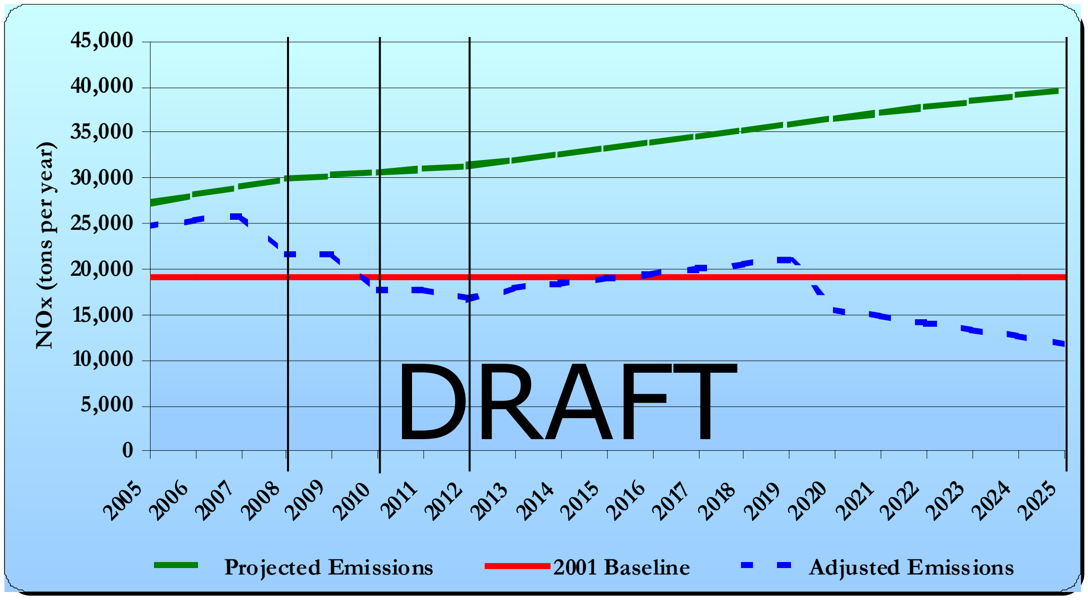
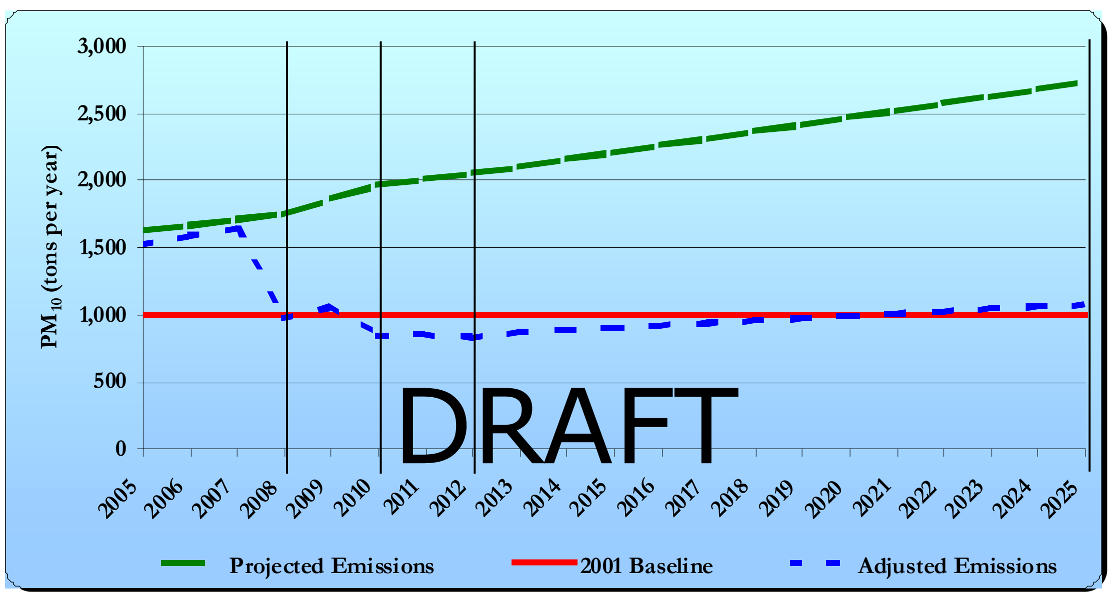


Figure 3-4. Aggregated PM_{10} Emissions Versus 2001 Baseline



Stakeholder Comments Received:

Ed Avol

Figures 3.3, 3.4 – These figures need some additional explanation, or they will be misleading; These projections rely on several approaches/reduction measures/technologies not yet approved/certified/in place…and all of the proposed measures are needed to get these lines to behave as shown.

3.5. Potential Regulatory Initiatives

Potential federal regulatory assistance that could help future emissions reductions include EPA rules on engine standards for Category 3 ocean-going vessel engines for foreign ships in U.S. waters, expediting research and development of low emissions Tier 4 new locomotive engines, development of "Blue-Sky Series" ocean-going vessel engines, and the creation of a SECA in the U.S. coastal waters.

3.6. Emerging Technologies - Future Considerations

New technologies and applications are emerging everyday. New engine and fuel technologies, advanced emissions control technologies, and other emerging technologies that might aid future reduction of emissions for mobile sources in the Port will be considered and incorporated in future control measures as soon as the technology is verified with known efficiency and emissions reduction benefits.

Some of these technologies or standards, like the 2007 on road heavy-duty vehicle engine standards, are incorporated into the ARB modeling for on road trucks. Others advancements, like slide valve and common rail technologies for OGV main engines, are not incorporated specifically in the OGV projected emissions. This is because, at this time, these technologies do not have a verified or agreed-upon reduction value with ARB or EPA. Control measure OGV7 does take into account that ship engines built by MAN B&W will get a 35percent reduction in NOx emissions due to the company's statements that they are building cleaner engines (which might include slide valve, common rail, and other technologies). However, this reduction was not taken for the other engine manufacturers.

Emerging technologies will need to reviewed, updated, and incorporated into future iterations of the NNI analysis.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

Section 3.6 - We object to the arbitrary criteria to exclude the consideration of existing technologies such as slide valves because they are not verified by regulatory agencies. In contrast, speculative technologies such as "blue-sky" engines have been included and growth projections that have no supporting data. A consistent approach is needed.

3.7. Throughput Limitations

Physical constrains on the Port's infrastructure including available land and space for future business growth, existing facility layout, transportation and other logistic and support systems may physically limit the Port's future growth and consequently may limit emissions growth.

The current NNI evaluation does not take these considerations into account, and therefore models the port cargo flows and throughputs as unconstrained. However, the system is not unconstrained, and there are some significant bottlenecks that will reduce the throughput capacity and affect the total cargo volumes through the port. These bottlenecks include, among others, bridges, highways, rail capacity, berth space, terminal space and configuration, and size of ships. These bottlenecks will impede the Port from reaching the unconstrained growth that is used for this analysis. These limiting factors should be taken into account in updates to both cargo throughput forecasts and NNI analyses.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

Section 3.7 - We appreciate the recognition of physical constraints and limitations on future port growth. The draft report identifies several bottlenecks, such as bridges, highways and rail capacity. Many of the bottlenecks have been identified in numerous studies (BT&H/EPA, SCAG and LAEDC). These studies recognize that even if funding were available to address these bottlenecks it could take at least ten years to complete work on such major impediments like the 710 and Gerald Desmond Bridge. These limiting factors cast doubt on the accuracy of the projected growth estimates and therefore the accuracy of the emission reduction model. They should be corrected to the greatest extent possible prior to any public policy decisions being made based on these assumptions.

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4. FINANCIAL ANALYSIS

The Financial Working Group (FWG) has developed detailed financial analyses of the Task Force recommended control measures. The analyses include estimates of capital costs, operating costs, and cost effectiveness (expressed as cost per ton of emissions reduced). The FWG also assessed potential sources of funding to pay for or supplement the implementation of the measures. In addition, the Benefit Analysis Subgroup developed estimates of the benefits to public health from the projected emissions reductions in terms of avoidance of adverse health outcomes and assigned monetary values to those benefits.

"Order of Magnitude" cost estimates for each of the control measures considered in the NNI analysis were developed and reviewed by the FWG. It is important for the reader to understand that the cost estimates presented in this report rely on a long string of assumptions (identified in previous sections) that were made during the technical analysis. These assumptions include, but are not limited to: very aggressive growth projections with no consideration of off-terminal constraints associated with the inland transportation system, numerous assumptions that are included in the 2001 baseline emissions inventory relating to emissions and activity, operational assumptions made by the various working groups, and decisions on control measures made by the Task Force itself. Also, the cost estimates have not been reviewed by the sources that will be asked to implement the proposed control measures. Therefore, these cost estimates should only be considered as preliminary "Order of Magnitude" estimates and should be further evaluated and updated as additional information becomes available. Further, the cost estimates should be part of the update to the NNI analysis that has been suggested previously to take place on three-year intervals.

The costs identified for analysis by the FWG included those associated with existing and proposed regulatory measures, existing and proposed industry-funded efforts, existing port funded programs, and those unfunded measures directly related to achieving NNI. There were several costing issues that were not settled in the FWG and still need further analysis as the process moves forward and for some measures there were opposing cost estimates that were developed by different stake-holders. For example, rail measures R7 and R9 were estimated independently by the SCAQMD and the rail group, resulting in two different scenarios. After considerable debate, consensus could not be reached on accepting one scenario over the other and therefore, both scenarios were included in the cost measure estimates. In addition, there was considerable debate on the projected health benefits on to the NNI control measures and the monetary values assigned to those benefits.

The following tables summarize the estimated emissions reductions from the proposed control measures, the "Order of Magnitude" cost estimates associated with those control measures, and the ARB mid-range estimates for the undiscounted health benefits valuation associated with the reduced emissions. The summaries are provided in five-year increments, with each successive five-year group becoming more speculative as assumptions and uncertainty grow.

Table 4-1. Summary Emissions Reduction Estimates for Proposed NNI Control Measures

	2005 (tons reduced)	2006 (tons reduced)	2007 (tons reduced)	2008 (tons reduced)	2009 (tons reduced)	2005 - 2009 (tons reduced)
Oxides of Nitrogen	2,430	2,730	3,130	8,200	8,550	**25,040**
Diesel Particulate Matter	110	80	80	800	800	**1,870**

	2010 (tons reduced)	2011 (tons reduced)	2012 (tons reduced)	2013 (tons reduced)	2014 (tons reduced)	2010 - 2014 (tons reduced)
Oxides of Nitrogen	12,890	12,920	14,200	13,580	13,670	**67,260**
Diesel Particulate Matter	1,110	1,130	1,180	1,200	1,230	**5,850**

	2015 (tons reduced)	2016 (tons reduced)	2017 (tons reduced)	2018 (tons reduced)	2019 (tons reduced)	2015 - 2019 (tons reduced)
Oxides of Nitrogen	13,760	13,850	13,940	14,040	14,130	**69,720**
Diesel Particulate Matter	1,260	1,290	1,320	1,360	1,390	**6,620**

	2020 (tons reduced)	2021 (tons reduced)	2022 (tons reduced)	2023 (tons reduced)	2024 (tons reduced)	2020 - 2024 (tons reduced)
Oxides of Nitrogen	20,260	21,610	22,960	24,310	25,660	**114,800**
Diesel Particulate Matter	1,420	1,450	1,490	1,520	1,550	**7,430**

	2025 (tons reduced)	Total NNI Control Measures (tons reduced)
Oxides of Nitrogen	27,110	**304,000**
Diesel Particulate Matter	1,590	**23,000**

Table 4-2. Cost Summary Estimates for Proposed Non-Regulatory Unfunded Control Measures*

	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2005 - 2009 (2005 $)
Cost Scenario 1 (w/SCAQMD R7 & R9)	$10,000,000	$110,000,000	$70,000,000	$230,000,000	$200,000,000	**$620,000,000**
Cost Scenario 2 (w/Rail R7 & R9)	$11,000,000	$115,000,000	$125,000,000	$257,000,000	$228,000,000	**$736,000,000**

	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2010 - 2014 (2005 $)
Cost Scenario 1 (w/SCAQMD R7 & R9)	$910,000,000	$180,000,000	$490,000,000	$200,000,000	$210,000,000	**$1,990,000,000**
Cost Scenario 2 (w/Rail R7 & R9)	$790,000,000	$195,000,000	$358,000,000	$245,000,000	$521,000,000	**$2,109,000,000**

	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2015 - 2019 (2005 $)
Cost Scenario 1 (w/SCAQMD R7 & R9)	$920,000,000	$200,000,000	$480,000,000	$220,000,000	$490,000,000	**$2,310,000,000**
Cost Scenario 2 (w/Rail R7 & R9)	$1,841,000,000	$1,122,000,000	$1,395,000,000	$1,135,000,000	$935,000,000	**$6,428,000,000**

	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2020 - 2024 (2005 $)
Cost Scenario 1 (w/SCAQMD R7 & R9)	$620,000,000	$240,000,000	$250,000,000	$1,130,000,000	$1,140,000,000	**$3,380,000,000**
Cost Scenario 2 (w/Rail R7 & R9)	$491,000,000	$228,000,000	$234,000,000	$1,114,000,000	$1,121,000,000	**$3,188,000,000**

	2025 (2005 $)		Total Unfunded Program Cost (2005 $)
Cost Scenario 1 (w/SCAQMD R7 & R9)	$1,150,000,000	* - The total cost estimates for implementing all measures considered	**$9,500,000,000**
Cost Scenario 2 (w/Rail R7 & R9)	$1,130,000,000	under this plan range from $11.6 to $15.7 billion (funded + unfunded)	**$13,600,000,000**

Table 4-3 Summary Health Benefits Valuation (Undiscounted) Associated with NNI Control Measures*

	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2005 - 2009 (2005 $)
Health Benefits Valuation (Mean)	$91,000,000	$78,000,000	$80,000,000	$572,000,000	$585,000,000	**$1,400,000,000**
	2010 (2005 $)	**2011 (2005 $)**	**2012 (2005 $)**	**2013 (2005 $)**	**2014 (2005 $)**	**2010 - 2014 (2005 $)**
Health Benefits Valuation (Mean)	$858,000,000	$893,000,000	$956,000,000	$968,000,000	$999,000,000	**$4,700,000,000**
	2015 (2005 $)	**2016 (2005 $)**	**2017 (2005 $)**	**2018 (2005 $)**	**2019 (2005 $)**	**2015 - 2019 (2005 $)**
Health Benefits Valuation (Mean)	$1,032,000,000	$1,063,000,000	$1,095,000,000	$1,128,000,000	$1,162,000,000	**$5,500,000,000**
	2020 (2005 $)	**2021 (2005 $)**	**2022 (2005 $)**	**2023 (2005 $)**	**2024 (2005 $)**	**2020 - 2024 (2005 $)**
Health Benefits Valuation (Mean)	$1,280,000,000	$1,334,000,000	$1,390,000,000	$1,447,000,000	$1,505,000,000	**$7,000,000,000**
	2025 (2005 $)					**Total Health Benefits Valuation (2005 $)**
Health Benefits Valuation (Mean)	$1,567,000,000					**$20,200,000,000**

* - The Health Benefits estimates in the table do not represent a consensus view of the Task Force. The rail representatives and the PMSA believe the Health Benefits analysis is deeply flawed, is likely to mislead stakeholders and increase the risk that solutions will be ineffective as well as costly in terms of the resources available to the Port, lessees, users and surrounding communities.

The total "Order of Magnitude" costs associated with the NNI analysis, including the costs associated with complying with existing and proposed regulations, as well as existing industry efforts, is estimated between $11.6 billion (using SCAQMD rail estimates) and $15.7 billion (using the rail group estimates) over the 21-year study period. That cost is estimated to reduce over 300,000 tons NOx and 23,000 tons diesel particulate matter emissions between 2005 and 2025. Again, it is important to note that these results reflect inherent assumptions, such as growth rate that cannot be achieved without substantial improvements in the port and South Coast basin transportation infrastructure (which have not been defined nor included).

These FWG work products are described in greater detail in the following sections.

Stakeholder Comments Received:

Rail Industry

4. Financial Analysis - Most of the assumptions employed by the FWG regarding technology availability, emissions, performance, and costs are speculative, represent over simplifications of rail operations, and are not well documented. The analysis either understates the costs or fails to include many costs that would arise with measure implementation.

Of particular importance is the fact that the analysis does not offer implementation assumptions and costs that reflect the unique nature of rail operations. This is apparent in the review of the measures that force the establishment of a dedicated locomotive fleet. Attendant to such a requirement are numerous operational complexities which go to the heart of the feasibility and cost of the control measures.

The TWG has assumed that rail activity levels will increase by over 350 percent and this will lead to a corresponding increase in emissions. However, in estimating the number of units required for each *measure, it does not appear that there has been an increase in the amount of equipment required. For instance, the SCAQMD analysis for measures R7 (ultra low units), R9 (fuel), and R10 (idling controls) assume 250 line-haul/heavy horsepower units and120 local switch units will be sufficient for compliance. However, if rail activity grows by more than 350 percent, then the number of locomotives must be increased accordingly. Because this was not done, the SCAQMD dramatically underestimated the costs for all "additional" rail measures, R7—R11.*

Dave Howekamp

The first paragraph, second sentence "... may realize through avoiding the adverse health outcomes that may occur due to continued increases in emissions" should be changed to "... will realize through avoiding the adverse health outcomes that will occur due to continued increases in emissions". The whole purpose of NNI is to protect public health so the report should not be shy about the fact that health benefits will occur. Any uncertainty regarding the exact estimates of cost savings are dealt with in the CARB analysis.

4.1. Cost Estimates

To meet the NNI program development schedule, the cost estimates were developed within a very short time frame. While diligent efforts have been made to accurately consider and reflect the relevant factors that will affect the cost of these measures, the estimates discussed and presented in this section should be viewed as order-of-magnitude cost estimates for comparison purposes, but should not be deemed reliable cost estimates for budgetary purposes. In addition to schedule constraints, the specificity of the cost estimates is influenced by the fact that the emission reduction measures that make up the NNI proposals are in various stages of planning and implementation, from the discussion/evaluation stage through fully implemented programs. Therefore, full details are not available for all of the measures.

When these measures are implemented, their costs are or will be borne by different entities, primarily the Port and the owners or operators of the affected vessels, vehicles, or equipment. To reflect the different financial contributors and the various stages of implementation, the NNI measures have been categorized into the following groups:

Existing Regulatory Costs (to industry) – These measures are promulgated regulations or other enforceable programs (such as the railroad MOU) which will be paid for by the affected companies or industries. For example, OGV8 is an ARB requirement for ships operating in California waters to use lower-sulfur fuels. The cost of implementing this requirement (i.e., the differential cost of the fuel plus infrastructure costs to load, store, and burn the fuel) will be borne by the vessel owners or operators.

Proposed Regulatory Costs (to industry) – These measures are proposed regulations which will be paid for by the affected companies or industries if/when promulgated and effective. For example, EPA plans to promulgate new emission standards for Category 1 and 2 marine engines that will affect harbor craft (HC6). The cost of implementing this requirement will be borne by engine manufacturers and purchasers.

Existing and Proposed Non-Regulatory Industry-Funded Costs – These two categories cover measures that are non-regulatory programs that are or will be funded by industry. For example, OGV2 is the Port's voluntary speed reduction (VSR) program, the cost of which (in terms of the cost of delay caused by reducing speed) is borne by the vessel operators.

Non-Regulatory Port-Funded Costs – These measures are non-regulatory programs that are currently funded by the Port either directly or through incentive programs, such as R5 and R6, the replacement of switching locomotives operating within the Port.

Proposed Non-Regulatory Unfunded Costs – This category currently covers the majority of NNI measures that are not regulatory measures and for which funding sources have not yet been identified. Once funding sources are identified, some of these measures may be reclassified into the Non-Regulatory Industry-Funded Costs (either existing or proposed, as appropriate).

The cost estimates were developed using information from a variety of sources, including equipment vendors, fuel suppliers, and industry representatives. To the extent possible given the schedule constraints, they have been reviewed by appropriate industry representatives, whose comments and suggestions have been incorporated, again as feasible under the schedule. Further consideration and refinement should be undertaken to consider and/or address remaining concerns.

The cost estimates have been prepared in terms of capital and operating costs. Capital costs have not been annualized but are presented for the years in which the costs will be first incurred. Operating costs are presented on an annual basis.

The cost estimates are summarized by year for each of the categories discussed above in Table 4-4. In this table, the color codes used to differentiate the categories discussed above are displayed at top along with a brief description of the category. Below that on the table is a summary by year of the totals of all measures in each financial category, and the overall 21-year totals are shown in the far right column of the table. Below the summary rows is a detailed list of all the NNI measures and their estimated costs by year. Where capital and operating costs have been identified these are shown on separate lines. Again, 21-year totals are displayed in the far right column. For each emission source category (ocean-going vessels, harbor craft, etc.), subtotal rows have been included that show the sums of the measures in each financial category. Two overall cost estimates have been prepared because of a considerable difference between estimates prepared by SCAQMD staff and railroad representatives for locomotive measures R7 and R9. Both estimates are presented for these measures, for the locomotive measures subtotal, and for the overall summary.

Stakeholder Comments Received:

Ed Avol

Section 4.1 – This section on cost estimates needs some summary statements to guide the reader, rather than just leaving the tables to trudge through. A summary paragraph of the tables would be helpful as well, but at a minimum, it would be helpful to say something like the following: "Costs for reduction measures being contemplated for <each category: trucks/rail/OGV/…> are currently estimated to be $XYZ. Total reduction measure costs (all categories) are currently estimated to be $..."

Table 4-4. Summary of Estimated Capital and Operating Costs

KEY TO COLOR CODES:

Existing Regulatory Costs (to industry)	Existing regulatory requirements (may have future effective dates) with costs that will be incurred by industry
Proposed Regulatory Costs (to industry)	Proposed regulatory requirements with costs that will be incurred by industry if enacted
Non-Regulatory Industry-Funded Costs	Existing non-regulatory programs that are currently funded by industry
Proposed Non-Regulatory Industry-Funded Costs	Proposed non-regulatory programs that will be funded by industry if implemented
Non-Regulatory Port-Funded Costs	Existing non-regulatory programs that are currently funded by the port (or other entities)
Proposed Non-Regulatory Unfunded Costs	Proposed non-regulatory programs for which port/industry/other funding will be required if implemented

Summary Costs	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
Existing Regulatory Costs (to industry)	$1,000,000	$3,000,000	$4,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$30,000,000	**$288,000,000**
Proposed Regulatory Costs (to industry)	$0	$0	$0	$10,000,000	$10,000,000	$90,000,000	$50,000,000	$60,000,000	$70,000,000	$70,000,000	$80,000,000	$90,000,000	$90,000,000	$100,000,000	$100,000,000	$110,000,000	$110,000,000	$120,000,000	$120,000,000	$130,000,000	$140,000,000	**$1,550,000,000**
Non-Regulatory Industry-Funded Costs	$10,000,000	$1,000,000	$1,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	**$262,000,000**
Proposed Non-Regulatory Industry-Funded Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs	$15,600,000	$17,400,000	$2,700,000	$3,200,000	$1,400,000	$1,400,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	**$50,000,000**
Proposed Non-Regulatory Unfunded Costs (SCAQMD Rail Costing Scenario)	$10,000,000	$110,000,000	$70,000,000	$230,000,000	$200,000,000	$910,000,000	$180,000,000	$490,000,000	$200,000,000	$210,000,000	$920,000,000	$200,000,000	$480,000,000	$220,000,000	$490,000,000	$620,000,000	$240,000,000	$250,000,000	$1,130,000,000	$1,140,000,000	$1,150,000,000	**$9,450,000,000**
Prop. Non-Reg. Unfunded (Rail Group's Costing Scenario)	$11,000,000	$115,000,000	$125,000,000	$257,000,000	$228,000,000	$790,000,000	$195,000,000	$358,000,000	$245,000,000	$521,000,000	$1,841,000,000	$1,122,000,000	$1,395,000,000	$1,135,000,000	$935,000,000	$491,000,000	$228,000,000	$234,000,000	$1,114,000,000	$1,121,000,000	$1,130,000,000	**$13,591,000,000**
Total Costs (SCAQMD Rail Costing Scenario)	**$36,600,000**	**$131,400,000**	**$77,700,000**	**$263,200,000**	**$231,400,000**	**$1,021,400,000**	**$250,600,000**	**$570,600,000**	**$290,600,000**	**$300,600,000**	**$1,020,600,000**	**$310,600,000**	**$600,600,000**	**$350,600,000**	**$630,600,000**	**$770,600,000**	**$390,600,000**	**$410,600,000**	**$1,290,600,000**	**$1,310,600,000**	**$1,340,600,000**	$11,600,000,000
Total Costs (Rail Group's Rail Costing Scenario)	**$37,600,000**	**$136,400,000**	**$132,700,000**	**$290,200,000**	**$259,400,000**	**$901,400,000**	**$265,600,000**	**$438,600,000**	**$335,600,000**	**$611,600,000**	**$1,941,600,000**	**$1,232,600,000**	**$1,515,600,000**	**$1,265,600,000**	**$1,075,600,000**	**$641,600,000**	**$378,600,000**	**$394,600,000**	**$1,274,600,000**	**$1,291,600,000**	**$1,320,600,000**	$15,700,000,000

Note: Certain costs currently presented in the yellow band (Proposed Non-Regulatory Unfunded Costs) may be reassigned to the blue band (Proposed Non-Regulatory Industry-Funded Costs) after evaluation by the port and/or the NNI Task Force)

Source Category Details

Ocean-Going Vessel Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
OGV1 - New Engine Standards for Ships	Green	$/ton	$0	$0	$0	$1,200,000	$2,500,000	$3,800,000	$4,100,000	$4,400,000	$5,300,000	$6,100,000	$7,000,000	$7,800,000	$8,700,000	$9,500,000	$10,300,000	$11,200,000	$12,000,000	$12,900,000	$13,700,000	$14,600,000	$15,400,000	**$150,500,000**
OGV2 - VSR MOU	Blue	Operational	$8,600,000	$500,000	$1,100,000	$10,200,000	$10,800,000	$11,300,000	$11,700,000	$12,000,000	$12,500,000	$12,900,000	$13,400,000	$13,800,000	$14,300,000	$14,700,000	$15,200,000	$15,600,000	$16,100,000	$16,500,000	$17,000,000	$17,400,000	$17,900,000	**$263,500,000**
OGV3 - AMP	Blue	Capital	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$500,000**
		Capital	$3,900,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$3,900,000**
		Operational	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	**$14,700,000**
OGV4 - Auxiliary Engine Fuel Improvement Prog	Blue	Operational	$100,000	$500,000	$1,000,000	$1,500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$3,100,000**
OGV5 - New Cat3 Eng Standards (Low)	Green	$/ton	$0	$0	$0	$0	$0	$0	$5,000,000	$10,000,000	$13,100,000	$16,300,000	$19,500,000	$22,700,000	$25,900,000	$29,100,000	$32,300,000	$35,400,000	$38,600,000	$41,800,000	$45,000,000	$48,200,000	$51,400,000	**$434,300,000**
OGV6 - Reroute Cleanest Ships	Blue	$/ton	$0	$0	$0	$4,300,000	$6,900,000	$9,500,000	$7,200,000	$5,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$32,900,000**
OGV7 - Low Emissions Main Engines	Blue	Capital	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$258,600,000	$0	$258,600,000	$258,600,000	$0	$0	$847,400,000	$847,400,000	$847,400,000	**$3,318,000,000**
		Operational	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$400,000	$0	$900,000	$1,300,000	$1,300,000	$1,300,000	$2,100,000	$2,900,000	$4,900,000	**$15,100,000**
OGV8 - Cleaner Fuels for Ship Aux Engines	Blue	Operational	$0	$0	$0	$6,600,000	$7,000,000	$7,300,000	$7,600,000	$7,800,000	$8,100,000	$8,400,000	$8,700,000	$8,900,000	$9,200,000	$9,500,000	$9,800,000	$10,100,000	$10,400,000	$10,700,000	$11,000,000	$11,300,000	$11,600,000	**$164,000,000**
OGV9 - Main Eng Fuel Improvement Prog	Blue	Operational	$0	$0	$0	$3,400,000	$5,500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$8,900,000**
OGV10 - SECA	Blue	Operational	$0	$0	$0	$0	$0	$7,500,000	$7,700,000	$8,000,000	$8,300,000	$8,600,000	$8,900,000	$9,200,000	$9,500,000	$9,800,000	$10,100,000	$10,400,000	$10,700,000	$11,000,000	$11,300,000	$11,600,000	$11,900,000	**$154,500,000**
OGV11 - Expanded Auxiliary Fuel Imprv Prog	Blue	Operational	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
OGV12 - Expanded Main Eng Fuel Imprv Prog	Blue	Operational	$0	$0	$0	$9,000,000	$13,700,000	$18,500,000	$19,100,000	$19,600,000	$20,400,000	$21,100,000	$21,800,000	$22,600,000	$23,300,000	$24,100,000	$24,800,000	$25,500,000	$26,300,000	$27,000,000	$27,800,000	$28,500,000	$29,200,000	**$402,300,000**
OGV13 - Additional Auxiliary Eng Red Freq Callers	Blue	$/ton	$0	$0	$0	$0	$0	$46,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$46,200,000**
OGV14 - Retro/Repower Req Infreq Callers	Blue	Capital	$0	$0	$0	$0	$0	$520,000,000	$0	$0	$0	$0	$704,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,224,000,000**
OGV15 - Expanded VSR	Blue	Capital	$0	$40,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$40,000,000**
Add in Fuel Savings		Operational	$0	$9,400,000	$9,400,000	$28,300,000	$1,600,000	$31,400,000	$1,000,000	$33,300,000	$34,600,000	$35,800,000	$37,100,000	$38,400,000	$39,600,000	$40,900,000	$42,100,000	$43,400,000	$44,700,000	$45,900,000	$47,200,000	$48,400,000	$49,700,000	**$662,200,000**
OGV16 - Expanded AMP	Blue	Capital	$0	$10,500,000	$10,500,000	$61,200,000	$10,500,000	$65,403,750	$0	$56,246,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$214,350,000**
		Operational	$0	$0	$0	$24,700,000	$39,700,000	$54,800,000	$80,200,000	$105,500,000	$109,500,000	$113,500,000	$117,500,000	$121,500,000	$125,500,000	$129,400,000	$133,400,000	$137,400,000	$141,400,000	$145,400,000	$149,400,000	$153,400,000	$157,400,000	**$2,039,600,000**
OGV17 - Add In-Use Measures for Ships	Blue	$/ton	$0	$0	$0	$0	$0	$19,400,000	$23,100,000	$26,800,000	$27,800,000	$28,800,000	$29,800,000	$30,800,000	$31,800,000	$32,900,000	$33,900,000	$34,900,000	$35,900,000	$36,900,000	$37,900,000	$38,900,000	$39,900,000	**$510,000,000**
Existing Regulatory Costs (to industry)			$0	$0	$0	$1,200,000	$2,500,000	$3,800,000	$4,100,000	$4,400,000	$5,300,000	$6,100,000	$7,000,000	$7,800,000	$8,700,000	$9,500,000	$10,300,000	$11,200,000	$12,000,000	$12,900,000	$13,700,000	$14,600,000	$15,400,000	**$150,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$6,600,000	$7,000,000	$80,400,000	$43,400,000	$52,600,000	$57,300,000	$62,100,000	$66,900,000	$71,600,000	$76,400,000	$81,300,000	$86,100,000	$90,800,000	$95,600,000	$100,400,000	$105,200,000	$110,000,000	$114,800,000	**$1,310,000,000**
Non-Regulatory Industry-Funded Costs			$12,500,000	$500,000	$1,100,000	$10,200,000	$10,800,000	$11,300,000	$11,700,000	$12,000,000	$12,500,000	$12,900,000	$13,400,000	$13,800,000	$14,300,000	$14,700,000	$15,200,000	$15,600,000	$16,100,000	$16,500,000	$17,000,000	$17,400,000	$17,900,000	**$270,000,000**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$1,300,000	$1,200,000	$1,700,000	$2,200,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	**$20,000,000**
Proposed Non-Regulatory Unfunded Costs			$0	$59,900,000	$19,900,000	$130,900,000	$77,900,000	$699,603,750	$107,500,000	$219,646,250	$164,500,000	$170,400,000	$880,400,000	$182,500,000	$447,400,000	$194,400,000	$459,800,000	$466,200,000	$213,700,000	$219,600,000	$1,073,900,000	$1,080,600,000	$1,088,600,000	**$7,960,000,000**
Total Costs			$12,500,000	$500,000	$1,100,000	$18,000,000	$20,300,000	$95,500,000	$59,200,000	$69,000,000	$75,100,000	$81,100,000	$87,300,000	$93,200,000	$99,400,000	$105,500,000	$111,600,000	$117,600,000	$123,700,000	$129,800,000	$135,900,000	$142,000,000	$148,100,000	**$9,710,000,000**

Harbor Craft Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
HC1 - New Engine Standards for Harbor Craft	Green	$/ton	$700,000	$800,000	$1,000,000	$1,100,000	$2,100,000	$3,000,000	$2,300,000	$1,600,000	$1,700,000	$1,800,000	$1,800,000	$1,900,000	$2,000,000	$2,100,000	$2,200,000	$2,200,000	$2,300,000	$2,400,000	$2,500,000	$2,500,000	$2,600,000	**$40,600,000**
HC2 - Clean Fuels for Harbor Craft	Green	Operational	$0	$0	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$500,000	$500,000	**$7,800,000**
HC3 - Early Implementation ULSD	Blue	Operational	$200,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$300,000**
HC4 - Dredging Activities	Blue	No reduction taken																						
HC5 - TAC HC Measures (Included in China Shipping Settlemei	Blue																							**$2,700,000**
HC6 - New Engine Stds - Cat 1/Cat 2	Green	$/ton	$0	$0	$0	$0	$0	$0	$0	$0	$400,000	$900,000	$1,300,000	$1,700,000	$2,100,000	$2,600,000	$3,000,000	$3,400,000	$3,800,000	$4,300,000	$4,700,000	$5,100,000	$5,500,000	**$38,800,000**
HC7 - Emulsified Fuel for Harbor Craft Mrn Eng	Blue	Operational	$0	$600,000	$600,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	**$40,800,000**
HC8 - In-Use HC Emission Reduction Measure (ATCM)	Blue	$/ton	$0	$0	$0	$0	$0	$5,100,000	$5,400,000	$5,700,000	$6,200,000	$6,800,000	$7,300,000	$7,800,000	$8,400,000	$8,900,000	$9,400,000	$9,900,000	$10,500,000	$11,000,000	$11,500,000	$12,100,000	$12,600,000	**$138,600,000**
HC9 - Repower Existing Craft	Blue	Capital	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$40,000,000**
HC10 - Retrofit Existing Craft	Blue	Capital	$0	$0	$0	$1,800,000	$1,800,000	$1,800,000	$1,800,000	$1,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,000,000**
HC11 - AMP Ready Staging Areas	Blue	Capital	$0	$0	$0	$200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$200,000**
Existing Regulatory Costs (to industry)			$700,000	$800,000	$1,400,000	$1,500,000	$2,500,000	$3,400,000	$2,700,000	$2,000,000	$2,100,000	$2,200,000	$2,200,000	$2,300,000	$2,400,000	$2,500,000	$2,600,000	$2,600,000	$2,700,000	$2,800,000	$2,900,000	$3,000,000	$3,100,000	**$50,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$5,100,000	$5,400,000	$5,700,000	$6,600,000	$7,700,000	$8,600,000	$9,500,000	$10,500,000	$11,500,000	$12,400,000	$13,300,000	$14,300,000	$15,300,000	$16,200,000	$17,200,000	$18,100,000	**$180,000,000**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$200,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$300,000**
Proposed Non-Regulatory Unfunded Costs			$8,000,000	$8,600,000	$8,600,000	$12,200,000	$12,000,000	$4,000,000	$4,000,000	$4,000,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	**$90,000,000**
Total Costs			$8,900,000	$9,500,000	$10,000,000	$13,700,000	$14,500,000	$12,500,000	$12,100,000	$11,700,000	$10,900,000	$12,100,000	$13,000,000	$14,000,000	$15,100,000	$16,200,000	$17,200,000	$18,100,000	$19,200,000	$20,300,000	$21,300,000	$22,400,000	$23,400,000	**$320,000,000**

Table 4-4. Summary of Estimated Capital and Operating Costs (continued)

Cargo Handling Equipment Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
CHE1 - Emission Stands. for HD Nonroad Diesel Engines	Green		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
CHE2 - YT Modernization & ULSD	Blue	Captial	$2,100,000	$4,500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$6,600,000**
		Operational	$1,000,000	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,500,000**
CHE3 - Early Impl. ULSD for non-YT	Blue	Operational	$200,000	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$500,000**
CHE4 - Alternative Yard Tractor Resolution	Blue	No reduction taken																						
CHE5 - Emulsified Fuels	Blue	Operational	$300,000	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$600,000**
CHE6 - TAC CHE Measures (Included in China Shipping Sett	Blue																							**$800,000**
CHE7 - Expanded YT Modernization	Blue	Captial	$0	$0	$4,500,000	$6,600,000	$3,000,000	$4,500,000	$5,900,000	$6,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$31,100,000**
CHE8 - Enhanced CHE Modernization	Blue	Captial	$0	$17,900,000	$17,900,000	$0	$0	$0	$18,700,000	$18,700,000	$18,700,000	$18,700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$110,600,000**
CHE9 - CHE at Ports & IM Rail Yards	Blue	$/ton	$0	$0	$0	$0	$0	$4,300,000	$4,500,000	$4,800,000	$4,600,000	$4,400,000	$4,200,000	$4,000,000	$3,800,000	$3,600,000	$3,400,000	$3,200,000	$3,100,000	$2,900,000	$2,700,000	$2,500,000	$2,300,000	**$58,300,000**
Existing Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$4,300,000	$4,500,000	$4,800,000	$4,600,000	$4,400,000	$4,200,000	$4,000,000	$3,800,000	$3,600,000	$3,400,000	$3,200,000	$3,100,000	$2,900,000	$2,700,000	$2,500,000	$2,300,000	**$60,000,000**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$3,600,000	$5,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,200,000**
Proposed Non-Regulatory Unfunded Costs			$0	$17,900,000	$22,400,000	$6,600,000	$3,000,000	$4,500,000	$24,600,000	$25,300,000	$18,700,000	$18,700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$140,000,000**
Total Costs			$3,600,000	$23,500,000	$22,400,000	$6,600,000	$3,000,000	$8,800,000	$29,100,000	$30,100,000	$23,300,000	$23,100,000	$4,200,000	$4,000,000	$3,800,000	$3,600,000	$3,400,000	$3,200,000	$3,100,000	$2,900,000	$2,700,000	$2,500,000	$2,300,000	**$210,000,000**

Rail Locomotive Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
R1 - Tier 0, 1, 2 Locomotive Standards	Green																							
R2 - ARB Diesel Fuel Used by Intrastate Locomotives	Blue	$/ton	$0	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$200,000	$200,000	$200,000	$200,000	$200,000	**$2,500,000**
R3 - Federal Standards for Nonroad Diesel Fuel	Blue	$/ton	$0	$0	$0	$40,000	$50,000	$90,000	$250,000	$410,000	$430,000	$450,000	$470,000	$500,000	$520,000	$540,000	$560,000	$580,000	$600,000	$620,000	$640,000	$660,000	$680,000	**$8,090,000**
R4 - Railroad MOU	Green																							
R5 - PHL Modernization & ULSD Program	Blue	Capital	$4,800,000	$4,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,600,000**
		Operational	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$200,000**
R6 - Ultra-Low Emission Switcher Locomotives: PHL	Blue	Capital	$0	$0	$1,100,000	$1,100,000	$800,000	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$3,800,000**
		Operational	$0	$0	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	**-$1,900,000**
R7 - Ultra-Low Emission Switcher & Line Haul: Class 1	Blue	Capital	$0	$0	$0	$26,300,000	$26,300,000	$167,700,000	$26,300,000	$178,300,000	$0	$0	$0	$700,000	$700,000	$2,500,000	$700,000	$117,800,000	$0	$0	$0	$700,000	$700,000	**$548,700,000**
(SCAQMD Cost Est)		Operational	$0	$0	$0	-$1,400,000	-$1,400,000	$6,300,000	$6,300,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$15,100,000	$15,100,000	$15,100,000	$15,100,000	$15,100,000	$20,000,000	**$168,500,000**
R7 - ULE Switcher & Line Haul: Class 1 (Rail Group Cost Est)	Blue	Capital/Op	$0	$0	$0	$0	$0	$0	$0	$0	$0	$270,000,000	$877,500,000	$877,500,000	$877,500,000	$877,500,000	$455,000,000	$0	$0	$0	$0	$0	$0	**$4,235,000,000**
R8 - Tier 3 Engine Standards	Not included	No reduction taken																						
R9 - ARB Diesel for Class 1 (SCAQMD Cost Est)	Blue	Operational	$0	$0	$1,900,000	$2,100,000	$2,300,000	$2,600,000	$2,700,000	$2,800,000	$2,900,000	$3,000,000	$3,100,000	$3,200,000	$3,400,000	$3,500,000	$3,500,000	$3,700,000	$3,900,000	$4,000,000	$4,100,000	$4,200,000	$4,400,000	**$61,300,000**
R9 - ARB Diesel for Class 1 (Rail Group Cost Est)	Blue	Operational	$0	$0	$51,900,000	$52,100,000	$52,300,000	$52,600,000	$52,700,000	$52,800,000	$52,900,000	$53,000,000	$53,100,000	$53,200,000	$53,400,000	$53,500,000	$3,500,000	$3,700,000	$3,900,000	$4,000,000	$4,100,000	$4,200,000	$4,400,000	**$661,300,000**
R10 - Idling Controls for Switchers & Line Haul	Blue	Capital	$0	$2,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$2,800,000**
		Operational	$0	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	**-$800,000**
R11 - Efficiency Improvement on In-Use Rail Equipment	Blue	$/ton	$600,000	$800,000	$900,000	$1,100,000	$1,100,000	$1,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$5,700,000**
R12 - Electrification of Alameda Corridor	Not included	No reduction taken																						
Existing Regulatory Costs (to industry)			$0	$100,000	$100,000	$140,000	$150,000	$190,000	$350,000	$510,000	$530,000	$550,000	$570,000	$600,000	$620,000	$640,000	$660,000	$680,000	$800,000	$820,000	$840,000	$860,000	$880,000	**$10,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$4,900,000	$4,900,000	$1,000,000	$1,000,000	$700,000	$700,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	**$10,000,000**
Proposed Non-Regulatory Unfunded Costs			$600,000	$3,560,000	$2,760,000	$28,060,000	$28,260,000	$177,760,000	$35,260,000	$188,960,000	$10,760,000	$10,860,000	$10,960,000	$11,760,000	$11,960,000	$13,860,000	$12,060,000	$136,560,000	$18,960,000	$19,060,000	$19,160,000	$19,960,000	$25,060,000	**$790,000,000**
Prop. Non-Reg. Unfunded (high end)			$600,000	$3,560,000	$52,760,000	$53,160,000	$53,360,000	$53,760,000	$52,660,000	$52,760,000	$52,860,000	$322,960,000	$930,560,000	$930,660,000	$930,860,000	$930,960,000	$458,460,000	$3,660,000	$3,860,000	$3,960,000	$4,060,000	$4,160,000	$4,360,000	**$4,900,000,000**
Total Costs (SCAQMD Rail Costing Scenario)			$5,500,000	$8,560,000	$3,860,000	$29,200,000	$29,110,000	$178,650,000	$35,510,000	$189,370,000	$11,190,000	$11,310,000	$11,430,000	$12,260,000	$12,480,000	$14,400,000	$12,620,000	$137,140,000	$19,660,000	$19,780,000	$19,900,000	$20,720,000	$25,840,000	**$810,000,000**
Total Costs (Rail Group's Rail Costing Scenario)			$5,500,000	$8,560,000	$53,860,000	$54,300,000	$54,210,000	$54,650,000	$52,910,000	$53,170,000	$53,290,000	$323,410,000	$931,030,000	$931,160,000	$931,380,000	$931,500,000	$459,020,000	$4,240,000	$4,560,000	$4,680,000	$4,800,000	$4,920,000	$5,140,000	**$4,920,000,000**

Heavy-Duty Vehicle Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
HDV1 - 2004 Emission Stds	Green																							
HDV2 - 2007 Emission Stds	Green																							
HDV3 - Gateway Cities (Portion maybe funded under Near Ter	Blue	Capital	$5,600,000	$5,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$11,200,000**
HDV4 - Engine Software Upgrade	Green																							
HDV5 - ULSD	Green	Operational	$0	$2,100,000	$2,200,000	$2,300,000	$2,400,000	$2,600,000	$2,700,000	$2,900,000	$3,100,000	$3,300,000	$3,600,000	$3,800,000	$4,000,000	$4,200,000	$4,500,000	$4,700,000	$4,900,000	$5,200,000	$5,400,000	$5,600,000	$5,900,000	**$75,400,000**
HDV6 - HD I&M	Green																							
HDV7 - Periodic Smoke Inspection	Green																							
HDV8 - Community-Based Inspections	Green																							
HDV 9 - Reduced Truck Idling	Green																							
HDV10 - Exp Gateway Cities	Not included	Capital	$0	$13,800,000	$15,300,000	$39,200,000	$75,000,000	$0	$0	$41,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$184,500,000**
HDV11 - CA HDV Stds & Fleet Mod for Mexican Trucks	Not included																							
HDV12 - Early ULSD Implementation	Blue	Operational	$200,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$300,000**
HDV13 - Retrofit HDVs with DOCs	Blue	Capital	$700,000	$700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,400,000**
HDV14 - Retrofit HDVs w/ DPFs	Blue	Capital	$0	$6,300,000	$2,600,000	$7,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$16,300,000**
HDV15 - PM In-Use Emission Control	Blue	$/ton	$0	$0	$0	$1,089	$1,568	$2,047	$1,834	$1,620	$1,514	$1,409	$1,303	$1,197	$1,091	$985	$879	$774	$668	$562	$456	$350	$244	**$20,000**
HDV16 - On-Board Diagnostics	Not included	No reduction taken																						
HDV17 - Transportation Refrigeration Units	Not included	No reduction taken																						
HDV18 - Electrified Truck Spaces	Not included	No reduction taken																						
Existing Regulatory Costs (to industry)			$0	$2,100,000	$2,200,000	$2,300,000	$2,400,000	$2,600,000	$2,700,000	$2,900,000	$3,100,000	$3,300,000	$3,600,000	$3,800,000	$4,000,000	$4,200,000	$4,500,000	$4,700,000	$4,900,000	$5,200,000	$5,400,000	$5,600,000	$5,900,000	**$80,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$1,089	$1,568	$2,047	$1,834	$1,620	$1,514	$1,409	$1,303	$1,197	$1,091	$985	$879	$774	$668	$562	$456	$350	$244	**$20,000**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$5,600,000	$5,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$11,000,000**
Proposed Non-Regulatory Unfunded Costs			$900,000	$20,900,000	$17,900,000	$46,600,000	$75,000,000	$0	$0	$41,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$200,000,000**
Total Costs			$6,500,000	$28,600,000	$20,100,000	$48,901,089	$77,401,568	$2,602,047	$2,701,834	$44,101,620	$3,101,514	$3,301,409	$3,601,303	$3,801,197	$4,001,091	$4,200,985	$4,500,879	$4,700,774	$4,900,668	$5,200,562	$5,400,456	$5,600,350	$5,900,244	**$290,000,000**

Administration/Research & Development Costs			2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
NNI Program Administration (3% of non-reg cost)			$300,000	$3,000,000	$2,000,000	$7,000,000	$6,000,000	$27,000,000	$5,000,000	$15,000,000	$6,000,000	$6,000,000	$28,000,000	$6,000,000	$14,000,000	$7,000,000	$15,000,000	$19,000,000	$7,000,000	$8,000,000	$34,000,000	$34,000,000	$35,000,000	**$280,000,000**
NNI Measure Research & Development			$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$21,000,000**
Total Costs			$1,300,000	$4,000,000	$3,000,000	$8,000,000	$7,000,000	$28,000,000	$6,000,000	$15,000,000	$7,000,000	$7,000,000	$28,000,000	$7,000,000	$15,000,000	$7,000,000	$15,000,000	$19,000,000	$8,000,000	$8,000,000	$34,000,000	$34,000,000	$35,000,000	**$301,000,000**

Stakeholder Comments Received:

Ed Avol

Table 4.1 – In addition to the discussions/recommendations made at the Financial Working group meeting on 8Jun05, please consider these improvements to the table:

- *Clarify the difference between "$0", which means no cost/it's free, and "no est", which means we cannot offer an estimate at this time;*
- *If a row has "no est" in it, it cannot have "$0" in the far right column for total costs;*
- *Add a color code key to the table;*
- *If you are only estimating to the nearest $100,000, then you might consider listing values in units of $100,000 (for example, $154,000 would be listed as "1.54", which would admittedly be harder to read but would make the table smaller;*
- *Put a vertical line or solid column to separate the "total program cost" column from everything else*

4.2. Cost Ranking and Prioritization

While the cost estimates presented above detail the total estimated costs associated with each measure, the cost ranking value is the cost of a measure per unit of emission reduction achieved (i.e., cost divided by tons of reduction). The cost ranking value of a measure gives an indication of how the measures compare with each other in terms of cost if they differ in the amount of reduction they are expected to achieve. The cost ranking value can also help with decision-making if resources are limited and the highest level of reductions is needed for the lowest feasible cost. For the NNI program, the cost ranking value has been calculated and expressed as dollars per ton of emissions reduced ($/ton) for PM and NOx separately. However, it should be stressed that these values should not be compared with "cost effectiveness" figures developed or reported in other works, because significant methodological differences exist between the cost ranking values presented in this report and traditional cost effectiveness calculations.

Because the costs have not been annualized, the cost ranking values are overall rather than yearly, and have been calculated by dividing total cost by total reductions. For example, a measure that costs $1,000,000 and results in a PM emission reduction of 20 tons for each of five years (for a total reduction of 100 tons of PM) would have a cost ranking value of $1,000,000/100 tons = $10,000/ton of PM. This is a simplification that does not consider the "cost of money" or financing costs that will be a part of the actual implementation of the measures. However, since all of the measures have been evaluated in the same way, the NNI measure results can be compared with other NNI measures.

The NNI measure cost ranking values are presented in Table 4-5. This table presents cost ranking values for PM and NOx individually, plus a combination of PM and NOx costs calculated by adding the NOx reductions to ten times the PM values. This combination value was calculated as a way of combining the cost values for PM and NOx in such a way that the PM reduction were given more emphasis to compensate for the fact that NOx reductions are generally much larger in terms of tonnage compared with PM reductions. Measures for which no emissions reductions were identified or taken do not have cost ranking figures associated with them and are designated in the table by "na."

Another summary of the cost estimate data presented in Table 4-1 is presented in Table 4-6, which shows the estimated costs of measures according to whether the measure are included in the projected out-year emissions (the "green line" in the NNI summary charts) or are included in the reduced emissions line (the "blue line").

Stakeholder Comments Received:

PMSA

4.2 Cost Effectiveness - This section is still undergoing significant revision. Accordingly, we reserve our comments for the next draft. We have concerns on how the costs were calculated and the metric that is being proposed as a surrogate for traditional cost-effectiveness. It will be difficult to compare the cost effectiveness in this report with any other cost effectiveness used in other applications such as the Carl Moyer program. We recommend not basing public policy decision or expenditures of public funds on this metric.

Dave Howekamp

Section 4.2 - Cost Effectiveness - This chapter should be relabeled and the term cost effectiveness replaced throughout with the cost comparison term that Bruce Anderson is developing. The FWG agreed that the numbers are not really cost effectiveness numbers because the costs are not annualized.

Table 4-5. Cost Ranking and Priority Values

Measure Designation / Name	Cost Ranking and Priority Values NOx	PM	Combined*
Ocean-Going Vessel Control Measures			
OGV1 - New Engine Standards for Ships	$41,876	$2,872,598	$36,548
OGV2 - VSR MOU	$6,782	na	$6,782
OGV3 - AMP	$27,565	$696,600	$19,750
OGV4 - Auxiliary Engine Fuel Improvement Prog	na	$1,551,644	$155,164
OGV5 - New Cat3 Eng Standards (Low)	$41,275	na	$41,275
OGV5 - New Cat3 Eng Standards (High)	na	na	na
OGV6 - Reroute Cleanest Ships	$41,275	na	$41,275
OGV7 - Low Emissions Main Engines	$35,900	na	$35,900
OGV8 - Cleaner Fuels for Ship Aux Engines	$10,562	$48,356	$3,317
OGV9 - Main Eng Fuel Improvement Prog	na	$59,527	$5,953
OGV10 - SECA	na	$34,543	$3,454
OGV11 - Expanded Auxiliary Fuel Imprv Prog	na	na	na
OGV12 - Expanded Main Eng Fuel Imprv Prog	$18,132	$37,127	$3,082
OGV13 - Additional Auxiliary Eng Red Freq Callers	$42,916	$1,079,216	$30,706
OGV14 - Retro/Repower Req Infreq Callers	$97,314	$2,453,803	$69,680
OGV15 - Expanded VSR	$12,652	na	$12,652
OGV16 - Expanded AMP	$32,757	$824,841	$23,446
OGV17 - Add In-Use Measures for Ships	$16,967	$5,703,546	$16,477
OGV17 - Add In-Use Measures for Ships (High)	na	na	na

* Combined values calculated by adding NOx to 10 x PM

na - Value not estimated because emissions have been included in adjusted out-year emissions so ton-per-year reduction is not available.

	NOx	PM	Combined*
Harbor Craft Control Measures			
HC1 - New Engine Standards for Harbor Craft	$6,433	$267,931	$5,188
HC2 - Clean Fuels for Harbor Craft	$3,978	$29,795	$1,704
HC3 - Early Implementation ULSD	$6,019	$48,272	$2,679
HC4 - Dredging Activities	na	na	na
HC5 - TAC HC Measures	$3,525	$38,800	$1,847
HC6 - New Engine Stds - Cat 1/Cat 2	$6,606	$128,130	$4,359
HC7 - Emulsified Fuel for Harbor Craft Mrn Eng	$5,624	$32,897	$2,076
HC8 - In-Use HC Emission Reduction Measure (ATCM)	$6,721	$96,175	$3,956
HC9 - Repower Existing Craft	$20,845	na	$20,845
HC10 - Retrofit Existing Craft	$3,782	$25,706	$1,530
HC11 - AMP Ready Staging Areas	$128	$3,378	$93

* Combined values calculated by adding NOx to 10 x PM

na - Value not estimated because emissions have been included in adjusted out-year emissions so ton-per-year reduction is not available.

Table 4-5. Cost Ranking and Priority Values (continued)

Measure Designation / Name	Cost Ranking and Priority Values NOx	PM	Combined*
Cargo Handling Equipment Control Measures			
CHE1 - Emission Stands. for HD Nonroad Diesel Engines	na	na	na
CHE2 - YT Modernization & ULSD	$3,565	$42,238	$1,933
CHE3 - Early Impl. ULSD for non-YT	na	$514,213	$51,421
CHE4 - Alternative Yard Tractor Resolution	na	na	na
CHE5 - Emulsified Fuels	$2,567	$10,380	$739
CHE6 - TAC CHE Measures	$1,264	$28,237	$873
CHE7 - Expanded YT Modernization	$2,627	$65,910	$1,878
CHE8 - Enhanced CHE Modernization	$98,058	$1,703,281	$62,231
CHE9 - CHE at Ports & IM Rail Yards	$6,954	$152,694	$4,778

* Combined values calculated by adding NOx to 10 x PM

na - Value not estimated because emissions have been included in adjusted out-year emissions so ton-per-year reduction is not available.

	NOx	PM	Combined*
Rail Locomotive Control Measures			
R1 - Tier 0, 1, 2 Locomotive Standards	na	na	na
R2 - ARB Diesel Fuel Used by Intrastate Locomotives	$3,256	$115,480	$2,540
R3 - Federal Standards for Nonroad Diesel Fuel	$16,081	$63,406	$4,548
R4 - Railroad MOU	na	na	na
R5 - PHL Modernization & ULSD Program	$3,522	$213,774	$3,024
R6 - Ultra-Low Emission Switcher Locomotives: PHL	$1,714	$98,513	$1,460
R7 - Ultra-Low Emission Switcher & Line Haul: Class 1 (low end)	$84,600	$721,343	$38,936
R7 - ULE Switcher & Line Haul: Class 1 (high end)	$499,557	$4,259,466	$229,912
R8 - Tier 3 Engine Standards	$0	$0	$0
R9 - ARB Diesel Fuel for Class 1 Locomotives (low)	$31,544	$299,604	$15,366
R9 - ARB Diesel Fuel for Class 1 Locomotives (high)	$340,252	$3,231,705	$165,746
R10 - Idling Controls for Switchers & Line Haul	$3,696	$44,668	$2,832
R11 - Efficiency Improvement on In-Use Rail Equipment	$52,314	$1,349,728	$37,701
R12 - Electrification of Alameda Corridor	na	na	na

* Combined values calculated by adding NOx to 10 x PM

na - Value not estimated because emissions have been included in adjusted out-year emissions so ton-per-year reduction is not available.

	NOx	PM	Combined*
Heavy-Duty Vehicle Control Measures			
HDV1 - 2004 Emission Stds	na	na	na
HDV2 - 2007 Emission Stds	na	na	na
HDV3 - Gateway Cities	na	na	na
HDV4 - Engine Software Upgrade	na	na	na
HDV5 - ULSD	na	na	na
HDV6 - HD I&M	na	na	na
HDV7 - Periodic Smoke Inspection	na	na	na
HDV8 - Community-Based Inspections	na	na	na
HDV 9 - Reduced Truck Idling	na	na	na
HDV10 - Exp Gateway Cities	$24,810	$722,609	$18,469
HDV11 - CA HDV Stds & Fleet Mod for Mexican Trucks	na	na	na
HDV12 - Early ULSD Implementation	na	$1,087,193	$108,719
HDV13 - Retrofit HDVs with DOCs	na	$500,000	$50,000
HDV14 - Retrofit HDVs w/ DPFs	na	$316,956	$31,696
HDV15 - PM In-Use Emission Control	$8,529	$161	$16
HDV16 - On-Board Diagnostics	na	na	na
HDV17 - Transportation Refrigeration Units	na	na	na
HDV18 - Electrified Truck Spaces	na	na	na

* Combined values calculated by adding NOx to 10 x PM

na - Value not estimated because emissions have been included in adjusted out-year emissions so ton-per-year reduction is not available.

Table 4-6. NNI Control Measure Cost Summary By Projection Type

SUMMARY and KEY TO COLOR CODES:	Total Program Cost (2005 $)
Measures included in green (non-NNI projection) emissions line	**$800,000,000**
Measures included in blue (NNI) emissions line (low cost estimate)	**$10,600,000,000**
Measures included in blue (NNI) emissions line (high cost estimate)	**$14,700,000,000**

Source Category Details

Ocean-Going Vessel Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
OGV1 - New Engine Standards for Ships	Green		$150,500,000
OGV2 - VSR MOU	Blue	Operational	$263,500,000
OGV3 - AMP	Blue	Capital	$500,000
	Blue	Capital	$3,900,000
	Blue	Operational	$14,700,000
OGV4 - Auxiliary Engine Fuel Improvement Prog	Blue	Operational	$3,100,000
OGV5 - New Cat3 Eng Standards (Low)	Green		$434,300,000
OGV5 - New Cat3 Eng Standards (High)	Green		$0
OGV6 - Reroute Cleanest Ships	Blue		$32,900,000
OGV7 - Low Emissions Main Engines	Blue	Capital	$3,318,000,000
	Blue	Operational	$15,100,000
OGV8 - Cleaner Fuels for Ship Aux Engines	Blue	Operational	$164,000,000
OGV9 - Main Eng Fuel Improvement Prog	Blue	Operational	$8,900,000
OGV10 - SECA	Blue	Operational	$154,500,000
OGV11 - Expanded Auxiliary Fuel Imprv Prog	Blue	Operational	$0
OGV12 - Expanded Main Eng Fuel Imprv Prog	Blue	Operational	$402,300,000
OGV13 - Additional Auxiliary Eng Red Freq Callers	Blue	Cap/Op	$46,200,000
OGV14 - Retro/Repower Req Infreq Callers	Blue	Capital	$1,224,000,000
OGV15 - Expanded VSR	Blue	Capital	$40,000,000
Add in Fuel Savings	Blue	Operational	$662,200,000
OGV16 - Expanded AMP	Blue	Capital	$214,350,000
	Blue	Operational	$2,039,600,000
OGV17 - Add In-Use Measures for Ships	Blue		$510,000,000
OGV17 - Add In-Use Measures for Ships (High)	Blue		$0
Total OGV Green Projection Line			**$600,000,000**
Total OGV Blue Projection Line			**$9,100,000,000**

Harbor Craft Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
HC1 - New Engine Standards for Harbor Craft	Green		$40,600,000
HC2 - Clean Fuels for Harbor Craft	Green	Operational	$7,800,000
HC3 - Early Implementation ULSD	Blue	Operational	$300,000
HC4 - Dredging Activities			$0
HC5 - TAC HC Measures (Included in China Shipping Settlen	Blue		$2,700,000
HC6 - New Engine Stds - Cat 1/Cat 2	Green		$38,800,000
HC7 - Emulsified Fuel for Harbor Craft Mrn Eng	Blue	Operational	$40,800,000
HC8 - In-Use HC Emission Reduction Measure	Blue		$138,600,000
HC9 - Repower Existing Craft	Blue	Capital	$40,000,000
HC10 - Retrofit Existing Craft	Blue	Capital	$9,000,000
HC11 - AMP Ready Staging Areas	Blue	Capital	$200,000
Total Green Projection Line			**$90,000,000**
Total Blue Projection Line			**$230,000,000**

Table 4-6. NNI Control Measure Cost Summary By Projection Type (continued)

Cargo Handling Equipment Control Measures	*Projection Line*	*Cost Type*	**Total Program Cost (2005 $)**
CHE1 - Emission Stands. for HD Nonroad Diesel Engines	Green		$0
CHE2 - YT Modernization & ULSD	Blue	Captial	$6,600,000
	Blue	Operational	$1,500,000
CHE3 - Early Impl. ULSD for non-YT	Blue	Operational	$500,000
CHE4 - Alternative Yard Tractor Resolution			$0
CHE5 - Emulsified Fuels	Blue	Operational	$600,000
CHE6 - TAC CHE Measures (Included in China Shipping Se	Blue		$800,000
CHE7 - Expanded YT Modernization	Blue	Captial	$31,100,000
CHE8 - Enhanced CHE Modernization	Blue	Captial	$110,600,000
CHE9 - CHE at Ports & IM Rail Yards	Blue		$58,300,000
Total Green Projection Line			**$0**
Total Blue Projection Line			**$210,000,000**

Rail Locomotive Control Measures	*Projection Line*	*Cost Type*	**Total Program Cost (2005 $)**
R1 - Tier 0, 1, 2 Locomotive Standards	Green		$0
R2 - ARB Diesel Fuel Used by Intrastate Locomotives	Blue	Operational	$2,500,000
R3 - Federal Standards for Nonroad Diesel Fuel	Blue	Operational	$8,090,000
R4 - Railroad MOU	Green		$0
R5 - PHL Modernization & ULSD Program	Blue	Capital	$9,600,000
	Blue	Operational	$200,000
R6 - Ultra-Low Emission Switcher Locomotives: PHL	Blue	Capital	$3,800,000
	Blue	Operational	-$1,900,000
R7 - Ultra-Low Emission Switcher & Line Haul: Class 1	Blue	Capital	$548,700,000
(low end)	Blue	Operational	$168,500,000
R7 - ULE Switcher & Line Haul: Class 1 (high end)	Blue	Capital/Op	$4,235,000,000
R8 - Tier 3 Engine Standards			$0
R9 - ARB Diesel Fuel for Class 1 Locomotives (low)	Blue	Operational	$61,300,000
R9 - ARB Diesel Fuel for Class 1 Locomotives (high)	Blue	Capital/Op	$661,300,000
R10 - Idling Controls for Switchers & Line Haul	Blue	Capital	$2,800,000
	Blue	Operational	-$800,000
R11 - Efficiency Improvement on In-Use Rail Equipment	Blue		$5,700,000
Total Green Projection Line			**$0**
Total Blue Projection Line (low end)			**$810,000,000**
Total Blue Projection Line (high end)			**$4,900,000,000**

Table 4-6. NNI Control Measure Cost Summary By Projection Type (continued)

Heavy-Duty Vehicle Control Measures	*Projection Line*	*Cost Type*	**Total Program Cost (2005 $)**
HDV1 - 2004 Emission Stds	Green		$0
HDV2 - 2007 Emission Stds	Green		$0
HDV3 - Gateway Cities	Blue	Capital	$11,200,000
HDV4 - Engine Software Upgrade	Green		$0
HDV5 - ULSD	Green	Operational	$75,400,000
HDV6 - HD I&M	Green		$0
HDV7 - Periodic Smoke Inspection	Green		$0
HDV8 - Community-Based Inspections	Green		$0
HDV 9 - Reduced Truck Idling	Green		$0
HDV10 - Exp Gateway Cities		Capital	$184,500,000
HDV11 - CA HDV Stds & Fleet Mod for Mexican Trucks			$0
HDV12 - Early ULSD Implementation	Blue	Operational	$300,000
HDV13 - Retrofit HDVs with DOCs	Blue	Capital	$1,400,000
HDV14 - Retrofit HDVs w/ DPFs	Blue		$16,300,000
HDV15 - PM In-Use Emission Control	Blue		$20,000
HDV16 - On-Board Diagnostics			$0
HDV17 - Transportation Refrigeration Units			$0
HDV18 - Electrified Truck Spaces			$0
Total Green Projection Line			**$80,000,000**
Total Blue Projection Line			**$210,000,000**

Administration/Research & Development Costs	*Projection Line*	*Cost Type*	**Total Program Cost (2005 $)**
NNI Program Administration (3% of non-reg cost)	Blue	Admin	**$280,000,000**
NNI Measure Research & Development	Blue	R&D	**$21,000,000**

Stakeholder Comments Received:

***Rail Industry** (6/13/05)*

Introduction - The railroads believe that the quality of the data and analysis being developed by the Technical Working Group (TWG) and the FWG is an inadequate basis for arguments and conclusions about rail measures in the NNI Task Force report. Most of the assumptions regarding technology availability, emissions, performance, and costs are speculative, represent over simplifications of rail operations, and are not well documented. The analysis either understates the costs or fails to include many costs that would arise with measure implementation.

Of particular importance is the fact that the analysis does not offer implementation assumptions and costs that reflect the unique nature of rail operations. This is apparent in the review of the measures that force the establishment of a dedicated locomotive fleet. Attendant to such a requirement are numerous operational complexities that are not mentioned in the work up, and which go to the heart of the feasibility and cost of the control measure.

The NNI Analysis Appears to Fail to Adjust for Activity Levels

A core assumption of the TWG is that rail activity levels will increase by over 350 percent and this will lead to a corresponding increase in emissions.[1] However, in estimating the number of units required for each measure, it does not appear that there has been a sufficient increase in the amount of equipment required. For instance, the SCAQMD analysis for measures R7 (ultra low units), R9 (fuel), and R10 (idling controls) all rely on the assumptions that 250 line-haul/heavy horsepower units and 120 local switch units are required for compliance. However, if activity levels (and correspondingly, emissions) increase by more than 350 percent, then the number of locomotives required for compliance must also increase by roughly the same percentage. However, the SCAQMD analysis only increased the line haul locomotives and their attendant costs by 66 percent. This dramatically underestimates the costs for all rail measures R7—R11 and dramatically overstated the cost-effectiveness of the measures.

Rail Measure R7 – Ultra-Low Emissions Locomotives - R7 Assumptions
Rail Measure R7 assumes the exclusive use of "ultra-low" emissions locomotives (e.g., 3.0 gram NOx and 0.0225 gram PM) for Port-related activity within the South Coast Air Basin (SCAB). The measure would be fully phased in by 2012 and require, according to the SCAQMD, 250 line haul units and 120 switchers for full implementation based on projected activity levels for 2010; the SCAQMD failed to sufficiently increase these numbers to handle the TWG's assumed increase in activity level of over 350 percent. The SCAQMD estimates this measure may cost approximately $717 million to implement through 2025 and will reduce PM by around 128 tpy by 2025. The TWG and FWG assume that some combination of LNG and SCR applied to locomotive engines will meet these standards.

At best, these assumptions and estimates are nothing more than unsupported, speculative conclusions about 1) LNG engine technology performance, cost, and availability, and 2) the practicality of requiring exclusive use of these engines in SCAB operations. No credible program could assume there would be LNG units available in the future. The rail industry has consistently held a position that line haul LNG locomotives are not viable, and we are providing cost estimates to – as accurately as possible – demonstrate the inherent difficulty and extreme cost of pursuing this measure. The more realistic approach to build a compliance strategy for R7 (one which is also not proven nor available for implementation) would be to assume there were some special "enhanced" version of the future Tier 3 locomotives that could be modified to achieve comparable emissions performance levels for NOx and PM to the TWG's levels for this measure.

Such units, if available, would provide a far more cost-effective method of compliance and would require no greater number of dedicated units. Additionally, basing the analysis on such units would provide more reliable insight into the potential impacts of meeting the "ultra low" emission levels. By doing this, the Task Force could set aside the debate about LNG technology and improve the cost accuracy of the FWG findings.

Below, for discussion purposes, Option A costs out R7 using LNG technology; Option B estimates compliance costs using theoretically modified Tier 3 units. Option A is comparable to the analysis performed by the NNI FWG, namely an evaluation of the measure in isolation from other measures. Option B looks at the measure in the context of other measures, in this case the MOU. While the NNI report mentions the interrelationship between measures would have to be addressed, there is no discussion regarding the importance of this interrelationship. By looking at these two options the railroads hope to offer insights that are strictly aligned with the FWG analysis (i.e., the "in isolation" approach), as well as ones that speaks to the important relationship any rail measures may have on the already adopted MOU program.

No matter what technology is used, the Railroads will require significantly more locomotives than estimated by the FWG, and will require development, optimization, and commercialization of that technology before it is viable for 'day-to-day' use.

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[1] The railroads continue to believe the TWG has failed to accurately project future growth and emission rates for rail. However, it is a serious methodological flaw not to grow the fleet size to accurately project the costs of these measures.

The FWG has provided an analysis of the stand alone cost (without consideration of either adopted or future NNI measures) of R7. To provide a similar and comparable estimate, the railroads have evaluated the size of a dedicated fleet necessary to ensure that Port-related traffic was handled by R7-compliant locomotives. Furthermore, to illustrate the tremendous cost of rail measure R7 (especially when considered in light of the potential reduction of around 128 typ PM as estimated by the TWG and FWG) the railroads have further assumed the SCAQMD-provided cost of the hypothetical LNG ultra-low locomotive at $1.7 million per unit. In the case of switchers and local helpers the railroads have used a lower value of $1.0 million, again consistent with the SCAQMD and FWG assumptions. This is just for illustration purposes, as the railroads do not believe that any such locomotive will be 1) available in a commercial form by 2010, 2) able to perform at the levels stated, and 3) available at a cost of $1.7 million per unit. Not included in the SCAQMD assumption set is the fact that the LNG units would require a fuel tender car, which the railroads estimate to cost approximately $1.0 million a piece.
Also note that for this illustration, the railroads ignore all other costs such as those associated with fueling infrastructure, the derating of locomotives (thus requiring incrementally more units because of the lower motive power delivered by LNG units), and the fuel cost penalty given the relatively higher cost of natural gas, the feedstock fuel.

To meet the requirements of rail measure R7 the BNSF and the UPRR will have to ensure that every locomotive servicing Port cargo meets the ultra-low standards. This will require a dedicated fleet of line-haul and switch locomotives. Each railroad has unique operations into and out of the Port in terms of traffic levels, traffic patterns, and the location of maintenance and fueling facilities. These operations have a significant effect on the number of units that each railroad requires. For example, the BNSF has "nearby" maintenance and fueling facilities at Barstow, Belen (New Mexico), and Clovis (New Mexico) and the UPRR has "nearby" facilities at Roseville, Tucson, El Paso, Salt Lake City, Portland, and Yermo.

The change-out (removal of the non-dedicated locomotive(s) from the train and addition of the dedicated, conforming locomotive(s)) of units must be accomplished so that ongoing train and yard operations are not compromised and trains with high-value cargo are not inordinately delayed. Tracks and facilities to serve train make-up are severely limited. As such, when possible, make-up/change-out must occur at as close a facility as possible to the SCAB without "plugging" or impeding ongoing operations. In some cases, change-out is not possible and some maintenance and fueling facilities further from the SCAB (i.e., Chicago, North Platte (Nebraska), Ft Worth, etc.) would need to be considered in order to avoid additional operational complications. It would appear that these limitations were not understood or considered by the TWG members.

The BNSF and UPRR estimate that to create a combined, dedicated fleet of locomotives which is capable of covering all of their port-related cargo in the 2005-2010 timeframe, will require approximately 1,650 units to meet the ultra-low engine emissions standard.

Of this number, 120 of the units are switchers, and 100 are local helpers (mid-sized locomotive units). The remaining 1,430 units are high-horsepower line haul units that operate into and out of the SCAB.

Table 1 – BNSF and UPRR Locomotive Requirements at 2005-2010 Port Traffic Levels

Type of Unit	Number of Units Required
Switcher	120
Helpers/Haulers	100
Line haul	1,430
All Units	1,650

Trying to Reduce the size of the dedicated fleet would only create other problems

While it may be theoretically possible to decrease the size of the required "dedicated" fleet, this option would require additional capital costs for extensive new facilities and operating and maintenance costs to rework maintenance, crew change, and train and locomotive dispatch practices. Instead, the railroads have proposed the most cost-effective and straightforward way of complying with the engine performance standard, namely through the use of a dedicated fleet performing at an ultra-low standard that does not include the construction of new facilities, except fueling facilities when assuming the use of LNG engines.

To make changes to the current set up of facilities and operating practices would also cause secondary effects associated with altering the cost structure and operating efficiencies of the rail goods movement system into and out of Los Angeles and Long
Beach. These effects include: loss of rail competitiveness and the reduction of value in the rail industry; shift of cargo traffic to other transportation modes; shift of cargo traffic to other ports; increases in commodity and finished good prices; and further declining competitiveness of US exports in foreign markets.

OPTION A -- LNG
To be clear, the railroads believe that LNG technology in line haul applications is not viable, will not be the way that the EPA develops its Tier 3 standards, and will not be available to meet the needs of the modern, high-horsepower road units used in intermodal service.[2] As noted previously herein, consistent with the railroads long standing position, the railroads believe that the TWG's and FWG's statements about the efficacy of LNG as a commercially viable locomotive engine fuel at the costs stated and in the timeframe described only hinders meaningful discussion about the most practical and cost-effective ways to achieve locomotive emission reductions. To be responsive to the Task Force's methodology, however, some initial costs of such a hypothetical "system" are presented below.

Table 2 – Estimated ULEL Costs to Serve the 2005-2010 POLA Traffic Levels[3]

Type of Unit	Number Required	Approximate Cost Per Unit	Total Cost
Switcher	120	$1.0 million	$120,000,000
Helper/haulers	100	$1.3 million[3]	$130,000,000
Tenders	1,430	$1.0 million[4]	$1,430,000,000
Line Haul	1,430	$1.7 million[5]	$2,431,000,000
Total	1,650		$4,111,000,000

By comparison, the FWG as estimated the costs for this measure would be around $335 million.

Also, LNG locomotives cannot store fuel on-board. Cryogenic tenders (specially fabricated cars to store the LNG) are added behind the locomotives in the train in order to operate across longer distances. For rough estimation purposes, at least one tender is needed per LNG locomotive; legal, safe tenders cost over

[2] There are four low-horsepower spark-ignited LNG locomotives operating in and around the Port, but that technology is not suitable for high-horsepower units.

[3] Unlike promising Truck Engine Switcher technology for "switcher" units, Helper/Haulers have greater horsepower requirements and it is unknown what technology might be available to meet the Tier 3 standards.
4 The initial TWG analysis failed to consider the need for tenders if LNG were to be placed in high horsepower service.
5 The railroads used the TWG's full per-unit capital cost estimate. The railroads have no way of knowing if this is an accurate estimate. For reference, new Tier 2 locomotives cost roughly $2 million each.

$1 million each. This additional cost of about $1.4 billion brings the total LNG outlay (minus fueling stations, fuel cost differential, operational delays, etc.) to around $4 billion.

These costs are for the purchase of new units and do not reflect operational costs associated with: 1) the change out of units at various crew change points for units arriving at or departing the basin, or 2) fueling infrastructure.

Each change-out of units would cost approximately $300. At traffic levels in the 2005- 2010 timeframe, there would be about 240 changes per day to meet the railroads' combined operations serving the port. The annual costs to carry out these power swaps would be approximately $26 million per year.[6]
The initial TWG/FWG materials assumed four fueling stations would be required to service 150 units; these costs should be increased significantly to service the expanded fleet, in a way that would not incur the costs of additional dwell time train delay. The TWG analysis also ignores the cost and complexity associated with estimating the fuel penalty associated both with the fuel differential cost and the drop in effective motive power that accompany the LNG technology. The cost of an additional 10 LNG fueling facilities would be about $40 million, using the TWG assumption that each facility would cost $4 million, an assumption the railroads believe is significantly understated.

OPTION B – Modified Tier 3 Locomotive Units
An alternative to the "stand alone" analysis for rail measure R7 is to assume that the true costs of adopting the ultra-low standards for the railroads is in fact the incremental cost of adopting rail measure R7 when compared to the compliance costs of the SCAB MOU. Additionally, to assume that locomotive builders could modify existing Tier 2 locomotives into 'Tier 3-type' units to meet rail measure R7's combined NOx and particulate emissions standards is also highly speculative and not supported in the literature. It would appear, however, to be a more reasonable and cost-effective means of compliance were such units available. The railroads have no idea if such units will ever be offered for sale and have had to estimate preliminary costs based on their own judgments.

For the purposes of this analysis, the railroads estimate that if modified Tier 3 units were available, the incremental costs (over and above the costs of a Tier 2 unit that would be needed to satisfy the present MOU) would be at least $1 million per locomotive. This assumes diesel particulate filter (DPF for PM) and various engine modifications to meet the NOx standards. There are no detailed engineering based cost projections from any manufacturer for this equipment. The railroads would need to purchase new switchers to comply with rail measure R7.

Table 3 – 'Tier 3' Locomotive Costs to Serve the 2005-2010 POLA Traffic Levels

Type of Unit	Number Required	Approximate Cost Per Unit	Total Cost
Switcher	120	$1.0 million	$120,000,000
Helper/hauler	100	$1.3 million	$130,000,000
Line Haul	1,430	$1.0 million	$1,430,000,000
Total	1,650		$1,680,000,000

By comparison, as stated earlier, the FWG as estimated that the costs for this measure would be around $335 million.

As with the LNG costing analysis, these costs are for the purchase of new units and do not reflect operational costs associated with the change out of units at various crew change points for units arriving at

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[6] As argued elsewhere, as a legal matter no state or local political jurisdiction can require a railroad to alter its current operations; however, we have done so in this analysis solely to portray compliance costs in the most plausible manner.

or departing the basin. Each change-out of units would cost approximately $300. At traffic levels in the 2005-2010 timeframe, there would be about 240 changes per day to meet the railroads' combined operations serving the port.
The annual costs to carry out these power swaps would be approximately $26 million per year.

Also these costs do not reflect any of the O & M aspects that would certainly be required to ensure operability of the after-treatment equipment.

Both Option A and Option B reflect 2005-2010 fleet requirements, not requirements associated with 450% increase in container traffic

The Option A and B analyses presented above use the number of units required to service Port traffic in the 2005-2010 timeframe. These analyses do not grow the dedicated fleet required in the future due the uncertain nature of the growth rate. However, if traffic levels increase dramatically -- as estimated by the TWG and which forms the basis of the TWG's assumed emissions inventory -- the number of locomotives required to service the additional traffic will also rise substantially, even allowing for efficiency improvements. If the TWG were right about its growth assumptions, the analyses above could be underestimated by several fold.

Rail Measure R7 would Gut the Railroad MOU with ARB and Render it Moot
The railroad MOU with ARB (which is an already adopted program) is a flexible compliance program and allows the railroads to pursue meaningful air quality reductions while maintaining reasonable rail operations. The MOU fleet average standard is 5.5 grams NOx. It appropriately creates incentives for the railroads to seek out a variety of emission reduction opportunities, while avoiding the onerous imposition of a strict engine-based performance standard. As explained above, any strict engine-based standard focused on one particular geographic area will significantly increase costs as the only effective way to meet the requirement is to establish a dedicated fleet operation. Nonetheless, the railroads will have substantial compliance costs to meet the MOU requirements, which will be fully phased in by 2010.

To implement rail measure R7 on top of the MOU will have negative consequences:

- *The MOU will be moot. The railroads will have to in effect abandon the MOU because R7 will require a dedicated fleet of ultra-low performance locomotives. Complying with the MOU will not make sense in such an environment.*
- *Depending on the timing of the MOU and R7 implementation, it is possible that the investment in compliance measures under the MOU will have to be written off, further increasing the cost of R7.*
- *Incentives to improve rail emissions performance across the organization will be lost. Creativeness will go by the wayside in favor of a "command-and-control" type program.*

Under this measure, the range of costs for new locomotives for a dedicated fleet would range between $1,680,000,000 and $4,111,000,000.

Rail Measure R9 – Fuel Requirements - R9 Assumptions
Rail measure R9 would require the Class 1 freight railroads to burn only ARB low sulfur fuel while operating in the SCAB on Port-related moves. The measure correctly points out that: "This will result in potentially significant operational, logistical and equipment changes, including but not limited to, draining of tanks, or the installation of separate tanks, baffling of tanks, or adding a dedicated fuel car containing ULSD to the train all with ability to switch over fueling".

Possible compliance strategy: fuel tank baffling[7]
It must be emphasized that all the proposed approaches to implement this option entail significant operational challenges. One option is priced out below; however, the FWG should recognize that all options were problematic in one way or another.

[7] *The railroads do not believe fuel tank baffing is a viable option; however, it is costed out here to illustrate the potential impacts of this measure.*

Theoretically, one rail measure R9 compliance strategy could involve engineering modifications to the fuel tanks in order to segregate EPA and CARB fuels. This could possibly involve the installation of a baffle, effectively splitting the existing tank into 2 smaller ones. New locomotives have fuel tanks that are welded to the frame, and are an integral part of the crash worthiness of the unit. The entire fuel tank would have to be cut out from the frame and replaced with a baffled tank.

The FWG assumes that only a handful of units would require modification (150 line haul and 25 switchers). That assumption is not correct: all locomotives that could possibly handle Port-related cargo would require modification since we would not be changing out non conforming locomotives (as would be the case in R7). For both railroads it would mean about 6,000 units.

Changing the fuel tank baffling in these units (the newer, high-horsepower units that serve the port) will also be quite expensive as simple baffling of the tanks is insufficient. In many cases, tanks are welded to the units, not bolted on. Also, given operating limitations, baffles must be installed in such a way to create an upper and lower chamber in the tank. These chambers must then have dual piping, filters, and control systems. Additionally, electronic fuel gauges and other instruments (e.g., automated valves, electronic fuel gages, limit switches, and controls to avoid locomotives from running totally dry in a single tank) need to be added to ensure the right tank is being drained at the right place along the route. All of these items should be included in the cost of the baffled tank line item.

The railroad's best guess for the costs to accomplish this new tank baffling would be approximately $100,000 per unit. Given the universe of 6,000 units that could be in POLA related (intermodal, bulk, and auto) service, the costs to implement this measure would be approximately $600,000,000.

South Coast Air Quality Management District
At the June 21 Task Force meeting, representatives of the railroads argued that SCAQMD cost estimates for measures such as R7 were based on costs to control one-half the number of trains serving the ports of Long Beach and Los Angeles. Trains arriving in Southern California carry cargo destined for both ports, and rail argued it would have to reduce emissions from all such locomotives, thereby increasing compliance costs beyond SCAQMD estimates. SCAQMD does not believe that this argument necessarily justifies higher compliance cost estimates. In addition to potential changes in operating practices that rail may be able to implement to avoid the need to control a greater number of locomotives, as the NNI control measures are crafted into specific compliance requirements, issues such as this can likely be addressed by, for example, developing appropriate emissions compliance calculation procedures. Finally, we note that it is our hope that control measures similar to the NNI measures will be implemented at both POLA and POLB thereby eliminating this issue.

4.3. Funding Sources

The FWG considered the cost estimates to meet the NNI program and assess the availability of funding sources. Specifically, the FWG was asked to consider two issues as it relates to funding sources, which are:

- Identify any and all available funding sources for the NNI program, and
- Determine, if other sources are unavailable, if the Port has sufficient financial resource to fund the non-regulatory unfunded costs of NNI.

The FWG was unable to complete the first undertaking of actively searching for and identifying specific, viable, long-term funding sources for the NNI program. This was due to a limit in available time and resources to complete the task. We recommend the commissioning of a thorough examination of the cost measures and implementation of a direct campaign to meet with interested organizations and agencies so that willing groups may become active. Moreover, we believe it is critical that national, state, and local agencies commit financial resources to this project in whatever form is best suited to create a realistic, long-term strategy to implement NNI.

As for the second undertaking, it should be noted that this option should only be considered if all other funding mechanisms are insufficient to implement and make NNI achievable. This option was requested assuming that all NNI measures were required to meet the emission standards and that the funding was only available from the Port and Port tenants. This also assumes the Port has legal authority to charge tariff charges to fund NNI programs (see Section 5 – Legal Analysis for details).

To complete the assessment of the Port's financial capacity to fund the NNI measures, certain scenarios and assumptions were made. The major assumptions made include the growth rate in volume and revenue; increase in operating expenses; allocation of funds towards the Port's existing capital improvement program; outstanding obligations of the Port (existing, long-term debt); and availability of new long-term debt to fund NNI measures. These assumptions are detailed in the following graphic, Exhibit 4-1.

Exhibit 4-1. Harbor Department Funding Analysis Assumptions

CITY OF LOS ANGELES, HARBOR DEPARTMENT
NNI PLAN
FUNDING OF NON REGULATORY MEASURES
FUNDING ANALYSIS - ASSUMPTIONS

OPTIMISTIC OPERATING CONDITIONS*

MAJOR ASSUMPTIONS - (All DOLLARS IN $000)			Scenario 3 "Most Likely"
1	Total Operating Revenue (FY 2006) ($000)	$	371,048
2	Shipping Revenue (FY 2006) ($000)	$	333,706
3	Shipping Revenue Growth Rate (CAGR)		7.6%
4	Operating Expenses (FY 2006) ($000)	$	171,689
5	Operating Expenses Growth Rate (CAGR)		4.0%
6	Term of Analysis - Beginning Date		7/1/2005
7	Term of Analysis - Ending Date		6/30/2025
8	5-Year CIP (FY 2005 - 2009) ($000)	$	1,873,567
9	Port Harbor Revenue Bonds (Existing Balance)	$	715,615
10	Port Revenue Bonds Annual Debt Service (Existing)	$	58,516
11	Project New Revenue Bonds (to Fund CIP)	$	1,070,000
12	Project New Debt Service (Existing + New D.S.)	$	131,746
13	Project New Revenue Bonds Interest Rate		5.5%

* Optimistic Operating Conditions includes stable, ongoing revenue growth; stable, low level operating expense increases; a 5-Year CIP (2005-2009), followed by no additional capital costs from 2010 to 2020; no Non Operating Net Expenses such as litigation settlements, security costs, ACTA shortfall payments, or other significant non-operating activities; excludes projects not included in the 5-Year CIP including portions of the Bridge to Breakwater project; assumes lease structures with container customers will remain relatively unchanged; and assumes periodic tariff increases and/or 5-year compensation resets to leases to generate revenue increases.

Overall, the Port has approximately $1.8 billion in existing capital projects scheduled to be funded from 2005 through 2009. These capital projects will be funded with net revenues of the Port (net revenues are equal to total operating revenues less operating expenses) as well as revenue bonds and commercial paper issued by the Port. The Port would then allocate net revenues to fund NNI measures (assuming NNI measures are not adjusted for inflation). From 2005 to 2025, the Port's net revenues would not be sufficient to fund the NNI measures (non-regulatory unfunded costs). The estimated shortfall in funding these measures is estimated at over $4 billion. To fund this shortfall, various actions would be required, including, but not limited to, increasing the tariff rate, adjusting compensation with Port leases, or reducing capital improvement program funding over the first five years. Consequently, any of these actions would have a potential negative impact the Port's finances as volumes decline correspondingly.

We recommend that the funding alternatives be further studied and revised as more definitive cost information becomes available, other funding partners become apparent, and volume assumptions are validated.

4.4. Benefit Analysis

The ARB assessed the potential health benefits valuation associated with the emissions reductions estimated for NNI. The methods used to develop the potential benefits are linked to the assumptions used to estimate projected emissions. The methods used for the analysis are similar to those used in developing health benefits for State Implementation Plans. During Task Force and FWG meetings there was vigorous discussion and debate about the health benefits analysis; the estimates developed do not represent a consensus view of the FWG or Task Force. Multiple industry representatives believe the health benefits analysis is deeply flawed and is likely to mislead stakeholders. Despite this criticism, the ARB stands behind their assessment and recommended it to the Task Force for inclusion in this final report. The ARB analysis is presented below, followed by stakeholder comments.

ESTIMATION OF THE HEALTH BENEFITS ASSOCIATED WITH THE REDUCTIONS OF DIESEL PM EMISSIONS

It is estimated that a decrease in both primary and secondary diesel PM from the implementation of No Net Increase (NNI) will result in approximately 2,200 fewer premature deaths. As shown in Table 4-7, the proposed NNI measures are expected to reduce primary diesel PM emissions by a cumulative amount of more than 24,000 tons by the end of year 2025, and therefore prevent an estimated 1,700 premature deaths (850 to 2,600, 95 percent confidence interval (95% CI)) by year 2025. In addition, staff estimates that the implementation of the proposed NNI measures is expected to accrue a cumulative reduction of more than 320,000 tons of NOx by the end of 2025, therefore reducing secondary PM formation and avoiding an estimated 490 premature deaths (240 to 730, 95% CI). Methodologies used to determine these mortality benefits and the reductions in non-mortality effects are discussed below.

Table 4-7. Annual Emission Reductions Associated with Implementation of the Proposed NNI Measures

Year	NOx Reductions, TPY	PM Reductions, TPY
2005	2438	105
2006	2745	75
2007	3162	68
2008	8358	782
2009	8599	792
2010	13393	1133
2011	13687	1172
2012	15124	1233
2013	14630	1250
2014	14744	1285
2015	14858	1322
2016	14972	1356
2017	15085	1391
2018	15199	1426
2019	15312	1461
2020	21473	1497
2021	23024	1531
2022	24572	1566
2023	26124	1602
2024	27673	1637
2025	29327	1676
Total	324,499	24,360

4.4.1. Primary Diesel PM

Lloyd and Cackette (2001) estimated that, based on the Krewski *et al.* study[4], a statewide population-weighted average diesel $PM_{2.5}$ exposure of 1.8 $\mu g/m^3$ resulted in a mean estimate of 1,985 premature deaths per year in California (Lloyd/Cackette, 2001). The statewide diesel $PM_{2.5}$ emission inventory corresponding to the $PM_{2.5}$ concentration of 1.8 $\mu g/m^3$ is 28,000 tpy (ARB, 2000). From this information, we estimate that reducing 14.11 tpy of diesel $PM_{2.5}$ emissions would result in one fewer premature death (28,000 tpy/1,985 deaths). Comparing the PM emissions before and after implementation, the proposed regulation is expected to reduce PM emissions by a cumulative amount of

[4] Although there are two mortality estimates in the report by Lloyd and Cackette – one based on work by Pope *et al.* and the other based on Krewski *et al.*, we selected the estimate based on the Krewski's work. For Krewski *et al.,* an independent team of scientific experts commissioned by the Health Effects Institute conducted an extensive reexamination and reanalysis of the health effect data and studies, including Pope *et al*. The reanalysis resulted in the relative risk being based on changes in mean levels of $PM_{2.5}$, as opposed to the median levels from the original Pope *et al.* study. The Krewski *et al*. reanalysis includes broader geographic areas than the original study (63 cities vs. 50 cities). Further, the U.S. EPA has been using Krewski's study for its regulatory impact analyses since 2000. (Krewski, 2000) (Pope, 1995)

25,000 tons by the end of year 2025, and therefore prevent an estimated 1,700 premature deaths (850 to 2,600, 95% CI) by year 2025.

Using this same methodology, conversion factors (tpy per unit change in incidence) were derived for other adverse health endpoints. For asthma attacks, work loss days, and minor restricted activity days (MRADs), concentration-response functions from the PM Standard Staff Report (ARB, 2002) were applied to a diesel $PM_{2.5}$ exposure of 1.8 $\mu g/m^3$ statewide, which corresponds to 47,000 asthma attacks, 410,000 work loss days, and 2.2 million MRADs, on an annual basis. Associating the diesel PM emission inventory of 28,000 tpy to these values leads to the following factors: 0.59 tpy per one asthma attack, 0.068 tpy per work day lost, and 0.0129 tpy per minor restricted activity day. Therefore, implementation of the proposed regulation is expected to prevent an estimated 41,000 asthma attacks (10,000 to 72,000, 95% CI), 360,000 work loss days (300,000 to 410,000, 95% CI), and 1.9 million MRADs (1.5 million to 2.2 million, 95% CI).

4.4.2. Secondary Diesel PM

Lloyd and Cackette also estimated that indirect (secondary) diesel $PM_{2.5}$ exposures at a level of 0.81 $\mu g/m^3$ resulted in a mean estimate of 895 additional premature deaths per year in California, above those caused by directly emitted formed diesel PM. The statewide NOx emission inventory corresponding to that $PM_{2.5}$ concentration of 0.81 $\mu g/m^3$ is 598,965 tpy. Following the same approach as above, we estimate that reducing 669 tons of NOx emissions would result in one fewer premature death (598,965 tons/895 deaths). Therefore, with a cumulative NOx reduction of 330,000 tons by the end of 2025, an estimated 490 premature deaths (240 to 730, 95% CI) would be avoided.

Using the same methodology described for primary $PM_{2.5}$ for the other health enpoints, conversion factors (tpy of indirect diesel $PM_{2.5}$ emissions per unit change in incidence) were derived. These factors were calculated to be 28.2 tpy per asthma attack, 3.24 tpy per work day lost, and 0.62 tpy per minor restricted activity day. Comparing the PM emissions before and after implementation of this regulation, the proposed regulation is expected prevent an estimated 12,000 asthma attacks (2,800 to 20,000, 95% CI), 100,000 work loss days (84,000 to 120,000, 95% CI), and 520,000 MRADs (430,000 to 610,000, 95% CI) by year 2025.

Table 4-8 shows the year-by-year tally of premature deaths avoided by implementation of NNI. The numbers grow over time because in the absence of NNI, emissions from the Port of Los Angeles are projected to grow. That is, each row of Table 4-8 (except for the row labeled “Total”) shows the number of premature deaths avoided in the year indicated.

Table 4-8. Premature Deaths Avoided by No Net Increase*

Year	Mortality, lower estimate	Mortality, mean	Mortality, upper estimate
2005	6.9	11.1	15.3
2006	6.0	9.4	12.8
2007	6.1	9.5	13.0
2008	39.1	67.9	96.8
2009	39.7	69.0	98.3
2010	58.3	100.3	142.4
2011	60.1	103.5	147.0
2012	64.1	110.0	155.9
2013	64.1	110.5	156.9
2014	65.5	113.1	160.8
2015	67.0	115.9	164.9
2016	68.4	118.5	168.7
2017	69.8	121.2	172.6
2018	71.2	123.8	176.5
2019	72.6	126.5	180.3
2020	81.9	138.2	194.5
2021	85.1	142.9	200.8
2022	88.3	147.7	207.2
2023	91.6	152.6	213.6
2024	94.8	157.4	220.0
2025	98.3	162.6	227.0
TOTAL	1,299	2,212	3,125

**Note: Results in Table 4-8 are sums of effects due to reductions in both primary and secondary diesel PM emissions. Since they have not been rounded, the values will not match those in the text.

4.4.3. Uncertainties and Limitations

There are a number of uncertainties involved in quantitatively estimating the health benefits associated with reductions in outdoor air pollution. Over time, some of these will be reduced as new research is conducted. However, some uncertainty will remain in any estimate. Below, some of the major uncertainties and limitations of the estimated health benefits presented in this report are briefly discussed.

a. Concentration-response functions

A primary uncertainty is the choice of the specific studies and the associated concentration-response (C-R) functions used for quantification. Epidemiological studies used for these estimates have undergone extensive peer review and include sophisticated statistical models that account for the confounding effects of other pollutants, meteorology, and other factors. The C-R function used for quantification of mortality is based on a publication by Krewski et al. (2000). This team of scientific experts conducted an extensive re-examination and re-analysis of health effect data from major studies including that of Pope et al. (1995). The re-analysis included broader geographic areas (63 cities vs 50 cities) than the original study by Pope, and the U.S. EPA has been using this re-analysis for its regulatory impact analyses since 2000. While there may be questions on whether C-R functions from the epidemiological studies are applicable to California, it should be noted that some of the cities considered by Krewski et al. are in California. Also, numerous studies have shown that the mortality effects of PM in California are comparable to those found in other locations in the United States. In addition, many of the studies were conducted in areas having fairly low concentrations of ambient PM, with ranges in PM levels that covers California values. Thus, the extrapolation is within the range of the studies. Finally, the uncertainty in the C-R functions selected is reflected in the lower and upper estimates given in Tables 4-5 and 4-6, which represent the 5^{th} and 95^{th} percentiles, respectively. For premature death, this estimated error amounts to about a 50 percent difference from the mean value.

b. Exposure estimates

Use of the C-R function requires an input of the population-weighted diesel PM concentration. For the calculations presented in this report we used a statewide population-weighted average concentration of 1.8 $\mu g/m^3$, which was estimated by ARB staff for the identification of diesel exhaust as an air toxic contaminant. Although staff also had estimated the population-weighted average concentration for the South Coast basin, use of a basin specific factor would represent a departure from our methodology that would need additional peer review.

A related issue is whether a change in diesel PM concentration of 1.8 $\mu g/m^3$ can have a measurable effect on health. It is important to emphasize that while the change is small, it is an incremental change from a statewide population-weighted PM2.5 average concentration of 18.5 $\mu g/m^3$.

c. Baseline rates of mortality and morbidity

Mortality and morbidity baseline rates are entered into the C-R functions in order to calculate the estimates presented in this report, and there is uncertainty in these baseline rates. Often, one must assume a baseline incidence level to be consistent throughout the city or country of interest. In addition, incidence can change over time as health habits, income and other factors change. For this analysis, we used baseline rates that are used by U.S. EPA.

d. Unquantified adverse effects

An additional limitation in this analysis is that we did not quantify all possible health benefits that could be associated with reducing diesel PM exposure. Although the analysis illustrates that reduction in diesel PM exposure would confer health benefits to people living in the South Coast basin, we did not provide estimates for all endpoints for which there are C-R functions available. For example, we did not estimate incidences of hospitalizations for exacerbation of heart disease, chronic lung diseases (i.e., asthma and chronic obstructive pulmonary disease), or acute lung diseases (i.e., pneumonia and acute bronchitis).

In addition, estimates of the effects of PM on infant mortality, premature births, and low birth weight are not presented. While these endpoints are significant in an assessment of the public health impacts of diesel exhaust emissions, there are currently few published investigations on these topics. Also, the results of the studies that are available are not entirely consistent. Nevertheless, there are some data supporting a relationship between PM exposure and these effects, and there is ongoing research in these areas that should help to clarify the role of diesel exhaust PM on these endpoints.

There is also evidence for other non-cancer health effects that are attributable to diesel exhaust PM exposure. For example, diesel PM apparently can act as an adjuvant in allergic responses and possibly asthma. However, additional research is needed at diesel exhaust concentrations that more closely approximate current ambient levels before the effect of diesel PM exposure on allergy and asthma rates is established. Also, because these endpoints have been investigated only in controlled exposure studies, population level C-R functions are not available for making estimates of the population-wide impacts of exposure.

Taken as a whole, the results of our limited analysis support the conclusion that reduction in diesel PM emissions from the Ports of Los Angeles and Long Beach will confer health benefits to the exposed population. However, since we did not make estimates for all possible endpoints, it is likely that we have underestimated the health benefits in this analysis.

Value of Premature Deaths Avoided

The U. S. EPA has established $4.8 million in 1990 dollars (or $6.3 million in 2000 dollars) for a 1990 income level as the mean value of avoiding one premature death (U.S. EPA, 1999, pages 70-72). This value is the mean estimate from 5 contingent valuation studies and 21 wage-risk studies, which span the range from $0.6 million to $13.5 million in 1990 dollars (or $0.8 million to $17.8 million in 2000 dollars).

Both kinds of studies examine the willingness to pay (or accept) for a minor decrease (or increase) in mortality risk. For example, if 10,000 people are willing to pay $800 apiece for risk reduction of 1/10,000 then collectively the willingness-to-pay for avoiding a premature death, in this example, would be $8 million.

Contingent valuation studies provide stated preference data about willingness-to-pay for decreased levels of risk. Such studies pose a market situation to survey respondents, who are asked how much they would be willing to pay. The approach is useful for getting estimates on willingness-to-pay for policies that have not yet been tried. The earliest techniques involved asking people directly about how much they place on risk avoidance. Today the referendum format is most popular, in which the survey suggests a specific dollar amount and the respondent says yes or no (Freeman, 2003).

Wage-risk studies provide revealed preference data about willingness to accept increased levels of risk.[5] Such studies look at comparisons between different jobs in terms of wages and risks of death on the job. The comparisons focus on risk only, by controlling for other differences in job attributes. The compensating wage approach may underestimate the value of preventing premature mortality, because people who are willing to be paid to accept increased risk may value risk reduction less than the average person (Freeman, 2003).

Table 4-9 provides some information about the 26 studies that U.S. EPA used to calculate its estimate of $4.8 million (in 1990 dollars) for the value of avoiding a premature death. A recent review (Viscusi and Aldy, 2003) discusses some of the studies and provides the level of risk reduction used in the study. From that we can infer the compensating wage.

[5] For small changes in risk, the amount that a person is willing to accept an increase in an incremental increase in the probability of death is about the same as the amount that the person is willing to pay for the same decrease in the probability of death. For large changes in risk, the willingness to accept higher risk increases substantially, whereas the willingness to pay for lower risk tends to level off.

Table 4-9. Annual Valuations of Premature Deaths Prevented

Authors	Year	Type of Estimate	Valuation (millions 1990$)	Annual risk reduction	Implied compensating wage (1990$/year)
Kneisner and Leeth	1991	Wage-risk	0.6	0.0004	240
Smith and Gilbert	1984	Wage-risk	0.7		
Dillingham	1985	Wage-risk	0.9		
Butler	1983	Wage-risk	1.1	0.00005	60
Miller and Guria	1991	Cont. Valu.	1.2		
Moore and Viscusi	1988	Wage-risk	2.5		
Viscusi, Magat, and Huber	1991	Cont. Valu.	2.7		
Gegax et al.	1985	Cont. Valu.	3.3		
Marin and Psacharopoulos	1982	Wage-risk	2.8		
Kneisner and Leeth	1991	Wage-risk	3.3		
Gerking, de Haan, and Schulze	1988	Cont. Valu.	3.4		
Cousineau, Lacroix, and Girard	1988	Wage-risk	3.6		
Jones-Lee	1989	Cont. Valu.	3.8		
Dillingham	1985	Wage-risk	3.9		
Viscusi	1979	Wage-risk	4.1	0.0001	410
Smith	1976	Wage-risk	4.6	0.0001	460
Smith	1976	Wage-risk	4.7	0.0001	470
Olson	1981	Wage-risk	5.2	0.0001	520
Viscusi	1981	Wage-risk	6.5	0.0001	650
Smith	1974	Wage-risk	7.2	0.000125	900
Moore and Viscusi	1988	Wage-risk	7.3	0.00006	440
Kneisner and Leeth	1991	Wage-risk	7.6		
Herzog and Schlottman	1987	Wage-risk	9.1	0.000097	880
Leigh and Folson	1984	Wage-risk	9.7	0.0001	970
Leigh	1987	Wage-risk	10.4		
Garen	1988	Wage-risk	13.5	0.000108	1,460

Sources: U.S. EPA, 1999; Viscusi and Aldy, 2003.

Note that typical studies (those getting a result close to the mean of $4.8 million in 1990 dollars) involve a mortality risk of 1/10,000 or something close to that level. The risk premium is several hundred dollars per year.

As real income increases, people may be willing to pay more to prevent premature death (U.S. EPA, 2003, pages 9-17 and 9-18). U.S. EPA further adjusted the 1990 value by a factor of 1.26 for a 2020 income level. Assuming that real income grew at a constant rate from 1990 and will continue at the same rate until 2020, we adjusted the value of avoiding a premature death (increasing it at a rate of 0.8 percent per year) for each year.

We then updated the value to 2005 dollars[6]. After these adjustments, the value is *\$8.2 million in 2005 and \$9.6 million in 2025, both expressed in 2005 dollars*.

The U.S. EPA's guidance of social discounting recommends using three and seven percent discount rates (U.S. EPA, 2000). Table 4 shows year-by-year valuations of the avoided premature deaths due to implementation of NNI. Based on these valuations, and the annual avoided premature deaths as weights, the weighted average value of reducing a future premature death, discounted back to the year 2005, is around \$4 million at seven percent discount rate, and \$6 million at three percent. Undiscounted valuations are also presented in Table 4-10. While the undiscounted sum of annual valuations is not particularly meaningful because it does not take into account the mismatch in time – we value a dollar in 2005 far more than we value a dollar in 2025 – it does provide a way to compare the health valuations to the costs of controls which were only reported as an undiscounted sum.

Table 4-10. Annual Valuations of Premature Deaths Prevented by No Net Increase

	Valuation (\$million) Undiscounted			Valuation (\$million) Using 7% discount rate			Valuation (\$million) Using 3% discount rate		
Year	**Lower**	**Mean**	**Upper**	**Lower**	**Mean**	**Upper**	**Lower**	**Mean**	**Upper**
2005	56	91	126	56	91	126	56	91	126
2006	50	78	106	46	73	99	48	76	103
2007	51	80	108	45	70	95	48	75	102
2008	329	572	815	268	467	665	301	523	746
2009	337	585	834	257	447	636	299	520	741
2010	498	858	1,218	355	612	868	430	740	1,050
2011	518	893	1,267	345	595	844	434	747	1,061
2012	557	956	1,354	347	595	843	453	777	1,101
2013	561	968	1,374	327	563	800	443	764	1,084
2014	578	999	1,419	315	543	772	443	765	1,088
2015	596	1,032	1,467	303	524	746	444	768	1,092
2016	613	1,063	1,513	291	505	719	443	768	1,093
2017	631	1,095	1,560	280	486	693	442	768	1,094
2018	649	1,128	1,608	269	468	667	442	768	1,095
2019	667	1,162	1,657	259	451	643	441	768	1,095
2020	758	1,280	1,802	275	464	653	487	822	1,156
2021	794	1,334	1,874	269	452	635	495	831	1,168
2022	831	1,390	1,949	263	440	617	503	841	1,179
2023	869	1,447	2,026	257	428	599	510	850	1,190
2024	906	1,505	2,103	251	416	582	517	858	1,199
2025	947	1,567	2,187	245	405	565	524	868	1,211
TOTAL	11,797	20,082	28,368	5,323	9,095	12,867	8,203	13,990	19,776
AVERAGE	\$9.08	\$9.08	\$9.08	\$4.10	\$4.11	\$4.12	\$6.32	\$6.32	\$6.33

[6] The conversion uses the February 2005 and February 2000 values of the California Consumer Price Index, obtained from the California Department of Industrial Relations.

Non-Mortality Health Effects

For avoiding non-fatal health effects, the following U.S. EPA valuations, updated to 2005 dollars, are used (U.S. EPA, 2003):

- $49 for acute asthma attack
- $178 for work loss day
- $58 for minor restricted activity day (MRAD)

Table 4-11 shows the year-by-year reductions in these health effects that are expected upon implementation of the proposed NNI measures. Table 4-12 shows the year-by-year valuation of these avoided non-mortality health effects.

Table 4-11. Non-Mortality Health Effects Avoided by No Net Increase*

	Asthma Attacks			Work Loss Days			Minor Restricted Activity Days		
Year	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean	Upper
2005	115	263	412	2,029	2,290	2,552	10,412	12,054	13,697
2006	103	224	344	1,734	1,946	2,158	8,908	10,219	11,529
2007	105	227	348	1,759	1,972	2,185	9,040	10,344	11,648
2008	593	1,614	2,634	12,237	14,031	15,824	62,676	74,071	85,466
2009	605	1,639	2,674	12,434	14,252	16,069	63,685	75,233	86,781
2010	897	2,384	3,870	18,113	20,725	23,337	92,790	109,375	125,960
2011	923	2,460	3,997	18,686	21,386	24,087	95,727	112,872	130,017
2012	992	2,613	4,235	19,874	22,723	25,572	101,826	119,908	137,991
2013	985	2,625	4,264	19,939	22,820	25,700	102,147	120,436	138,724
2014	1,004	2,688	4,371	20,410	23,367	26,325	104,551	123,334	142,117
2015	1,024	2,754	4,484	20,905	23,944	26,984	107,083	126,388	145,693
2016	1,043	2,815	4,588	21,363	24,477	27,592	109,422	129,208	148,994
2017	1,061	2,878	4,695	21,833	25,025	28,217	111,824	132,105	152,386
2018	1,080	2,941	4,802	22,303	25,572	28,842	114,227	135,003	155,780
2019	1,099	3,004	4,909	22,773	26,120	29,467	116,628	137,900	159,172
2020	1,292	3,283	5,275	25,050	28,549	32,048	128,400	150,568	172,736
2021	1,351	3,396	5,441	25,932	29,526	33,119	132,941	155,692	178,443
2022	1,409	3,509	5,610	26,826	30,516	34,206	137,537	160,889	184,240
2023	1,468	3,625	5,782	27,732	31,522	35,312	142,201	166,169	190,138
2024	1,526	3,739	5,952	28,625	32,513	36,401	146,793	171,367	195,942
2025	1,589	3,863	6,138	29,598	33,595	37,592	151,798	177,044	202,291
TOTAL	20,329	52,545	84,761	400,265	456,870	513,475	2,051,230	2,410,181	2,769,132

*Note: Results in Table 4-8 are sums of effects due to reductions in both primary and secondary diesel PM emissions. Since they have not been rounded, the values will not match those in the text.

Table 4-12. Valuations of Non-Mortality Health Effects Avoided by No Net Increase

	Valuation of Asthma Attacks ($ million, undiscounted)			Valuation of Work Loss Days ($ million, undiscounted)			Valuation of Minor Restricted Activity Days ($ million, undiscounted)		
Year	Lower	Mean	Upper	Lower	Mean	Upper	Lower	Mean	Upper
2005	0.006	0.013	0.020	0.36	0.41	0.45	0.6	0.7	0.8
2006	0.005	0.011	0.017	0.31	0.35	0.38	0.5	0.6	0.7
2007	0.005	0.011	0.017	0.31	0.35	0.39	0.5	0.6	0.7
2008	0.029	0.079	0.129	2.17	2.49	2.81	3.6	4.3	5.0
2009	0.030	0.080	0.130	2.21	2.53	2.86	3.7	4.4	5.0
2010	0.044	0.116	0.189	3.22	3.68	4.15	5.4	6.3	7.3
2011	0.045	0.120	0.195	3.32	3.80	4.28	5.5	6.5	7.5
2012	0.048	0.128	0.207	3.53	4.04	4.54	5.9	6.9	8.0
2013	0.048	0.128	0.208	3.54	4.05	4.57	5.9	7.0	8.0
2014	0.049	0.131	0.213	3.63	4.15	4.68	6.1	7.1	8.2
2015	0.050	0.134	0.219	3.71	4.25	4.79	6.2	7.3	8.4
2016	0.051	0.137	0.224	3.80	4.35	4.90	6.3	7.5	8.6
2017	0.052	0.140	0.229	3.88	4.45	5.01	6.5	7.7	8.8
2018	0.053	0.144	0.234	3.96	4.54	5.12	6.6	7.8	9.0
2019	0.054	0.147	0.240	4.05	4.64	5.24	6.8	8.0	9.2
2020	0.063	0.160	0.257	4.45	5.07	5.69	7.4	8.7	10.0
2021	0.066	0.166	0.266	4.61	5.25	5.88	7.7	9.0	10.3
2022	0.069	0.171	0.274	4.77	5.42	6.08	8.0	9.3	10.7
2023	0.072	0.177	0.282	4.93	5.60	6.27	8.2	9.6	11.0
2024	0.074	0.182	0.290	5.09	5.78	6.47	8.5	9.9	11.4
2025	0.078	0.189	0.300	5.26	5.97	6.68	8.8	10.3	11.7
TOTAL	0.992	2.564	4.137	71.12	81.18	91.23	118.9	139.7	160.5

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Stakeholder Comments Received:

Rail Industry

Only portions of the draft ARB document on potentially avoided undiscounted health care costs and alleged costs attributable to premature deaths were received and those portions were only available 10 days before comments were required. Additional portions were received only two working days before comments were required. Preliminary expert review demonstrates significant inconsistencies with accepted methodologies and fundamental flaws. Until appropriate peer review and an adequate review timeframe is allowed, it would be inappropriate for the Mayor to rely on health benefits estimated for the NNI Plan. The Task Force should not include the health benefits estimation in the draft report. Separate comments were sent to the NNI Task Force on Monday, June 20, 2005 highlighting critical concerns with the health benefits estimation. Finally, there is no consensus on the information presented in the health benefits estimation.

We wish to draw your attention to our significant concerns relating to the draft Health Benefits analysis we received only last week, as members of the Financial Working Group. The draft Health Benefits analysis is deeply flawed. It is likely to mislead stakeholders. It increases the risk that solutions will be ineffective as well as costly in terms of the resources available to the Port, lessees, users, and surrounding communities.

The flaws in the draft Health Benefits Analysis can be corrected. We have commissioned, and attached for inclusion in the final NNI Report, initial, independent reports regarding the draft Health Benefits analysis prepared by Dr. Michael Lakin (California EnSIGHT) and Dr. Philip Goad (Center for Toxicology and Environmental Health). We request that their reports and these additional comments be included in the final NNI Report.

Why The Railroads Care About Health Benefits Estimates
Flawed health benefits estimates can divert scarce resources from effective solutions and lead to wasteful solutions. The Port, lessees, users, and the surrounding communities do not have unlimited resources. Even effective solutions are likely to be expensive. Reliance on flawed analyses can mislead all stakeholders and lead to the wrong solutions, to a failure to improve the environment, and to additional wasteful solutions.

These outcomes would defeat the stated purposes of the NNI Plan, contrary to sound public policy and the public good.

Both of our railroads operate in and around the Port every day. We know the vital role that the Port plays in the economic health of the City and the State of California. Its facilities and operations are now among the largest and most complex in the world. The Port is a vital gateway between the entire country and the Pacific Rim. The consequences of flawed Port policies based on flawed premises, like the draft Health Benefits analysis, are huge.

We are also aware that surrounding communities are concerned about the growth and impacts of the Port, including rail operations. We have worked with the Port and State of California, as well as the federal government, to improve the efficiency and reduce the environmental impacts of rail operations. Both our railroads have demonstrated that they want to work with agencies and other stakeholders to devise solutions that work. In this letter and the attached reports, the railroads describe how the health benefits estimate can be improved.

The Health Benefits Analysis Process Was Flawed
Late in the NNI Plan process, some of the stakeholders in the Financial Working Group asked the ARB and SCAQMD for help determining the health benefits of adoption of the NNI Plan. ARB and SCAQMD staff quickly estimated health benefits associated with reductions in diesel particulate matter (DPM) emissions, including estimating the "Annual Valuations of Premature Deaths Prevented by No Net Increase" and providing an initial evaluation of the uncertainties and limitations in ARB's and SCAQMD's own estimations.

The railroads and other stakeholders have not had a meaningful opportunity for review of ARB/SCAQMD staff's estimations. This process thus lacks fundamental fairness and the Port cannot now take any action approving or implementing the NNI Plan without providing an adequate opportunity for review of the ARB/SCAQMD staff's estimations and also an opportunity for thorough, complete and transparent expert peer review.

The Port Should Comply With CEQA
To expedite the process of determining the health benefits of the NNI Plan, the Port can and should combine its further review with the environmental impact report (EIR) that the California Environmental Quality Act (CEQA) requires before the Port takes any further action. Unfortunately, it is now too late for the Port NNI Plan EIR to be "prepared as early as feasible in the planning process to enable environmental considerations to influence project program and design" as required by State CEQA Guidelines §15004(b). However, it is not too late for the Port "to provide meaningful information for environmental assessment" as also required by State CEQA Guidelines §15004(b) and for the Port to fully comply with all of the other requirements of CEQA.

The EIR on the NNI Plan must "identify and focus on the significant environmental effects of the proposed project" including "relevant specifics of the area, population concentration, the human use of the land (including commercial and residential development), health and safety problems . . ., and other aspects of the resource base such as water, historical resources, scenic quality, and public services." State CEQA Guidelines §15126.2(a). Of course, in the limited time available, the ARB/SCAQMD staff health benefits estimation did not and could not address even these mandatory and important topics.

Specific Flaws That Must Be Addressed in the EIR
As explained in more detail in the attached preliminary reports from Dr. Lakin and Dr. Goad, the ARB/SCAQMD staff estimation is deeply flawed on its face, it does not substitute for the required CEQA analysis, and it cannot serve as the basis for Port adoption or implementation of the NNI Plan. For example, Dr. Lakin and Dr. Goad found in their initial reviews that:

1. *The MATES II monitoring data indicates less diesel particulate matter (DPM) in the air near Port area than in essentially all other locations monitored.*
2. *The MATES II monitoring data also indicates that substantially less DPM is measured in the Port area than is predicted by modeling. Monitoring data is more accurate than predictions*

based on modeling and should be considered in assessing the accuracy of predictions contained in the ARB/SCAQMD staff estimation and in developing a sound NNI Plan.

3. *The State Implementation Plan methodology is not suited to modeling the emissions from a single facility in order to predict the concentration of those emissions in the air in and around the facility.*
4. *The studies that the ARB/SCAQMD staff estimation rests upon have not identified DPM as the cause of the premature deaths calculated in the ARB/SCAQMD staff estimation.*
5. *Health effects and linear dose-response relationships from exposure to low levels of DPM have not been established, contrary to the ARB/SCAQMD staff estimation.*
6. *The assumption in the ARB/SCAQMD staff estimation that a given reduction in DPM emissions results in identical reductions in population exposure – regardless of where the emissions occur -- is unfounded.*
7. *Methods of mortality rate calculations in the ARB/SCAQMD staff estimation are not appropriate or defensible. The methodology based on the estimate of premature mortality derived by Lloyd and Cackette (2001) should not be used until its accuracy, reliability, and appropriateness for its use as the basis for the NNI Plan until it can be independently validated by stakeholders.*
8. *The ARB/SCAQMD staff estimation ignores available regulatory guidance for human health effects analysis.*
9. *The methodology and assumptions used in the ARB/SCAQMD staff estimation are highly uncertain. Consequently, the results of the ARB/SCAQMD staff estimation are equally uncertain.*
10. *The results in the ARB/SCAQMD staff estimation are not readily reproducible to verify their accuracy due to the limited documentation provided.*
11. *The "Uncertainties and Limitations" section does not address all significant sources of uncertainties and does not address the uncertainty in the concentration– response relationship in adequate detail. Description, inclusion and summation of all sources of uncertainty should be provided in the NNI Plan.*
12. *The ARB/SCAQMD staff estimation may well mislead stakeholders and the public.*

How the Port Can Improve Health Benefits Estimates
The railroads suggest that the Port should analyze the health benefits of the NNI Plan in a transparent, scientifically valid, and well-founded manner, using recognized and peer reviewed methodologies, such as:

- *Valid and current monitoring data to define current conditions, to validate any modeling and to validate progress as defined by the NNI Plan.*
- *A toxicity assessment based on scientifically valid studies identifying health affects attributable specifically to DPM, as opposed to other air contaminants originating from other sources.*
- *A dose-response assessment based on valid scientific studies that determines the relationship between the level of DPM exposure and the health impacts resulting from that exposure, including identification of threshold levels below which adverse effects are not anticipated.*
- *Emissions and air dispersion modeling that estimates actual air concentrations of DPM based on anticipated uses of diesel engines and site-specific weather data in and around the Port. More refined air dispersion methodologies designed for this purpose are available and should be used.*
- *An exposure assessment that accounts for population characteristics such as number, location, and activity of potentially exposed people, and likely durations of exposure. This assessment should utilize both air dispersion modeling, and available fine particulate monitoring for geographically relevant areas neighboring the Port.*
- *Risk characterization that presents defensible scientifically supportable estimates of risk based on the toxicity assessment and exposure assessment performed for the NNI Plan.*
- *Uncertainties in the methods, assumptions, data, and conclusions should be clearly identified and addressed in the EIR.*

Of course, the full health benefits analysis must be "readily available for public examination" under State CEQA Guidelines §15147. In preparing an adequate health benefits assessment, the Port may also find in this complex area that "early consultation solves many potential problems that would arise in more serious *forms later in the review process." State CEQA Guidelines §15083. Unlike the ARB/SCAQMD staff estimation, "Conclusory statements unsupported by factual information will not suffice." State CEQA Guidelines §15088(c).*

The railroads look forward to participating in the preparation of a full and adequate EIR on the NNI plan. An NNI Plan that rests on a fully adequate EIR should provide assurance that public and private resources will be spent on truly improving air quality.

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June 20, 2005

LaDonna DiCamillo
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Dear Ms. Harris and Ms. DiCamillo:

California EnSIGHT, Inc. (EnSIGHT) is pleased to provide comments regarding the California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD) contributions to the draft No Net Increase (NNI) Plan and health benefits analysis (HBA) contained therein. ENSIGHT is an environmental and health sciences consulting company that provides risk assessment, exposure evaluation and toxicology services. EnSIGHT has been extensively involved in conducting exposure and risk assessments for various sources of air emissions, including diesel exhaust, for a variety of regulatory programs. Our comments and suggestions regarding the NNI Plan are provided below. Dr. Michael Lakin is the primary author of the comments and a summary of his experience follows.

Dr. Lakin is a recognized expert in risk assessment, toxicology, exposure assessment and diesel exhaust. He has extensive experience with the Port Facilities, and has more than 25 years of experience in the environmental health sciences. He has managed one of the largest groups of health and environmental scientists in the country, who along other disciplines, included one of most recognized air consulting companies, Systems Application International, a California based company that focuses on environmental and health related air issues. Dr. Lakin has been retained as an expert in numerous activities involving diesel exhaust, including his current participation on the technical committee of the MATES III effort. He participated on several committees associated with the listing of diesel exhaust as a TAC and on committees associated with the subsequent development of the diesel exhaust risk management plan by CARB. He also has conducted technology evaluations of methods to reduce emissions from internal combustion engines. Dr. Lakin has conducted air monitoring studies to measure chemicals in buildings and outdoors, as well as exhaust from diesel vehicles. He has provided expert testimony in numerous high profile issues, including Belmont High School and the evaluation and reopening of schools contaminated with asbestos. He worked on the health risk evaluation of diesel exhaust at the Roseville rail yard and has provided expert testimony in multiple Proposition 65 cases focusing on emissions of diesel exhaust from various facilities, engines and vehicles. He has conducted work at the Ports of Long Beach and Los Angeles including remediation projects, emissions inventory activities and as an expert in an air emissions lawsuit which focused on an allegation of health effects associated with particulates released from the ports.

On August 11, 2004, the Board of the Harbor Commissioners adopted a resolution authorizing completion of a report on the planned implementation of the No Net Increase Policy. The primary impetus to the NNI Policy and Plan appears to have been some of the findings identified in the Multiple Air Toxics Exposure Study (MATES II). Specifically, some of the findings have been interpreted by others to suggest Port-related emissions of diesel particulate matter (DPM) as the primary of contributor to basin-wide DPM air concentrations. However, these interpretations of the findings are inconsistent with other data contained in the MATES II report as discussed in a subsequent section below.

As we understand the twin goals of the NNI Plan, they are to: (1) accurately communicate information pertaining to Port-related DPM emissions, exposure, and potential health impacts associated with such exposure to stakeholders; and (2) develop an effective tool to quantify sources of DPM emissions, identify potential measures to reduce such emissions, to estimate emission reductions from the implementation of the measures, and to predict changes in air concentration of DPM in and around the Port area. In order to satisfy both of these objectives with a reasonable degree of certainty, accurate information must be used in conjunction with a methodology based on sound science. Failure to do so is likely to result in a Plan that will mislead stakeholders and in the identification and implementation of costly control measures that may have little or no benefit to stakeholders.

There are multiple steps in the analysis within the NNI Plan and HBA. The NNI Plan indicates that the current emission estimates are highly uncertain and future estimates, based on the projected growth, are even more uncertain. There is high uncertainty associated with estimating the air concentration of DPM in and around the Port as well as the population-weighted average for the South Coast Air basin from these emissions as well. The HBA attempts to predict highly uncertain estimates of the reduction in the population-weighted average air concentration of DPM in the South Coast basin attributable to the proposed future emission reductions from the Port sources. Compounding the uncertainty of the results of the HBA is the high level of uncertainty in the statistical estimates of increased mortality rates reportedly associated with exposure to $PM_{2.5}$ i.e., estimates derived by Lloyd and Cackette (2001) of "premature mortality" due to DPM exposure. Each step of the analysis used in the NNI Plan and HBA have a great degree of uncertainty present that generally compounds the total uncertainty in the final result. Given the overall goals of the NNI Plan and HBA, we have provided comments identifying ways to reduce these uncertainties and facilitate attainment of the goals, specifically:

1. **The MATES II monitoring data indicates less diesel particulate matter in the air near Port area than in essentially all other locations monitored. The MATES II monitoring data also indicates that substantially less DPM is measured in the Port area than is predicted by modeling. Monitoring data is more accurate than predictions based on modeling and should be considered in assessing the accuracy of predictions contained in the HBA and in developing NNI Plan.**

2. **The State Implementation Plan methodology is not suited to modeling the emissions from a single facility in order to predict the concentration of those emissions in the air in and around the facility. Other more refined air dispersion methodologies designed for this purpose are available and should be used.**

3. **Monitoring data is needed to define current conditions, to validate any modeling and to validate progress as defined by the plan.**

4. **The methodology and assumptions used in the HBA are highly uncertain. Consequently, the results of the HBA are equally uncertain. Moreover, the results are not readily reproducible to verify their accuracy due to the limited documentation provided. The methodology based on the estimate of premature mortality derived by Lloyd and Cackette (2001) should not be used in the HBA until its accuracy, reliability, and appropriateness for its use in the HBA can be independently validated by stakeholders.**

5. **The "Uncertainties and Limitations" section does not address all significant sources of uncertainties and does not address the uncertainty in the concentration–response relationship in adequate detail. Description, inclusion and summation of all sources of uncertainty must be provided in the NNI Plan and HBA**

More detail for each point is provided below.

1. **The MATES II monitoring data indicates less diesel particulate matter in the air near Port area than in essentially all other locations monitored. The MATES II monitoring data also indicates that substantially less DPM is measured in the Port area than predicted by modeling. Monitoring data is more accurate than predictions based on modeling and should be considered in assessing the accuracy of predictions contained in the HBA and in developing NNI Plan.**

The MATES II Report estimated the potential health risks of air toxics, including diesel particulate matter (DPM). It is also important to recognize that the MATES II study included monitoring data that indicated that actual measured exposures were much lower in the area of the port than was predicted by the models used to estimate cancer risk. These lower levels are also supported by the Agency's routine and regular monitoring of PM, which also shows lower emissions and potential risk in the port area than is predicted by the model.

The concentrations of DPM used in the health risk assessment were derived from either measured elemental carbon used as a surrogate for DPM at several sites, or dispersion modeling of estimated DPM emissions, and were not derived from actual DPM monitoring data. The methods employed resulted in DPM being identified as the largest potential contributor to risk while the modeling resulted in many sources, including those in and around the Port, being identified as opportunities for DPM emissions reductions in the air basin. However, the risk estimates derived using modeled DPM concentrations in the MATES II Report were substantially greater than those derived using the "measured" values and the modeled risk estimates were used to derive the basin wide risk estimates, the primary focus by stakeholders and the media. The MATES II results, and the reaction to them, became one of the initial reasons for developing the NNI Plan.

Given the goal of the NNI Plan is to be an accurate and effective tool for developing reasonable emissions goals for the port, the methodology, the accuracy, and uncertainty of the MATES II Report with respect to estimates of Port emissions must be critically evaluated. In the MATES II Report, the measured concentration of DPM was derived from estimates of a surrogate, elemental carbon, from very limited, offsite air monitoring data measurements. Estimated emissions from available known sources of DPM were predicted in a different section of the report and the source estimates were then used in an air dispersion model to estimate potential air concentrations of DPM. The calculated values should have been compared to the measured values, but they were not. Had they been compared, the report would have noted the very large difference in modeled versus measured values. The use of two different methods to estimate DPM air concentrations resulted in two very different answers.

The monitoring data utilized in the MATES II report did not indicate the Port area is the primary source of DPM in the basin. The MATES II site with the closest proximity to the POLA/POLB complex is the Long Beach site, and that site and Anaheim had nearly identical and the lowest concentrations of overall risk and DPM related risk, as compared to the other 7 sites that measured elemental carbon. This should be contrasted with the modeled data that predicted the highest concentrations of DPM at the Port area, which was again identical to Anaheim with downtown LA as the highest. In fact the modeled data gives the opposite results of the monitoring data, with the highest levels found in the northern, not in the southern part of the basin. The different methodologies result in opposite conclusions. Note on the map from the MATES II study (Figure

1), the actual measurements indicate the highest levels of diesel exhaust are not located at the Port, but rather the lowest DPM and associated estimate of potential cancer risk levels are at Long Beach and Anaheim based on the measured data. The measured levels agree with the "urbanization of downtown LA" as the primary source of diesel and mobile emissions.

Figure 1. Identification of Potential Cancer Risk Locations with Monitoring Data

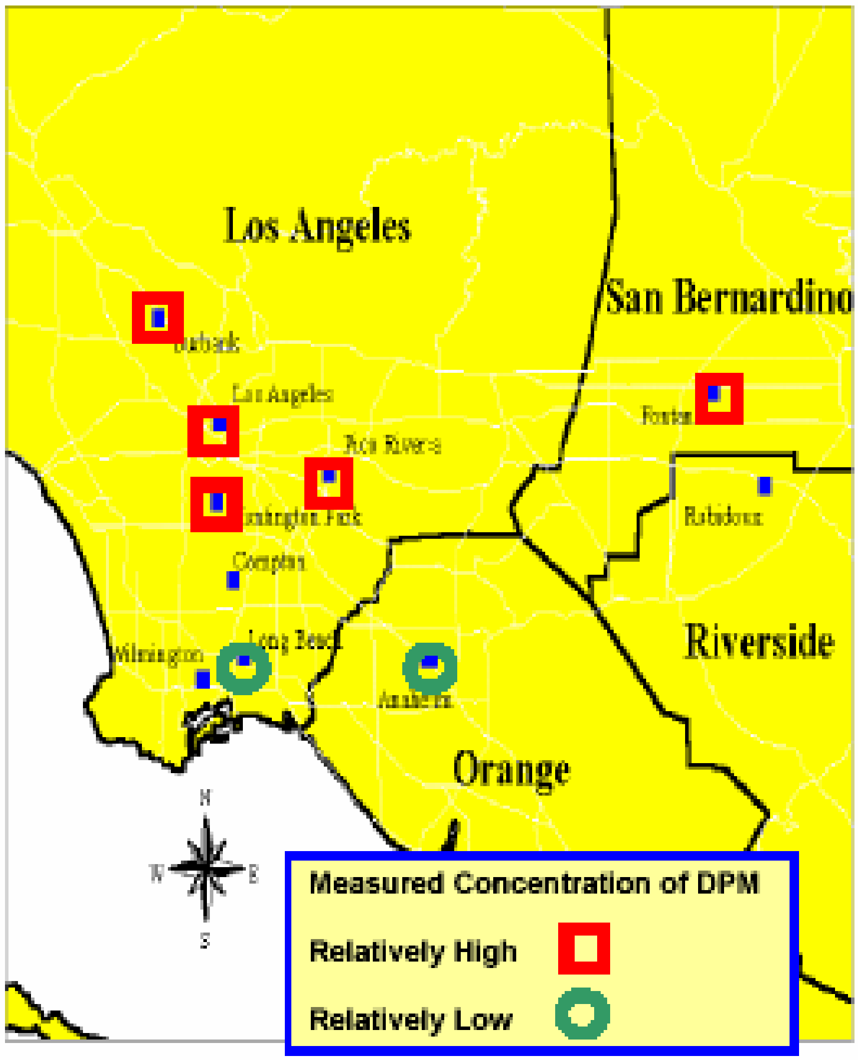

Figure 3-1
Location of MATES II Sites

5

There are two likely reasons for these confounded results: 1) the modeled results are based on data that is highly uncertain, e.g. source locations, emission rates, meteorology, and/or inaccurate assumptions; or 2) the monitoring data lacked the spatial resolution to describe the emissions/dispersion complexities.

In order for the NNI policy to be effectively designed to achieve a reduction in air toxics emanating from the Port, it is critical to accurately identify and describe the sources of air toxics, including as appropriate DPM, contributing to the Port's emission inventory. Second, the modeling approach used to predict the concentration of air toxics in the air in and around the Port now and into the future, with a reasonable degree of certainty, must incorporate accurate data and representative assumptions. Lastly, actual monitoring data must be collected to validate the accuracy of the modeled estimates to determine whether the control strategy as developed and implemented is effective in achieving the predicted results. If actual monitoring data vary from modeling input, refinements to the modeling and control strategy will be warranted.

The Technical Working Group has employed a variation of the SIP methodology (using an air toxics adaptation of the UAM-4 photochemical model), which is useful in predicting approximate air concentrations from large source inventories in large geographic areas. However, this methodology, as applied by the SCAQMD, has significant limitations in estimating exposure or potential risks to any person or discrete location within the discrete Ports area. The UAM-4 model is old and out-of-date, and does not incorporate the latest advection and dispersion science. Other, recently developed, dispersion modeling treatments, such as CAMx (with integrated air toxics and plume resolution treatment), would be more appropriate for more refined assessments. As detailed, near-field (less than 2 km) assessment of air toxics impacts is best carried out by a combination of a CAMx level regional model and a sub-grid scale model such as the plume-in-grid technique embedded in CAMx, or the ISC series of models. Such an approach is more likely to have the ability to serve as an appropriate basis for a definitive planning tool for NNI.

Finally, the MATES II Studies have received extensive comments questioning the protocols used and the findings. Industry and business representatives believe, for instance, that the attribution to the Ports of Los Angeles and Long Beach of the emissions associated with movement of global, national, state, and local goods 50 miles out to sea and emanating from the entire South Coast Air Basin is both inappropriate and inconsistent with the analysis performed for other sources in California. Analytical approaches such as these have resulted in the misidentification of emissions associated with global consumer goods movement to single points in a complex and extensive goods movement system. As a result, a MATES III Study is underway which will, hopefully, address and allay those issues and concerns. A draft, however, is not due until January 2006. It is premature, therefore, to include or rely on information presented in MATES II in the NNI Plan, until the stated concerns are addressed.

2. **The State Implementation Plan methodology is not suited to modeling the emissions from a single facility in order to predict the concentration of those emissions in the air in and around the facility. Other more refined air dispersion methodologies designed for this purpose are available and should be used.**

The NNI Plan indicates that it employs State Implementation Plan (SIP) methodology, which was designed to assess and forecast the impacts of statewide inventories upon the air quality at the Statewide level. The State Implementation Plan methodology is not capable of refinement to accurately estimate exposure or potential risks to any person or persons at a discrete location within the Port study area. Consequently, the predicted basin-wide average air concentration from Port activities is not readily translated into accurate estimates of Port-related DPM exposure and potential health risks to those persons near the Port.

Other more refined methodologies are routinely employed by entities within the California Environmental Protection Agency (Cal-EPA) and the United States Environmental Protection Agency (USEPA) to estimate potential exposure to and assess potential health risks from chemicals present at or released/emitted from a facility at a discrete location. These other refined methodologies are used because they are capable of providing estimates that have greater certainty and are more accurate for these purposes. Other than time pressure, no reason appears to have been offered for using the Statewide Implementation Plan methodology in lieu of the other more refined methodologies routinely employed by Cal-EPA and the USEPA. Haste does not appear to be an adequate basis for frustrating one of the goals of the NNI Report.

3. **Monitoring data is needed to define current conditions and validate progress**

Monitoring data indicates prior modeled predictions in the MATES II Report near the Port are inaccurate, and warrant monitoring data to "validate" modeled predictions. As described above, the MATES II monitoring data shows DPM levels lower in the Port area than Valley and Uplands areas while MATES II modeling data shows predicted "DPM" levels higher near the Port than in outlying areas. The current "modeling" approach has not been demonstrated to be any more accurate than the MATES II approach. Unless available monitoring data is evaluated now to verify the accuracy of the conclusions based solely upon modeling of the current conditions, it will be difficult, if not impossible, to determine if the proposed control measures are having the desired effect. Therefore, available monitoring data should to be evaluated prior to release of the NNI plan and HBA to identify baseline conditions in and around the Port and verify the accuracy of the assumptions made with respect to current levels of DPM in and around the Port.

4. The methodology and assumptions used in the HBA are highly uncertain. Consequently, the results of the HBA are equally uncertain. Moreover, the results are not readily reproducible to verify their accuracy due to the limited documentation provided. The methodology based on the estimate of premature mortality derived by Lloyd and Cackette (2001) should not be used in the HBA until its accuracy, reliability, and appropriateness for its use in the HBA can be independently validated by stakeholders.

The projected benefits of the proposed emission reductions are derived based on estimates of reduced premature mortality. The estimates of reduced premature mortality contained in the HBA are, in turn, based upon two unstated assumptions:

a. Each ton of DPM emission reductions will result in a reduction of 0.000064 $\mu g/m^3$ in the population-weighted average air concentration of $PM_{2.5}$ in the South Coast basin; and

b. A causal and linear concentration-response (C-R) relationship in the mortality rate of Southern Californians and the annual population-weighted basin-wide average concentration of $PM_{2.5}$ in the range of projected reductions in the annual population-weighted basin-wide average concentration of DPM from the emission reductions in the NNI Plan projected to occur between 2005 to 2025.

In attempting to predict the benefits to air quality and health from the emission reductions in DPM, the HBA assumes that a specific mass of diesel PM reduction from any diesel engine subject to the future control measures will result in a predictable decrease in the annual average ambient basin-wide population-weighted concentration of DPM. For example, the HBA would predict that a projected emission reduction of 1 ton per year (TPY) would result in the same reduction in the population-weighted average DPM concentration for the South Coast basin irrespective of when and where the reduction occurs. It would not matter if it were within the Port or anywhere within the South Coast air basin. The HBA assumes that reducing emissions of DPM by 1 TPY would, with a high degree of certainty, result in a decrease in the basin-wide annual average ambient population-weighted concentration of DPM in air of 0.000064 $\mu g/m^3$ (1 TPY/28,000 TPY[1] x 1.8 μg DPM/m^3 = 0.000064 $\mu g/m^3$).

No data is provided in the HBA validating the assumption that a reduction of one TPY in the emissions will result in a decrease in the basin-wide annual average ambient population-weighted concentration of diesel particulate matter

[1] The HBA states that annual emissions of 28,000 TPY of diesel PM resulted in an ambient population-weighted concentration of 1.8$\mu g/m^3$.

in air of 0.000064 μg/m^3. In fact, CARB basin-specific data indicates it is inaccurate to assume a one-to-one relationship between mass emission rates of DPM and $PM_{2.5}$ and air concentrations or population-weighted average air concentrations of $PM_{2.5}$ as shown below in Table 1.

As Table 1 shows, CARB data indicates that the mass DPM emissions are 19.8% of the mass $PM_{2.5}$ emissions. However, DPM is present in the air as a lower percentage of the total $PM_{2.5}$ as a concentration (8.6%) and as a population-weighted average concentration (10.8%). Thus, the relative percentage of the mass emission rates of DPM and $PM_{2.5}$ do not appear to have a one-to-one relationship with either the relative percentage of $PM_{2.5}$ as DPM with respect to either air concentration or population-weighted average air concentration.

Table 1. Comparison of Year 2000 $PM_{2.5}$ and DPM Data in the SCAQMD

SCAQMD 2000 $PM_{2.5}$ Emissions (TPY)	**SCAQMD 2000 DPM Emissions (TPY)**	**SCAQMD 2000 Annual Average $PM_{2.5}$ Air Concentration (μg/m^3)**	**SCAQMD 2000 Annual Average Population-weighted $PM_{2.5}$ Air Concentration (μg/m^3)**	**SCAQMD 2000 Annual Average DPM Air Concentration (μg/m^3)**
40,515[A]	8,024[B]	28[C]	22.3[C]	2.4[D]

Percentage of $PM_{2.5}$ emissions as DPM	**Percentage of $PM_{2.5}$ air concentration as DPM**	**Percentage of $PM_{2.5}$ population-weighted air concentration as DPM**
19.8%	8.6%	10.8%

[A] CARB California Almanac of Emissions and Air Quality 2005 available at http://www.arb.ca.gov/aqd/almanac/almanac.htm.
[B] CARB California Almanac of Emissions and Air Quality 2001 available at http://www.arb.ca.gov/aqd/almanac/almanac.htm
[C] CARB Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, May 3, 2002
[D] CARB California Almanac of Emissions and Air Quality 2002 available at http://www.arb.ca.gov/aqd/almanac/almanac.htm

The first assumption is contradicted by the CARB data presented in Table 1, and apparently inaccurate. Obviously, accurate estimates of the population-weighted annual average concentration of any emission, including DPM, are dependent on a wide variety of factors not even considered in the NNI Plan methodology, such as the location of the emission source(s), emission source characteristics (source height, velocity, temperature, etc.), duration and time of day emitted, local meteorology, proximity to and density of local population, etc. Given the assumption is apparently inaccurate, it seems unreasonable for use in the HBA as it will likely mislead stakeholders.

The accuracy of estimated number of premature fatalities avoided by the proposed emissions reduction is questionable because:

a. The accuracy of the underlying premature mortality estimate derived by Lloyd and Cackette (2001) cannot be verified because adequate documentation of how this value was derived has not been made available within the HBA and other secondary materials. At a minimum, a worksheet or similar documentation should be made available by proponents of this value reproducing the specific calculations and explaining exactly how the value was derived by Lloyd and Cackette (2001).

b. Secondary sources reportedly used by Lloyd and Cackette (2001) to derive this estimate indicate the relationship between premature mortality attributable to changes in $PM_{2.5}$ exposure may be described by a log-linear relationship rather than a linear relationship. It is unclear what relationship was assumed to exist in the calculations used by Lloyd and Cackette (2001).

c. No documentation is provided validating the assumption that the relationship between premature mortality attributable to changes in $PM_{2.5}$ exposure is in fact linear, log-linear, or any other type of function over the range of anticipated change in $PM_{2.5}$ levels attributable to the emission reductions identified in the HBA. Furthermore, no documentation is provided that this assumption is applicable solely to changes in ambient DPM levels.

d. No data has been identified or provided in the HBA validating that the estimate of premature derived by Lloyd and Cackette (2001) is applicable to or representative of anticipated response in Southern Californians living in the South Coast Air Basin now or in the future.

Other than the reference to the Lloyd and Cackette (2001) article, no documentation validating that the estimate of premature mortality derived by Lloyd and Cackette (2001) is appropriate for use as an accurate, reliable method to derive quantitative predictions of reduced premature fatalities due to reductions of diesel $PM_{2.5}$ in the South Coast air basin has been provided in the HBA. Typically the data, assumptions, references, and detailed backup calculations are provided in report appendices to facilitate the goal of accurate stakeholder communication by identifying the data and assumptions considered and make the procedures used more transparent.

Without such back up data to validate the accuracy of the myriad of assumptions, any estimates in the projected health benefits are highly uncertain and provisional. Therefore, the methodology based on the estimate of premature mortality derived by Lloyd and Cackette (2001) should not be used in the HBA until its accuracy, reliability, and appropriateness for its use in the HBA can be independently validated by stakeholders.

5. The "Uncertainties and Limitations" section does not address all significant sources of uncertainties and does not address the uncertainty in the concentration–response relationship in adequate detail.

The NNI Plan and HBA attempts to address such uncertainties with respect to the estimated health benefits in a section entitled "Uncertainties and Limitations". This attempt is welcomed, but is quite limited in both scope and detail, thus is not likely to fully and accurately communicate the degree and breadth of uncertainty in estimates of the anticipated health benefit, thereby frustrating the goal of the NNI Plan. More is needed in terms of both scope and detail to achieve the goal of the NNI Plan with respect to accurate communication to stakeholders.

With respect to scope, it focuses solely upon aspects of the uncertainty associated with estimates of the concentration-response (C-R) and fails to address the uncertainty in all other aspects of the NNI Plan and HBA. These unaddressed aspects include, but are not limited to uncertainty in the:

a. Estimates of current emissions and emission rates of all sources subject to the proposed control measures;

b. Operation characteristics of such sources (e.g., where, when, and daily duration of such emissions occur, etc.);

c. Projected future growth rate of the emissions from these sources;

d. Dispersion of these emissions in the air in the vicinity of the Port and throughout the entire South Coast basin;

e. Change in the predicted population-weighted average exposure concentrations of DPM from the changes in the emissions of these sources; and

f. Accuracy of the assumption that the estimate of premature mortality by Lloyd and Cackette (2001) in terms of number of fatalities based on exposure to a population-weighted average air concentration can be extrapolated to a tons per year emission rate of $PM_{2.5}$, e.g., emissions of 14.11 tons per year of $PM_{2.5}$ will produce one premature fatality in that year.

With respect to detail, the "Uncertainty and Limitations" section does not discuss a number of aspects of uncertainty previously identified in the C-R estimate in adequate detail. Examples include:

a. Whether the estimate of premature mortality derived by Lloyd and Cackette (2001) attributable to a population-weighted average exposure of 1.8 $\mu g/m^3$ DPM is properly derived – no back up calculations are provided to validate its accuracy and correct input data & assumptions were employed. Although this value was presented in one of several tables contained in a 40-page article that was published in a peer-reviewed journal, it would seem improbable that any reviewer independently verified the appropriateness of the methodology employed and accuracy of the calculations used to derive their estimate of 1,985 premature fatalities in California due to exposure to 1.8 $\mu g/m^3$ of DPM.

b. Along with this same issue, is a lack of identification of the secondary sources of data used by Lloyd and Cackette (2001) to derive the estimate of premature fatalities due to DPM exposure. For example, the specific baseline mortality and morbidity baseline rates are not identified. It is unclear whether these baseline rates are representative for that in the South Coast basin for the period the HBA addresses from 2005 to 2025.

c. No documentation is provided addressing the overall shape of the C-R curve and its precise relationship between concentration and response in the range of anticipated changes in the population-weighted average concentration of DPM in the South Coast basin attributable to the proposed control measures identified in the NNI Report.

d. Whether the estimates and conclusions by Krewski et al. (2000) based on data collected throughout the US can be extrapolated to $PM_{2.5}$ composed solely of DPM – no data is provided demonstrating that this assumption is accurate is provided. A large amount the particulate emissions in the East and Midwest are from coal-fired power plants and they include large amounts of sulfates. There is a great deal of uncertainty in the ability to discern the effects elicited from the sulfate component of the exposure with the effect solely attributable to the physical particle component of the exposure.

e. Whether relative risk estimates contained in Krewski et al. (2000) based on data collected largely in areas other than the South Coast basin can be used to predict the response of the population in the South Coast basin from exposure to $PM_{2.5}$ - again, no data supporting this assumption is provided.

f. Explanation of the inconsistency between the findings by both the USEPA and OEHHA that lifetime exposure to 5 $\mu g/m^3$ is not likely to result in adverse non-cancer health effects and the conclusions presented in Lloyd and Cackette (2001) and relied upon in the HBA finding that a single year of exposure of the 2000 California population to the population weighted average concentration of 1.8 $\mu g/m^3$ DPM will result in 1,985 premature fatalities.

To achieve the goal of accurately communicating information pertaining to Port-related DPM emissions, exposure, and potential health impacts associated with such exposure to stakeholders, a complete, comprehensive, and accurate description of all aspects of uncertainty in the estimate of the health benefit is warranted. If such discussion is not provided, other alternatives are available. Waiting for the completion of the more detailed on-going health risk assessment is a possibility. Another alternative is eliminating the HBA from the NNI Plan entirely. The resolution authorizing the NNI Plan does not appear to specify that a HBA is required, thus this highly uncertain and speculative analysis could be eliminated.

We believe that it is inconsistent with the goals of the NNI Policy and Plan for CARB and SCAQMD to publish the HBA in its current state due to its highly uncertain methodology and resulting speculative conclusions regarding theoretical health benefits and potential health impacts of emissions from sources of DPM associated with the Ports of Los Angeles and Long Beach.

Respectfully Submitted,

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Principal

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June 20, 2005

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LaDonna DiCamillo
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Dear Ms. Harris and Ms. DiCamillo:

We are pleased to provide preliminary comments on behalf of the Center for Toxicology and Environmental Health (CTEH) regarding the California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD) June 3, 2005 draft document entitled "Estimation of the Health Benefits Associated with the Reductions of Diesel PM Emissions" herein referred to as the "Health Benefits Analysis," or HBA. We have also reviewed the discussion prepared by CARB titled, "Uncertainty and Limitations." CTEH is a toxicology consulting group located in Little Rock, AR, which has been extensively involved in assessing the health effects of diesel exhaust through our work with railroads and other clients. Our individual background and experience is summarized below.

Phillip Goad, Ph.D., is an owner and Senior Toxicologist with CTEH. He has a B.S. in Chemistry from Harding University in Searcy, Arkansas and a Ph.D. in Interdisciplinary Toxicology from the University of Arkansas for Medical Sciences, in Little Rock, Arkansas. He has adjunct appointments at the University of Arkansas for Medical Sciences College of Medicine and College of Public Health. For the past 24 years he has been practicing the discipline of toxicology, risk assessment and public health evaluation. He has been involved in the evaluation of health effects, risk, and exposure to diesel exhaust since the early 1990's and has studied diesel exhaust exposure in the railroad industry. As part of his consulting responsibilities, he has extensively reviewed the toxicological and epidemiological literature on diesel exhaust.

David Hewitt, M.D., M.P.H., is Director of Occupational Health Services at CTEH. His post-graduate training includes an M.P.H. in epidemiology with San Diego State University, a preventive medicine residency with the California Department of Health Services Environmental Epidemiology and Toxicology Branch, and an occupational medicine residency with the University of Minnesota. He is board-certified in both preventive medicine and occupational medicine. His work experience includes clinical occupational medicine and consulting in the areas of toxicology and environmental epidemiology for the past 13 years. He has worked as a medical officer with the Agency for Toxic

University of Arkansas for Medical Sciences Bioventures Program Associate

Substances and Disease Registry in Atlanta, GA, where he consulted with medical providers and the general public throughout the U.S. regarding chemical exposures. Dr. Hewitt has considerable experience regarding the health effects of diesel exhaust exposures through evaluation of occupational exposures and review of the toxicological and epidemiological literature.

According to the HBA, implementation of the No Net Increase Task Force recommendations will result in approximately 2,200 fewer premature deaths through the year 2025 in California due to decreases in both primary and secondary diesel particulate matter (DPM). However, the derivation of these conclusions is flawed in a number of respects which makes regulatory decisions based on such calculations of dubious value. Our criticisms of the analysis and conclusions found in the HBA can be summarized as follows:

1. The studies relied on in the Health Benefits Analysis (HBA) have not identified diesel exhaust as the cause of the premature deaths calculated in the report.
2. Health effects and linear dose-response relationships from exposure to low levels of diesel exhaust have not been established.
3. The assumption in the HBA that a given reduction in diesel exhaust emissions results in identical reductions in population exposure regardless of where the emissions occur is unfounded.
4. Methods of mortality rate calculations in the HBA are not appropriate or defensible.
5. The HBA ignores regulatory guidance for human health risk assessment, and conclusions regarding safe levels of diesel exhaust exposure.

These criticisms are described in greater detail below.

1. The studies relied on in the Health Benefits Analysis (HBA) have not identified diesel exhaust as the cause of the premature deaths calculated in the report.

The studies that serve as the basis for the HBA evaluated all sources of fine particulate matter, not just diesel exhaust. In fact, the Krewski analysis cited in the HBA mentions diesel exhaust only twice, and the original Harvard Six Cities study (Dockery et al., 1993) and the American Cancer Society (ACS) study (Pope et al., 1995) make no reference to diesel exhaust at all.

These two studies analyzed by Krewski et al. (2000) included an analysis of fine particulate matter and its relationship to mortality statistics, using data from a number of different cities. The source and composition of fine particulates in the reviewed studies is completely unknown. It is not evident from the HBA or the Lloyd and Cackette (2001) reference what percentage of fine particulate was considered to result from diesel exhaust. There are numerous sources of fine particulates in the atmosphere of which DPM is a variable fraction. Individual exposures and the magnitude of exposure to diesel particulates among participants in the cited studies are unknown, which adds another level of uncertainty to the calculations. The studies do not reflect exposures which may have occurred before the study began, and in the ACS study the exposures are not even entirely concurrent with participation in the study. It is impossible to conclude from this data that diesel particulates are the causative agent in any reported association. It is erroneous to conclude that diesel exhaust was the source of all or even a majority of the measured fine particulate in these studies and that the results of the study can be directly extrapolated to diesel exhaust exposure with the sensitivity that has been applied. Without this basic information, it is impossible to determine the significance, if any, of diesel particulate in these studies.

Perhaps this is why the Lloyd and Cackette, 2001 paper cited in the HBA states the following:

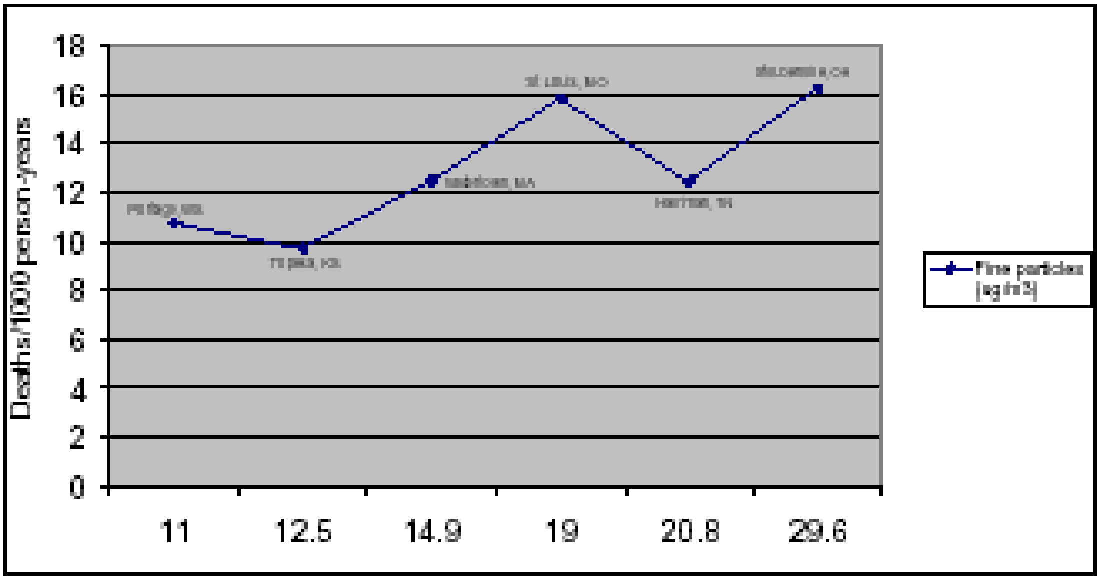
> *"Overall, the results of these studies suggest associations between PM [particulate matter] and gaseous pollutant emissions from traffic-related sources and various respiratory health end-points, but the extent to which the adverse health impacts are due specifically to diesel exhaust exposure, as opposed to PM and gaseous pollutants from all sources, is uncertain."* (emphasis added)

2. Health effects and linear dose-response relationships from exposure to low levels of diesel exhaust have not been established.

The HBA does not specifically state the magnitude of reduction in annual DPM air concentrations that would result from the annual DPM reductions that were cited, although it appears to be as low as 0.004 $\mu g/m^3$ in 2007 to 0.1 $\mu g/m^3$ in 2025. Calculations made in the HBA appear to depend on the concept that the dose-response relationship between fine particulate exposure and mortality effects is linear regardless of dose, even at very low levels of exposure. However, Lloyd and Cackette, (2001) note that "Results from animal studies suggest that there may be a threshold of exposure to diesel exhaust below which adverse structural and biochemical effects may not occur in the lung...." Also, Commentary by the HEI Health Review Committee which is attached to the Krewski et al. reanalysis notes that "In the ACS study, the Reanalysis Team tested whether the relationship between ambient concentrations and the mortality was linear. They found some indications of both linear and nonlinear relationships, depending upon the analytic technique used, suggesting that the issue of concentration-response relationships deserves additional analysis."

The Commentary also noted unexplained city-to-city variations and concluded: "Because the reason for this residual city-to-city variation is not understood, the possibility that the reported associations between air pollution and mortality could be decreased or increased by other, unmeasured, variables cannot be excluded." It was also noted that relative risks of mortality were significantly associated with education in both the Six Cities and ACS studies with a "near absence of statistically significant associations among the more highly educated." The reason for this confounding effect is unknown but clearly introduces another level of uncertainty in extrapolating these results to other populations.

The studies which were reanalyzed by Krewski et al. reported mortality risk ratios for fine particulate differences between the city with the highest fine particulate level vs. the city with the lowest fine particulate level. This difference ranged between 18.6 and 24.5 $\mu g/m^3$. For the Six Cities study, the differences in mortality ratios between the other city comparisons besides the two with the highest and lowest fine particulate concentration were not significantly different at a 95% confidence interval. Review of the published data shows that death rates per 1000 for each city did not correlate well with the fine particulate concentration at smaller differences (see graph below). In fact, there was essentially no change in mortality rates between Watertown and Harriman which had fine particulate levels of 14.9 and 20.8 µg/m^3, respectively. Based on the current estimated fine particulate level in the South Coast area of about 18 µg/m^3, this data does not support the conclusion that a decrease in the diesel $PM_{2.5}$ level of only 0.1 µg/m^3 or less would affect mortality rates.



Data derived from Dockery et al., 1993, Table 1, p 1755

In the Six Cities study, a simple standardized mortality rate was not reported for each city but instead was calculated as a combined adjusted mortality rate which factored in age, sex, smoking, education, and body-mass index using a Cox proportional-hazards regression model and then correlated with fine particulate level. The HEI Commentary, specifically noted that the Six Cities study was based on only six city-wide data points and is not sufficient to determine regression coefficients. The commentary did note that "the more appropriate approach would have been to calculate standardized mortality rate ratios for each city and to simply list them together with the other characteristics of the six cities." Despite this limitation, when looking at the crude death rates, it is apparent that the data are not sensitive enough to discriminate risk levels between fine particulate level differences of a few µg/m^3 or less.

Similarly, review of the ACS study shows a plot of all 50 cities in relation to fine particle concentrations (see Figure 2 from Pope et al. below). Although a regression coefficient is calculated of 8.0 deaths/year/100,000 persons per µg/m^3 of fine particulate, it is apparent from visual examination of the data that the relationship between adjusted mortality and fine particle

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concentration is quite variable in the concentration range of 10-15 μg/m^3 for fine particulates with wide variations in adjusted mortality rates at even the same concentrations (see circled data below).

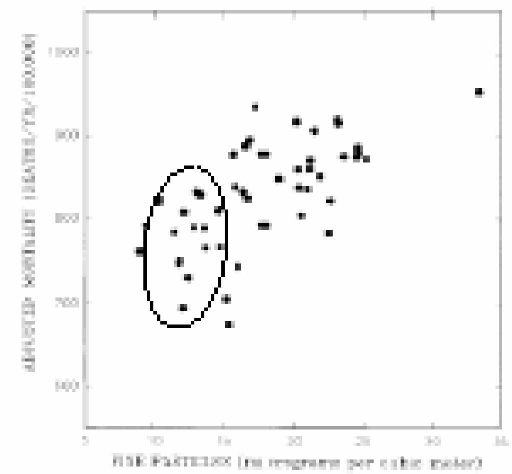

Figure 3. Age-, sex-, and race-adjusted population-based mortality rates for 1980 plotted against mean fine particulate air pollution levels for 1979 to 1983. Data from metropolitan areas that correspond approximately to areas used in prospective cohort analysis.

From Pope et al., 1995, p 672

Thus, assumptions regarding linearity of response to diesel particulate in the draft document that were used to determine the number of premature deaths secondary to diesel particulate cannot be supported by the data referenced for small changes in fine particulate levels.

We would also note that the association of increased mortality from diesel exhaust exposure has not been established in experimental animal studies at exposure levels many times higher than 1.8 μg/m^3. Lloyd and Cackette noted after review of animal studies that "Evidence for associations between diesel exposure and noncancer deaths is equivocal." For example, the Mauderly et al. (1996) study they cited exposed rats and mice to 350-7100 μg/m^3 of diesel exhaust for 7 hours/day, 5 days/week for two years and showed no consistent exposure-related increase in mortality. These levels of exposure are far in excess of 1.8 μg/m^3 being cited as associated with increased mortality in humans.

3. The assumption in the HBA that a given reduction in diesel exhaust emissions results in identical reductions in population exposure regardless of where the emissions occur is unfounded.

The authors of the HBA have used a relatively simplistic analysis to determine the effect of diesel exhaust on mortality. They cite Lloyd and Cackette, 2001, and conclude that the statewide diesel $PM_{2.5}$ emission inventory corresponding to the state-wide population-weighted average DPM concentration of 1.8 $\mu g/m^3$ was 28,000 tons per year (tpy). The authors also noted that a $PM_{2.5}$ exposure of 1.8 $\mu g/m^3$ results in a mean estimate of 1,985 premature deaths per year in California. The authors then simply divide the 28,000 tpy figure by the number of deaths (1,985) to determine that 14.11 tons per year of diesel $PM_{2.5}$ results in one death. This simplistic assumption is based on the premise that 14.11 tpy of diesel exhaust will have the same impact on the population-weighted average DPM air concentration no matter where in the state the emission occurs. There is no adjustment regarding the location of diesel exhaust release, the time period of release, meteorologic conditions, location of potential receptor populations, or other factors which would be considered in an exposure assessment. They thus assume that the same amount of diesel exhaust emitted in a downtown area would result in the same air concentration as that emitted on a highway in the mountains; or that diesel exhaust emitted in a place with little wind would result in the same air concentration as if it were emitted in an area with high winds. Basic science, logic and existing data contradict this assumption.

Although CTEH does not endorse the simplistic approach used in the HBA of using emissions from a localized source to directly calculate state-wide DPM assumed air concentrations, we will use emissions and air DPM concentrations data to illustrate the flaws in this approach. Following is a table listing DPM air concentrations and emissions for the year 2000 for the five largest air basins in California; San Diego, Sacramento Valley, San Joaquin, San Francisco Bay Area, and South Coast. The "Air/DPM Emissions" Column provides the simple ratio of DPM air concentration ($\mu g/m^3$) per ton of DPM emitted. The "Ratio to South Coast" column normalizes the Air/DPM Emissions ratio for each air basin to that for the South Coast Air Basin.

Comparison of DPM Air Concentrations and DPM Emissions in Five California Air Basins

Air Basin	2000 DPM Air ($\mu g/m^3$)[a]	2000 DPM Emission (tons)[b]	Air/DPM Emission ($\mu g/m^3$ per ton DPM)	Ratio to South Coast
San Diego	1.4	1,748	0.0008009	2.68
Sacramento Valley	1.2	2,249	0.0005336	1.78
San Joaquin	1.3	4,139	0.0003141	1.05
San Francisco Bay Area	1.6	4,221	0.0003791	1.27
South Coast	2.4	8,024	0.0002991	1.00

a – From 2005 California Almanac of Emissions and Air Quality, Appendix C found at http://www.arb.ca.gov/aqd/almanac/almanac05/appc05.htm
b - From 2001 California Almanac of Emissions and Air Quality found at http://www.arb.ca.gov/aqd/almanac/almanac01/appb01.htm

These data demonstrate that there is almost a 3-fold difference in the ratio of DPM air concentration per ton of DPM emitted in these five air basins. Thus, a simplistic analysis assuming a fixed reduction in DPM air concentration per ton reduction in emissions, regardless of where the emissions reductions occur, is not supported by these data.

The fallacy of the HBA approach can also be seen by comparing $PM_{2.5}$ emissions and air concentrations in the South Coast Basin with DPM emissions and air concentrations for the same period. Data for the year 2000 reveal that the DPM air concentration for the Basin that year (2.4 µg/m^3; 2005 California Almanac of Emissions and Air Quality, Appendix C) comprises only 11% of the $PM_{2.5}$ air concentration (22.3 µg/m^3; CARB, 2002, Table 6-8), while the DPM emissions (8,024 tons; 2001 California Almanac of Emissions and Air Quality) comprises 20% of the total $PM_{2.5}$ emissions (40,515 tons; 2001 California Almanac of Emissions and Air Quality). Thus, diesel emissions in the South Coast Air Basin comprise a proportionately lower contribution to basin-wide $PM_{2.5}$ air levels than would be indicated by a simplistic analysis of emissions.

In reality, the impact of localized emission reductions on population-weighted average air concentrations should be determined through air dispersion modeling that estimates off-site air concentrations in relation to receptor populations, and/or through actual air monitoring in the potentially impacted areas. For example, any modeling of the ports would have to take into consideration the fact that a very high percentage of the time, the wind in the port areas is blowing away from the heavily populated areas (see attached figure for 2004). Both of these approaches (i.e., air modeling and air monitoring) are available, and appropriate, for application to the task at hand, i.e., estimating actual population exposure impacts of proposed future emissions reductions. Unfortunately, neither of these has been relied upon thus far. The use of air monitoring and air modeling results would be consistent with the U.S. EPA methodology applied in its calculations of the benefits and costs of the 1990 Clean Air Act Amendments (U.S. EPA, 1999).

4. Methods of mortality rate calculations in the HBA are not appropriate or defensible

We would note that the methodology used to calculate the 1,985 deaths from a DPM air concentration of 1.8 µg/m^3 is not described in Lloyd and Cackette, 2001 or in the HBA. However, based on information presented in the HBA, premature deaths were calculated as: (tons PM in area) x (1,985 premature deaths in CA/28,000 tons PM per year in CA).

It does appear that the state-wide mortality estimate (1,985 deaths) is based on exposure to the population-weighted average DPM level, while the DPM emissions value is simply the state total. From this value, the deaths per ton of DPM emitted was calculated (i.e., [1985 premature deaths/total population of California]/28,000 tpy emitted in California]). In our opinion, it does not appear to be appropriate to apply the figure of 1,985 deaths/28,000 tpy to a subpopulation of the state unless it is standardized by the baseline population on which it was calculated. We have already stated our criticisms of the use of the emissions in a given location to predict changes in DPM air concentrations. However, if one accepts the assumptions used for calculating premature deaths in general, assuming the baseline population of California is 30 million, the appropriate calculation to determine the number of premature deaths in a subset of this population would be (tpy reduced per year/28,000 tpy) x (subset population) x (1,985/30 million). Without this standardization, the calculation could be applied to any group and give the same result. Thus, it inaccurate to apply the rate of 1985/28,000 tpy to a subset population since it is not a true population rate. This results in an overestimate of the number of deaths based on simple arithmetic calculations alone. In short, the methods and data used to calculate the premature mortality estimates should be described in detail in order to determine the validity of these estimates.

5. The HBA ignores regulatory guidance for human health risk assessment, and conclusions regarding safe levels of diesel exhaust exposure.

As noted previously, the authors of the HBA have concluded that the statewide diesel emission inventory corresponding to the state-wide population-weighted average DPM air concentration of 1.8 µg/m^3 was 28,000 tons per year (tpy). The authors also concluded that a DPM concentration of 1.8 µg/m^3 resulted in a mean estimate of 1,985 premature deaths per year in California, and a varying number of other individuals experiencing other specific adverse health impacts. To take this a step further, using the HBA rationale, one could then conclude that if a DPM air concentration of 1.8 µg/m^3 results in 1,985 deaths, then a level of 0.0009 µg/m^3 will cause one death (i.e., 1.8/1985). Obviously, this is an implausible assumption and completely ignores the concept of dose-response and threshold effects for non-cancer effects. Even lower estimates can be determined for asthma attacks (0.00004 µg/m^3), lost work days (0.000004 µg/m^3), and minor restricted activity days (0.0000008 µg/m^3).

In contrast, the Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency (CalEPA) has developed methodology for performing risk assessments for chemicals and chemical mixtures that present potential chronic noncancer health effects. According to OEHHA, a risk assessment includes a "comprehensive analysis of the dispersion of hazardous substances in the environment, the potential for human exposure, and a quantitative assessment of both individual and population-wide health risks associated with those levels of exposure" (OEHHA, 2000). In order to perform the "quantitative assessment" for noncancer agents, OEHHA has described a methodology consistent with recommendations of both the National Academy of Sciences (NAS) and the U.S. EPA to develop chronic "reference exposure levels," or RELs. The REL is defined as "the concentration, at or below which no adverse health effects are anticipated in the general human population," and is to be based on "the most sensitive relevant adverse health effect reported in the medical and toxicological literature." Furthermore, according to the OEHHA methodology, RELs are designed to protect "the most sensitive individuals in the population" by the inclusion of margins of safety that account for diversity within human populations and for uncertainty related to the applicability and completeness of the available data (OEHHA, 2000).

The U.S. EPA has developed a similar methodology for assessing chronic noncancer health risks, and refers to the resulting toxicity parameter as the "Reference Concentration," or RfC. The RfC is also defined as, *"An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime."*

In 1998, OEHHA developed an REL for diesel particulate matter (DPM) of 5 μg/m^3. In 2002, the U.S. EPA finalized the Health Effects Assessment Document for DPM outlining the rationale for its RfC, which is also set at 5 μg/m^3. Regarding the RfC for DPM, the U.S. EPA notes that it is "an exposure level of DE (measured as DPM) to which humans may be exposed throughout their lifetime without experiencing any adverse noncancer health effects (USEPA, 2002). CARB has adopted the OEHHA REL for DPM, which can be found in the "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values at http://www.arb.ca.gov/toxics/healthval/healthval.htm.

Unfortunately, in addressing the Ports of Los Angeles and Long Beach, CARB and SCAQMD appear to have ignored the State's own methodology for assessing risks in the State of California for noncancer health effects. They have NOT performed a "comprehensive analysis of the dispersion of hazardous substances in the environment," or assessed "the potential for human exposure," and they have ignored their own REL and the U.S. EPA RfC for diesel particulate matter. Instead of reassuring the public that at airborne concentrations of diesel exhaust below 5 μg/m^3 "no adverse health effects" are anticipated even with a lifetime of exposure, they have implausibly stated that in just one year, an air concentration of 1.8 μg/m^3 will kill 2,000 people, and cause 44,000 asthma attacks, 410,000 work loss days, and 2.2 million minor restricted activity days (MRAD).

During the NNI Task Force Financial Working Group meeting held on June 8, 2005, during which Dr. Goad participated by phone, members of CARB indicated that their approach to the potential health effects of DPM were predicated on the assumption that when $PM_{2.5}$ air concentrations are in excess of the California Ambient Air Quality Standard (12 μg/m^3) for this pollutant, it is appropriate to consider DPM as exerting toxic effects, regardless of its concentration in the air. Using their logic, if the average $PM_{2.5}$ air concentration is 13 μg/m^3, and the DPM concentration is 1 μg/m^3 (i.e., 5 times below their REL), they would estimate that the DPM would cause 1,103 premature deaths each year (1.0/1.8 x 1,985). However, if the average $PM_{2.5}$ air concentration was 12 μg/m^3, and the DPM concentration was 1 μg/m^3, the DPM would cause "no adverse health effects." Thus, no matter how low the DPM concentration is in a given area, if that area is in nonattainment for $PM_{2.5}$, any level of DPM will be considered to result in adverse human health effects. The conclusion from their methodology must be that if any area has $PM_{2.5}$ air concentrations greater than 12 μg/m^3, the only "acceptable" level of diesel exhaust is zero.

CARB's Uncertainties and Limitations Discussion

We agree that an open discussion of uncertainties and limitations in data, methodology and conclusions is a critical component of a valid risk assessment. However, the limited discussion recently provided by CARB falls far short of addressing the critical deficiencies of HBA. In addressing the uncertainties regarding concentration-response (CR) functions, CARB's discussion focuses solely on the applicability of the studies cited in Krewski et al. (2000) to the State of California overall. They have not addressed what we have indicated above to be a major uncertainty in their analysis, i.e., applicability of these studies regarding the supposed health impacts of $PM_{2.5}$ emissions from multiple unidentified sources and to the estimation of the health impacts of very low levels of DPM. Regarding thresholds, CARB notes that "Many of the studies were conducted in areas with fairly low concentrations of ambient PM..." They fail to state, however, that the CR functions derived from these studies were based on relative risk calculations derived from mortality rates in the city with the highest versus lowest PM concentrations, with the differences ranging between 19 to 25 $\mu g/m^3$. These studies do not, and cannot, address potential health impacts in the 1.8 $\mu g/m^3$ and lower range.

The CARB Uncertainties and Limitations discussion also refers to a number of non-cancer health effects, such as chronic obstructive pulmonary disease, asthma, infant mortality, and others. They conclude by stating "Since we did not make estimates for all possible endpoints, it is likely that we underestimated the health benefits in this analysis." It is our opinion that this type of speculative discussion is inappropriate in a document such as this, and is highly likely to mislead the public into thinking that the adverse health impacts discussed in this section have, in fact, been associated with DPM exposure. In contrast, we would point out the following summary statements found in the U.S. EPA Health Assessment Document for diesel exhaust:

> *"Studies on the acute health effects of DE exposure in humans, experimental and epidemiologic, have failed to demonstrate a consistent pattern of adverse effects on respiratory morbidity; the majority of studies offer, at best, equivocal evidence of an exposure-response relationship."*
>
> *"Most of the epidemiologic data indicate an absence of excess risk of chronic respiratory disease associated with exposure to DE."*
>
> *"Epidemiologic studies of the effects of DE on organ systems other than the pulmonary system are scant. Whereas a preliminary study of the association of cardiovascular mortality and exposure to DE found a fourfold higher risk ratio, a more comprehensive epidemiologic study by the same investigators found no significant difference between the observed and expected number of deaths caused by cardiovascular disease."*
>
> (U.S. EPA, 2002; page 5-95)

How should the Port evaluate potential impacts of future diesel exhaust emission?

To address potential impacts of future diesel exhaust emissions from the Ports, a scientifically-valid risk assessment needs to be performed. The assessment should be consistent with appropriate methodology, and should include the following:

- A toxicity assessment based on scientifically valid studies identifying health affects attributable specifically to diesel exhaust, as opposed to other air contaminants originating from other sources.
- A dose-response assessment based on valid scientific studies that determines the relationship between the level of diesel exhaust exposure and the health impacts resulting from that exposure, including identification of threshold levels below which adverse effects are not anticipated.

- Emissions and air dispersion modeling that estimates actual air concentrations of diesel exhaust particulate matter based on anticipated uses of diesel engines and site-specific weather data.
- An exposure assessment that accounts for population characteristics such as number, location, and activity of potentially exposed people, and likely durations of exposure. This assessment should utilize both air dispersion modeling, and available fine particulate monitoring for geographically relevant areas.
- Risk characterization that presents defensible scientifically supportable estimates of risk based on the toxicity assessment and exposure assessment performed for this project. Uncertainties in the methods, assumptions, data, and conclusions should be clearly identified and addressed in the analysis.

Until these steps are taken, CARB and SCAQMD should refrain from publishing premature and unfounded conclusions regarding health impacts of emissions from the Ports of Los Angeles and Long Beach.

Respectfully submitted,

Phillip T. Goad, Ph.D.
Partner and Senior Toxicologist

David J. Hewitt, M.D., M.P.H.
Director Occupational Health Services

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June 18, 2005

VIA E-MAIL

Commissioner Camilla Townsend
Commissioner Thomas Warren
Los Angeles Board of Harbor
Commissioners
Port of Los Angeles
425 S. Palos Verdes Street
San Pedro, CA 90731

Re: Comments on Estimation of Health Benefits

The Financial Working Group has prepared a report that attempts to provide a monetary estimate of the health benefits associated with implementation of the control measures identified by the No Net Increase Task Force and to do so in a form that can be compared to the costs of the NNI control measures. The report was prepared by the Air Resources Board and uses a methodology previously used by the United States Environmental Protection Agency as well as the ARB and other air districts. My purpose in writing this letter is not to object to the inclusion of the health benefits in the final report or to object to the methodology used. Rather, my purpose is simply to comment very briefly on the benefits and how they were derived.

The report calculates that the reduction in NOx and primary PM from implementation of the NNI measures will prevent an estimated 1700 "premature deaths" by 2025. I lack the expertise to question whether this number is correct or even to comment on how it was determined. However, I note that the report contains no definition of what constitutes a "premature death". Does this mean the death of an otherwise healthy person or is it more likely to mean the somewhat earlier death of a very ill or very old person? I do not mean to say that a death is not tragic, or to imply that even a slightly earlier death is not to be avoided if possible, but the issue of what is a "premature death" seems to me to be an important question when considering the value placed on such a death.

The conclusion of the benefits report states that the "health benefits of implementing NNI are very substantial" and estimates that the "total undiscounted health benefits" between 2005 and 2025, in 2005 dollars, are between $11 and $28 billion, with a mean of $20 billion. The conclusion further states that the non-fatal health effects account for only $20 million of the health effect benefits in 2025. Thus, the vast majority of the $20 billion number is due to the premature death calculation. This makes it very important to understand the methodology used for determining the value of a premature death.

The report states that it used a value of "$4 million at seven percent discount rate, and $6 million at three percent" of avoiding one premature death. These numbers were based on EPA studies, which had been adjusted for inflation. The Financial Working Group requested more information on how the $4-6 million valuation numbers were developed, and the ARB provided a document entitled "Value of Premature Deaths Avoided". That document, which is now part of the report to the task force, states that the value is the "mean estimate from 5 contingent valuation studies and 21 wage-risk studies." A footnote explains that "[c]ontingent valuation studies pose a market situation to survey respondents, *who are asked how much they would be willing to pay for alternative levels of safety*" and "wage-risk studies look at comparisons between different jobs in terms of wages and risks of death on the job." Footnote 1.

We do not know the questions that were asked in these studies, but it is not difficult to imagine the different responses that one would get based on how the question is asked. For example, if a person is asked the open-ended question "What would it be worth to avoid a premature death from air pollution" you might get one answer. If the same person were asked "Assume you had $10 million, how much would you spend to avoid a premature death from air pollution" the answer would be very different. The person might ask "What do you mean by a premature death" and make very different choices depending on the definition and if they felt they were spending their "own" money rather than being asked an abstract question. Unfortunately, the report just doesn't provide much information on these very important issues.

June 18, 2005
Page 3

Lastly, ARB states that the report may underestimate the health benefits because they did "not quantify all possible health benefits that could be associated with reducing diesel PM exposure." This is an accurate statement to the extent that not all health endpoints were evaluated. However,. it is equally accurate to say that the health benefits may be greatly overstated if you do not agree with the methodology for the "premature death" calculation.

Very truly yours,

Sharon Rubalcava

Sharon Rubalcava
WESTON BENSHOOF
ROCHEFORT RUBALCAVA & MacCUISH LLP

SFR/

Natural Resources Defense Council

The Natural Resources Defense Council (NRDC) and the Coalition for Clean Air (CCA) commend the California Air Resources Board (ARB) for its efforts to calculate the public health benefits associated with achieving the goal of No Net Increase (NNI). We strongly believe that it is absolutely imperative that these estimates be included in the final NNI submittal to the Mayor.

As has been discussed during multiple Financial Working Group meetings, these estimates are based on a vetted methodology and years of research by state and national regulatory agency experts. Furthermore, these figures are the first representation of what community members and members of the NNI Task Force have been asking for since the outset of this effort.

As we all know, the entire purpose of the NNI Task Force is to address the significant particulate matter (PM) and smog-forming emissions resulting from port operations which directly affect the health of workers and residents of nearby communities. The adverse health effects from exposure to air pollution generate high costs resulting from hospital visits, asthma attacks, lost work days and even premature deaths, just to name a few. Diesel pollution in particular from the ports' trains, ships, cargo handling equipment and trucks poses significant risks to local residents, including cancer and heart disease. Cancer clusters reported by USC to be statistically significant in the Los Angeles area should alarm us all. Other studies have shown that the health impacts from diesel pollution exposure alone cost Southern California over $10 billion last year.

The health benefits resulting from implementation of the NNI plan, which, over time, exceeds one billion dollars annually, further help justify the costs associated with trying to reduce air pollution from port operations in our region. If the NNI plan is not implemented, communities adjacent to the Port of Los

Angeles' operations, including associated railyards and transportation corridors, will continue to bear the brunt of the health impacts and associated costs. In effect, residents throughout our region will continue to subsidize the movement of goods.

Additionally, we understand the inherent uncertainties that surround such a valuation and believe ARB has done a good job of documenting these in its most recent updated drafts. As ARB staff has stated, these uncertainties are accounted for and captured in the significantly large confidence interval that bounds the mortality and non-morality estimates. We recommend including a summary table that includes both mortality and non-mortality estimates combined. Additionally, we do have the concern that asthma cases may be underestimated. It is unclear whether asthma prevalence captures not only visits to the hospital or a school nurse but also diagnosis by a pediatrician. This could result in a significant underestimation of asthma attacks.

Finally, as NRDC, CCA, ARB and others have repeatedly emphasized, although the calculated public health benefits appear high, the proposed figures are underestimated. As ARB has noted in its updated draft, several health and non-health benefits that would result from achieving NNI were not included in the study. For example, health consequences from ozone exposure and other adverse health effects from PM exposure, such as respiratory illnesses, chronic respiratory diseases, low birth weight, and allergic responses, were not included in the valuation. Furthermore, NNI would avoid some non-health related costs, including reduced visibility from smog, climate change and its effect on the economy, noise and traffic congestion, and adverse effects on other organisms and ecosystems.

These non-quantified impacts should be explicitly stated and addressed in a future iteration of this analysis. Additionally, the current ARB analysis should explicitly state that these benefits only capture those from achieving NNI. These health impact figures do not account for the public health impacts which will be incurred until the 2001 baseline is achieved. Similarly, ARB's analysis does not capture the public health impacts that communities will continue to suffer even when 2001 baseline levels are achieved. ARB should clearly articulate these points in their analysis.

Thank you again for the opportunity to provide comments on this critical element of the NNI plan.

Noel Park

SAN PEDRO AND PENINSULA HOMEOWNERS' COALITION

Member Associations

Averill Park · Barton Hill · Casa Verde Estates · Downtown Residents · La Rambla · Leland Park
Palisades · Palos Verdes Shores · Peck Park/Holy Trinity · Point Fermin · Rolling Hills Riviera
San Pedro Homeowners United · South Shores · Vista Del Oro · Westmont No. 4

P.O. Box 1106, San Pedro, CA 90733
(310) 832-5720 (evening) (562) 804-5205 (day) Fax (562) 804-5210

June 18, 2005

Comments on the No Net Increase Task Force Financial Committee discussions of June 16, 2005

Via e-mail to Ms. Julie Means at *jmeans@portla.org*

To frame our comments, we are enclosing two documents.

The first is a press release, dated October 10, 2001, in which Harbor Commission President Nicholas G. Tonsich is quoted as saying that, "The Board is proud to establish this new environmental policy which sets as a goal that there will be no net increase in air emissions or traffic impact from future Port operations".

The second is page 1 of the minutes of the October 7, 2004 "No Net Increase/Air Quality Task Force", in which Deputy Mayor Doane Liu is quoted as saying that "...No Net Increase means if the Port wants to grow, it cannot create any more pollution than we have now. This restart is very important to the Mayor. In understandable terms, it is not going to cost our health for the Port to grow."

Based upon the above, we find that the document "NNI Financial Committee, Funding Of Non Regulatory Measures, Discussion Items For Committee", dated 6/3/05, is non-responsive and inappropriate to the above stated policy of the Port. The mission of the Port staff is to find the means, and devise a plan, which will achieve the Port's stated policy, "No Net Increase", not to make up excuses and cover stories for why it cannot be done.

This document, and its accompanying presentation, are filled with statements such as "Port does not have financial capacity to meet NNI obligations, even under optimistic operating conditions." Clearly, this is not true. The cost forecasts presented are all based upon the huge growth projections, essentially a quadrupling of throughput between 2001 and 2025 forecast by the Port. If the Port cannot devise ways to control the emissions created by this massive growth, it is clearly obligated to scale back the growth to a level under which the emissions can be controlled. There must be a tradeoff between the billions of dollars planned to be spent for additional Port infrastructure to promote and support growth, and the necessary cost of pollution control. This is clearly and unequivocally stated in Deputy Mayor Liu's remarks.

We reject this document in its entirety. We suggest that the Port staff must go back and analyze the tradeoffs between growth inducing capital expenditures and pollution controls, to determine the amount of growth which can be accommodated while making absolutely sure that, in the words of Deputy Mayor Liu, "it is not going to cost our health".

Comments on NNI Task Force Financial committee meeting of June 16, 2005, Page 2

As to the document "Estimation of the Health Benefits Associated with the Reductions of Diesel PM Emissions", prepared by the California Air Resources Board (CARB), we take the strongest possible exception to the suggestion that this document might be excluded from the Task force's final report.

As we have said, both at the last Task Force meeting, and at the June 16 meeting, these findings are based upon generally accepted methodology, used regularly by both the CARB and the United States Environmental Protection Agency (USEPA). In addition, these findings have been supported by the South Coast Air Quality Management District (SCAQMD). The agencies are among the foremost authorities in the world on air pollution matters. To try to exclude this information, based upon a call for more studies, is, in our view, nothing more than obfuscation.

We certainly agree that there is a need for more studies of this issue. We direct your attention to the final page of the report "Unquantified adverse effects". In addition to this discussion, we direct your attention to the paper "Health Effects of Diesel Exhaust Air Pollution", by Task Force member John Miller, MD, dated August 28, 2003. This document has been previously distributed to the Task Force, and was cited and quoted from at the last full Task Force meeting. We would also direct your attention to the documents presented at the town meeting "Growing Pains: Health and Community Impacts of Goods Movement and the Ports", presented by the Southern California Environmental Health Sciences Center (SCEHSC), a joint venture of the USC and UCLA Schools of Medicine, February 25 and 26, 2005. These documents describe even more and more frightening health impacts in addition to those identified by Dr. Miller.

CARB states, in the above referenced document, "However, since we did not make estimates for all possible endpoints, it is likely that we have underestimated the health benefits in this analysis." In the face of all of the research referenced above, we have no doubt whatsoever that this is true. WE believe that, in the fullness of time, the cost over the 20 year period analyzed by CARB will prove to be more on the order of $40 to $50 billion than the $20 billion calculated by CARB.

Time is of the essence, however. People are being made ill today, and many are dying. It is absolutely wrong to go on expanding this menace, while calling for "more studies". The City of Los Angeles has an absolute responsibility to protect the public health. These control measures must be implemented immediately, and further studies done concurrently.

The public, the Mayor, and the Harbor Commission, have an overriding need for this information. The public health is at risk. We demand that this report be included in the final report of the Task Force. Anything less will end up being counterproductive for the Port and its tenants. As we said at the June 16 meeting, the press has this report. Leaving it out of the Task Force report will only give the appearance of a cover up of this huge public health risk, and generate the resulting negative and counterproductive press coverage, while the public gets the information anyway in the end.

NEWS

425 S. Palos Verdes Street
San Pedro, CA 90731
Tel: 310/732-3508
After 5:00 p.m.:
310/732-3500

October 10, 2001

CONTACT: Julia Nagano/Dennis McCarbery
(310)732-3508

SUBJECT: BOARD OF HARBOR COMMISSIONERS IMPLEMENTS HISTORIC ENVIRONMENTAL POLICY

The Los Angeles Board of Harbor Commissioners, acting on the request of Mayor Jim Hahn to maintain and enhance the quality of life of residents of the harbor area, today adopted a historic environmental policy regarding Port of Los Angeles operations and future mitigation measures.

"The Board is proud to establish this new environmental policy which sets as a goal that there will be no net increase in air emissions or traffic impact from future Port operations," said Commission President Nicholas G. Tonsich. "This policy will be carried forward in conjunction with the soon to be established Port Community Advisory Committee."

In announcing the new policy, Commissioner Tonsich announced he is directing staff "to return to the Board within 60 days with a plan and schedule to carry this program forward."

Port staff was directed to conduct seven sperate environmental studies. They are:

- Conduct baseline air emission inventory of the Port area focused on diesel particulates.
- Conduct baseline traffic studies with an emphasis on intersections of critical importance to the communities of San Pedro and Wilmington, and coordinate this effort with the Los Angeles Department of Transportation and CalTrans.
- Evaluate the effects of air emissions, particularly diesel particulates, from Port operations on the local communities and coordinate with appropriate regulatory agencies to define the methodologies.

--- more ---

- Identify effects of Port operation on the environment of San Pedro and Wilmington including but not limited to effects on water quality, transportation, lighting, aesthetics and other community quality of life issues.
- Identify real measures that will reduce the air emissions from Port operational activities.
- Further, staff should identify a plan to implement a program that will provide for quantifiable reductions in diesel particulate emissions from Port operations
- An finally, staff is directed to provide a report which identifies facilities at the Port which may pose a risk to the community and document and distribute an evacuation plan for the community, in coordination with the Fire Department and other local, state and federal agencies with authority in this area.

The Board of Harbor Commissioners directed staff to prepare the seven studies so that they may be provided to the Port's Community Advisory Committee (PCAC) for review by the PCAC and its panel of independent experts (the panel requested by Councilwoman Janice Hahn). Two of the seven studies which deal with air and traffic will be used to establish baselines to ensure the Port achieves the mayor's goal of maintaining and enhancing the quality of life, Commissioner Tonsich said.

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newsrela

No Net Increase/Air Quality Task Force
Sheraton Hotel LA Harbor Hotel
601 S. Palos Verdes St., Salon C
San Pedro CA 90731
Thursday, October 7, 2004
9:30am-2:30pm

CO-CHAIRPERSONS COMMISSIONER CAMILLA TOWNSEND AND COMMISSIONER TOM WARREN PRESIDED.

ATTENDEES

Refer to attached sign-in sheet.

1. Welcome and Introductions – Camilla Townsend

Board Commissioner Townsend opened the task force meeting. Thanks Mayor Hahn for starting Task Force. Introductions were then made around the table (see sign-in sheet). Peter Gardiner is the facilitator.

2. Welcome, Opening Remarks and Charter – Doane Liu

Deputy Mayor Doane Liu stated that Mayor Hahn backs "No Net Increase". He went on to say, that No Net Increase means if the Port wants to grow, it cannot create any more pollution than we have now. This restart is very important to the Mayor. In understandable terms, it is not going to cost our health for the Port to grow. The Mayor is very appreciative of the commitment of task force members.

3. Identify/Confirm Meeting Protocol and Meeting Dates – Peter Gardiner

- Decision Making

  Due to the number of task force members, Facilitator reserves the right to limit speaking times. Three easels will also be used to keep notes on items of agreement, items that need more information, and items that are loose ends.

- Record Keeping

  Minutes will be taken by Port staff and will be approved at next meeting. Will also circulate draft minutes to attendees prior to the next meeting.

- Meeting Dates

  Six meetings are scheduled with two meetings a month, concluding at the end of the year. The task force will prepare a draft plan. Public meetings can address the draft created from the meetings. Additional members will not be added to the task force. Port of Long Beach would be asked to come and observe.

NRDC

We again commend the tremendous effort that has gone into development of these control measures; however, we wanted to raise some general and specific concerns given the additional information that has been incorporated into the cost documentation since our last comment letter to the Financial Working Group (FWG) on May 12th.

Based upon our review, we have the following general comments followed by specific concerns on each measure:

GENERAL COMMENTS

We have a number of overarching concerns that impact the substantive discussion of the document:

1) *The cost documentation should explicitly address and separate measures that are already mandatory due to regulation, MOU or other agreements. These costs should not be included in the costs to achieve 'No Net Increase' (NNI) since they are slated to be incurred independent of this plan. It is misleading to include costs of compliance or regulations, which could be interpreted as necessary to achieve NNI.*

2) *Currently, significant capital outlays are not amortized over time. For example, OGV14 has one time capital outlays in 2010 and 2015 of over $500 million. These outlays do not reflect the fact that the costs will likely be spread out over time into the future.*

3) *In any cost summary tables, it should be noted that currently three measures account for over two-thirds of the cost. Additionally, these measures have very tentative costs associated with them which should be prominently noted.*

4) *In cost summary tables, it should be noted that a third of the costs are currently incurred in 2023 and beyond. Given significant outlays will occur after 2022, decision makers should have the opportunity to plan investments in advance, identify funding opportunities and prepare budgets.*

5) *As was presented on the first page of the 'Cost Summary' document, we agree costs should be broken out in five year increments. We would also recommend that for each five year increment percentage reductions in PM and NOx be included. Note that by 2010, the NNI achieves approximately 50% annual reductions in PM and NOx based on $450 million in non-regulatory/compliance costs over the first five years.*

6) *It is our understanding that several regulatory rules currently under development will require portions of certain measures to occur as compliance. Therefore, those measures should have discounted costs to account for compliance.*

7) *Given the inherent uncertainties in projecting costs far into the future, a range of costs should be provided for each measure. Costs are dependent on a vast number of variables and presenting a single point estimate for annual costs is misleading.*

8) *The current cost documentation contains a number of measures without cost estimates. We strongly recommend that any additional cost measures be distributed no later than Wednesday of this week to allow for sufficient time for review.*

9) *Many of the measures cover similar programs with overlapping costs. These overlapping costs must be quantified and subtracted from the total NNI costs. We have highlighted individual measures where double counting may be occurring.*

10) *As described in our previous comment letter to the FWG, we wanted to reiterate three general concerns (please reference our May 12th letter for a more detailed explanation):*
    a. *The calculations currently proposed separate PM and NOx emission reductions in terms of cost effectiveness for each proposed mitigation measure. This practice is problematic because it does not truly capture the full benefit of implementing a measure simultaneously reducing PM and NOx. Furthermore, as suggested under the current Carl Moyer guideline update, we strongly believe that a cost-benefit equation that evaluates both PM and NOx reductions should at least account for the weighting factor of 10 attributable to PM health impacts as compared with NOx.*
    b. *We would like the cost-basis document to clearly emphasize that the past Carl Moyer threshold for cost-effectiveness should not be relied upon going forward, particularly given the magnitude of the public health impacts from port operations and the Mayor's directive to achieve a No Net Increase in air pollution from the Port of Los Angeles. Ultimately, all these measures are necessary to achieve the NNI goal to begin the process of protecting regional public health.*
    c. *By relying solely on the Port of Los Angeles' Emissions Inventory's assumptions and emission figures, we have significant concerns that the emissions associated with OGV hotelling operations has been significantly understated. We recommend that these concerns be explicitly noted for each of these measures.*

SPECIFIC COMMENTS ON CONTROL MEASURES

Our concerns over specific assumptions and estimates made in individual measures are detailed below.

Ocean- Going Vessel (OGV) Measures

OGV2 – Vessel Speed Reduction (VSR) Memorandum of Understanding (MOU)

- *There is no detail or source listed for the estimate of $3,000 per vessel per hour. Additionally, this figure is inadequately representative given that it is only from one shipping line.*
- *This measure appears to be calculating costs for 'delayed hours'. These costs are speculative given a ship's ability to adjust speed outside of the 20 mile boundary and a shipping lines' ability to adjust for shipping arrival times.*

OGV3 – Alternative Marine Power (AMP)

- *It is our understanding that the port is willing to pay up to $810,000 per ship retrofitted. Given China Shipping's cost of $320,000 per vessel and other vessels such as cruise ships that have incurred retrofit costs of less than $500,000, it should not be assumed that AMP retrofits will cost the full $810,000. At the very least, a range in costs should be provided to capture this difference.*
- *Additional documentation is needed to support the $1.5 million estimate of cost to the port.*
- *It is unclear what the operational costs are based on. ARB, as part of their cold-ironing feasibility study, currently estimates 3 laborers per shift.*
- *As we have previously commented on a number of occasions, the hotelling emissions from auxiliary engines may be significantly underestimated. We recommend that this note be included in both the measure description document as well as in the cost document. We would also like this note to be incorporated in the other measures as appropriate.*

OGV4 – Auxiliary Engine Fuel Improvement Program

- *Given the unpredictability in fuel costs, relying on costs from the 1st quarter of 2005 is limiting. We do not believe it is appropriate to use only this data point and extrapolate costs based on this figure 20 years into the future. This measure should at the very least capture a range in costs. We recommend using the 3-year average as a more representative cost premium.*
- *Also, as previously stated in our comment letter to the FWG (5/12/05), in anticipation of EU adoption and current CARB rulemaking, supply of lower sulfur marine fuels should increase, potentially resulting in a decrease in costs. This point should be noted in the cost basis documentation.*
- *We recommend noting fuel usage in the cost basis documentation to support the operating cost figures.*

OGV7 – Low Emissions Main Propulsion Engines

- *Our estimates for SCR range from $260,000 to $1.2 million, as documented in our August 2004 report, Harboring Pollution: Strategies to Clean Up U.S. Ports (Harboring Pollution)[7], and are far lower than the $1.97 million included in this measure.*
- *Capital estimates for SCR and Man B&W should take into account the volume discounts that would apply given the large number of orders.*
- *Additionally, given that equipment is slated for purchase for at least 15 years, are these costs anticipated to remain constant for this technology into the future?*
- *The equipment life appears to be too low.*

OGV8 – Cleaner Fuels for Auxiliary Engines & OGV 11 – Expanded Auxiliary Fuel Improvement Program

- *As recommended under OGV4, given the unpredictability in fuel costs, relying on costs from the 1st quarter of 2005 is limiting. We do not believe it is appropriate to use only this data point and extrapolate costs based on this figure 20 years into the future. This measure should at the very least capture a range in costs. We recommend using the 3-year average as a more representative cost premium.*
- *It should be noted in the cost analysis for this measure, what proportion of vessels would be switching from IFO 2.7% to MGO versus MDO to MGO.*
- *Also, as previously stated in our comment letter to the FWG (5/12/05), in anticipation of EU adoption and current CARB rulemaking, supply of lower sulfur marine fuels should increase, potentially resulting in a decrease in costs. This point should be noted in the cost basis documentation.*
- *We recommend noting fuel usage in the cost basis documentation to support the operating cost figures.*

OGV9 – Main Engine Fuel Improvement Program, OGV10 – Sulfur Oxide Emission Control Area (SECA) & OGV12 – Expanded Main Engine Fuel Improvement Program

- *As recommended under OGV4, given the unpredictability in fuel costs, relying on costs from the 1st quarter of 2005 is limiting. We do not believe it is appropriate to use only this data point and extrapolate costs based on this figure 20 years into the future. This measure should at the very least capture a range in costs. We recommend using the 3-year average as a more representative cost premium.*
- *Also, as previously stated in our comment letter to the FWG (5/12/05), in anticipation of EU adoption and current CARB rulemaking, supply of lower sulfur marine fuels should increase, potentially resulting in a decrease in costs. This point should be noted in the cost basis documentation.*
- *We recommend noting fuel usage in the cost basis documentation to support the operating cost figures.*

OGV14 – Retrofit/Repower Requirements for Infrequent Callers

- *We want to be sure the capital estimates for the new engines take into account any potential volume discounts that would apply given the large number of orders.*
- *Additionally, given that the equipment is slated for purchase in at least 5 to 10 years, are these costs anticipated to remain constant for this technology into the future?*

OGV15 – Expanded VSR Program

- *There is no detail or source supporting the estimate of $3,000 per vessel per hour. Additionally, this figure is inadequately representative given that it is only from one shipping line.*

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[7] This report is available online at: http://www.coalitionforcleanair.org/reports-harboring-pollution-strategies-to-clean-up-US-ports.html, or http://www.nrdc.org/air/pollution/ports/contents.asp

- *This measure appears to be calculating costs for 'delayed hours'. These costs are speculative given a ship's ability to adjust speed outside of the 40 mile boundary and a shipping line's ability to adjust for shipping arrival times.*
- *Annual reporting costs should not be double counted in conjunction with OGV2.*

OGV16 – Expanded Alternative Maritime Power (AMP)

- *Additional documentation is needed to support the $1.5 million port cost.*
- *Costs should account for economies of scale when multiple 'outlets' will be installed at a given terminal.*
- *Given the $320,000 actual cost to retrofit the China Shipping vessel, $500,000 per ship for all years into the future is high. At the very least a range should be noted.*
- *ARB, as part of their cold-ironing feasibility study, currently estimates only 3 laborers per shift needed for such a program.*

Harbor Craft (HC) Measures

HC2 – Clean Fuels for Harbor Craft

- *This item will be required by regulation and should not be categorized as costs necessary to achieved NNI.*

HC3 – Early Implementation of ULSD

- *As previously stated in our comment letter to the FWG (5/12/05), there is no support for the $0.07 subsidy cost per gallon. ARB's June 2003 Proposed Amendments to California's Diesel Fuel Regulations Document (http://www.arb.ca.gov/regact/ulsd2003/isor.pdf) on page 11 estimates that the costs of reducing the sulfur content of diesel fuel and requiring the fuel to meet minimum lubricity specifications will be about 2 to 4 cents per gallon of diesel.*
- *It is not clear whether fuel consumption estimates account for more efficient engines installed through repowers.*

HC5 – Technical Advisory Committee (TAC) Harbor Craft Measures

- *It is not clear whether or how these costs will be included.*

HC7 – Emulsified Fuels

- *It is not clear whether fuel consumption estimates account for more efficient engines installed through repowers.*

HC9 – Repower Existing Harbor Craft

- *The assumptions behind the estimated $160,000 cost per repower must be clearly stated. For example, incentive programs commonly cover the cost of a new engine. The resale value of the old engine commonly covers most drydock and installation expenses, leaving an overall incremental cost of roughly $50,000, as documented in our August 2004 report, Harboring Pollution.[8]*

HC10 – Harbor Craft Retrofits

- *It is not clear whether some of these technologies are appropriate for use on harbor craft, most notably Lean NOx catalysts.*
- *The costs of some of the retrofit controls have not all been scaled for use on large horsepower engines.*

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[8] This report is available online at: http://www.coalitionforcleanair.org/reports-harboring-pollution-strategies-to-clean-up-US-ports.html, or http://www.nrdc.org/air/pollution/ports/contents.asp

- *The $2,000 cost estimate of a DOC is more appropriate for a bus or truck. In Harboring Pollution, we estimated $50,000 for a DOC scaled for a tugboat, including installation costs.*
- *The $10,000 cost estimate for a DPF is also more appropriate for a bus or truck. We have no estimate for a DPF scaled to a harbor craft and are not sure a DPF would work well on a harbor craft. However, the estimated cost for a DPF should be over $50,000 if it was found to be compatible on harbor craft.*

HC11 – AMP-Ready Staging Areas

- *As of December 2003, according to the Port of Los Angeles, 6 of 12 tugs based at the port had the capability to plug into electrical power while not in use.[9] This should be accounted for in the costs for this measure.*

Cargo Handling Equipment (CHE) Measures

CHE2 - YT Modernization & ULSD

- *The LSD cost of $0.07 per gallon is too high, per comments above.*
- *At least part of the modernization program could be paid for by other incentive fund programs such as Carl Moyer. Further, this measure may be part of compliance with the upcoming CARB CHE ATCM. Therefore costs are overestimated.*

CHE3 - Early implementation of ULSD for non-YT

- *The LSD cost of $0.07 per gallon is too high, per comments above.*

CHE4 - Alternative Yard Tractor Resolution, no cost estimate

- *This measure should include a cost estimate. For example, LNG yard tractors being purchased for use at the YTI terminal at the Port of Los Angeles and at the LBCT at the Port of Long Beach cost roughly $106,000. This is an approximately $40,000 incremental cost to the base off-road diesel without after-treatment. However that cost is likely to be covered by incentive funding programs, such as Carl Moyer.*

CHE5 - Emulsified Fuels

- *This program should not be included as an extra cost specific to NNI since it is an ongoing program already in existence.*

CHE6 - TAC CHE Measures

- *This measure is missing an explanation of the cost. It simply has a $1.75 million cost listed from the port.*

CHE7 - Expanded YT Modernization

- *It is not clear why the level of subsidy varies from 30% to 40% for different phases of this measure.*
- *At least part of this measure would be attributable to compliance of the upcoming CARB CHE ATCM; therefore the overall cost to NNI is over estimated.*

CHE8 - Enhanced CHE Modernization

- *At least part of this measure would be attributable to compliance of the upcoming CARB CHE ATCM; therefore the overall cost to NNI is over estimated.*

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[9] Garrett, T.L. Air Resources Group, Port of Los Angeles, personal conversation on December 8, 2003. As reported in NRDC's and CCA's report "Harboring Pollution: The Dirty Truth about U.S. Ports", March 2004.

Locomotive Measures

R2 - ARB low sulfur Diesel

- *No cost should be included since this measure is only compliance with existing regulations.*
- *The LSD cost of $0.07 per gallon is too high, per comments above.*

R3 - Federal low sulfur diesel for locomotives

- *Again this measure is an existing rule and therefore costs nothing more than compliance.*

R5 - Switcher Modernization (16) and low sulfur diesel until 2007 mandatory deadline

- *The $1.2 million cost for each new Switcher is too high. In Harboring Pollution, we report that a new electric hybrid switcher costs $750,000. The cost may have increased in the past year, but $1.2 million is not a reasonable estimate.*
- *The LSD cost of $0.07 per gallon is too high, per comments above.*

R6 - Ultra-low Emission Locomotives (4)

- *The costs for new locomotives are reasonable: $1.07 million for National Railway Equipment and $783,000 for Railpower, but why invest in new National Railway Equipment locomotives that are one quarter of a million dollars more expensive than the Railpower switchers if both meet the same emission standards?*
- *Costs for the Cleaire Longview retrofit are reasonable at $25,000, but useful lifetime of 8 years appears to be too short.*

R7 - Ultra Low Emission Line Haul and Switch Locomotives

- *The replacement program for 150 new LNG line haul locomotives assumes an inflated cost estimate of $1.7 million per LNG train.*
    - *If 150 new LNG line haul locomotives are deployed, the per unit cost will be much lower.*
    - *The $1.7 million is likely based upon the incremental cost of the 4 LNG locomotives that Hunter & Hunter wants to deploy between the Port and Lancaster, CA. However, this short-line route is probably not typical of the 150 locomotives being discussed in this measure.*
    - *The $1.7 million cost of the Hunter & Hunter project was fully funded through the Carl Moyer program. Similar funding would apply to this measure, covering or at least lowering the cost.*
    - *Energy Conversions Inc. (ECI) reports a cost of roughly $2 million for new OEM LNG locomotives. However, existing diesel locomotives converted to LNG, which is likely to be the case here, cost as little as $1 million per locomotive.*
    - *In comparison, Motive Power, the company that built the four LNG switch locomotives now being used in Vernon, estimates a cost of $1.25 million for a new 2000 HP line-haul LNG locomotive. This is cheaper than a new diesel locomotive, which costs approximately $1.5 million.*
- *The refueling station costs of $4 million per station are too high.*
    - *For example, the largest LNG station in the world (City of Los Angeles East Valley) cost less than $4 million.*
    - *Noting that the cost of the fueling station depends on the size, how many locomotives need to be fueled and daily fueling demands; and assuming that each locomotive will burn about 1,000 gallons of LNG per day; if 10 locomotives share a station, it will require 30,000 to 50,000-gallons of LNG storage on-site, costing roughly $2.0 million.*
    - *Similarly, a station serving 25 LNG locomotives would cost approximately $3.0 million.*
    - *Finally, fueling infrastructure may cost nothing at all, considering that LNG locomotives can actually be fueled directly from a 10,000-gallon LNG transport truck. The four LNG locomotives in Vernon are currently being fueled in this manner, at no infrastructure cost. The cost of the fuel is the same as if it were delivered into a fueling station.*
- *The $116,000 estimate in extra fuel costs of LNG is questionable.*
    - *Currently LNG is selling for roughly the same price as diesel, actually a few cents less per diesel equivalent gallon.*

- *In the future, especially if the SES LNG terminal is successful, we expect that the cost of LNG will be significantly less than diesel.*
- *For the purposes of this report, we recommend that the cost of the LNG be conservatively considered equal to that of diesel.*

- *Oxidation catalysts should not need to be replaced every 8 years and the initial cost of $200,000 for original OCs seems too high.*
- *The replacement program for 25 Switchers seems duplicative of R5 & R6; therefore costs should not be added but taken in place of R5 and R6.*

R9 - CARB Diesel for Class 1 Railroads

- *This measure should not include the cost of fuel for 25 switchers because they already have to comply with the CARB fuel rule for intra-state locomotives, whether they are owned by Class 1 railroads or not.*
- *The LSD cost of $0.05 per gallon is too high, per comments above.*

R10 - Idling controls for line hauls & switcher locomotives

- *The idling control cost of $16,000 is reasonable although some are much cheaper. A range of costs would have been useful.*
- *New switchers come with automatic idling controls, so the cost for 25 switchers should not be included since other measures cover their replacement.*
- *Heavy-duty Diesel Vehicle (HDDV) Measures*

HDV3 - Gateway Cities

- *This program already has funding and therefore should not be counted as part of the NNI additional expenses.*

HDV5 - ULSD

- *This is a mandatory federal rule; compliance should not be counted within NNI costs*
- *The LSD cost of $0.06 per gallon is too high, per comments above.*

HDV10 - Expanded Gateway Cities

- *This measure may be covered in some part by existing Gateway Cities funds and therefore over estimates the cost.*
- *Useful life estimates (Truck - 10 years, DPF - 5 years) are too low although it's unclear whether they are incorporated or not.*
- *The number of trucks does not add up:*
    - *1987 – 1993 are replaced in two years from 2008-2009.*
    - *The same model year group is replaced again from 2009 – 2012.*
    - *1991 and newer model trucks should be replaced with 2004 and newer models instead of 1999 or newer models suggested here; maybe that was accounted for in some of the capital cost estimates, since the cost jumps from $25,000 per new truck to $46,250 without explanation.*

HDV12 - Early ULSD Implementation

- *The LSD cost of $0.07 per gallon is too high, per comments above.*
- *It is not clear whether this measure would work. For example, how would it be enforced?*

HDV13 - Retrofit HDVs with DOCs

- *It is not clear that this measure achieves any emission reductions, 1999 and newer trucks are likely to utilize a catalyst. Therefore adding a DOC would be redundant.*
- *The cost of adding a DPF to the same trucks is accounted for in the next measure; this is double counting costs.*

HDV14 - Retrofit HDVs with DPFs

- *The cost of $8,500 for DPFs is reasonable, however Moyer and other incentive programs may cover some of these costs.*
- *The 5-year useful lifetime is too low.*

NO NET INCREASE TASK FORCE

LEGAL WORKING GROUP MEMORANDUM

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I. SUMMARY

Historically, local governments have exercised "police powers" to protect public health and safety, including regulation of air pollution. The City of Los Angeles has been a long-time leader in seeking to control air pollution. Beginning in the 1960's, federal and state air quality legislation preempted certain local control over emissions from on-road and nonroad sources. Local controls over emissions from vessels raise the potential for conflict with federal law, in instances where Congress has determined there is a need for national uniformity, and international treaties. But the City of Los Angeles and its Harbor Department, as trustee owner and operator of the Port of Los Angeles, still retains certain "proprietary powers" to control emissions generated by operations within the Port, although the range of these proprietary powers has yet to be fully defined by the courts. The courts have played a very active role in determining the authority of local, regional, state and federal governmental bodies to regulate emissions in this complex field.

II. DISCUSSION

A. TRADITIONAL MUNICIPAL POLICE POWERS

The City of Los Angeles has broad police powers to adopt laws and regulations.[1] Pursuant to the Los Angeles City Charter, the Board of Harbor Commissioners of the City's Harbor Department exercises the City's police powers in the Port of Los Angeles, sometimes subject to City Council approval.[2]

The power to adopt appropriate air quality requirements is one of the police powers of local government.[3] In 1960, upholding the enforcement of the City of Detroit's smoke prohibitions against interstate ships, the U.S. Supreme Court stated:

> Legislation designed to free from pollution the very air that people breathe clearly falls within the exercise of even the most traditional concept of what is compendiously known as the police power.[4]

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1. Los Angeles City Charter §101 provides that the City "shall have all powers possible for a charter city to have under the constitution and laws of this state . . . ." Cal. Constitution, article XI, § 7 states that cities and counties have the power to "make and enforce . . . all local, police, sanitary, and other ordinances not in conflict with general laws."

2. City Charter §652(a) provides that the Board has the "power and duty" to: "Make and enforce all necessary rules and regulations governing the maintenance, operation and use of the Harbor District . . . . " Pursuant to City Charter §653(a), the "rules and regulations of general application" adopted by the Board must be approved by the City Council.

3. 87 Op. Cal. Atty. Gen. 96 (2004).

Los Angeles has been a leader in air pollution control for at least 90 years. The City's regulation of smoke from brickyards was upheld as a valid regulation in an historic case decided by the United States Supreme Court in 1915.[5] In 1945, the City of Los Angeles began the first air pollution control program aimed at mitigating photochemical "smog," when it established the Bureau of Smoke Control in its public health department.[6]

B. CALIFORNIA STATE REGULATION OF AIR QUALITY

In 1947, California state legislation was enacted creating county air pollution control districts, beginning the move towards regional, state, and federal regulation of air quality.[7] The creation of the California Air Resources Board (ARB) in 1967, was followed by the adoption of significant revisions to California's air pollution control laws in 1975 and 1988. The state's authority to regulate air pollution in California is currently divided between the ARB and the local and regional air pollution control districts, including the South Coast Air Quality Management District (SCAQMD) which has specified jurisdiction over the South Coast Air Basin, including the City of Los Angeles.

Under California law "local and regional authorities have the primary responsibility for control of air pollution from all sources, other than emissions from motor vehicles...."[8] Cities are included within the definition of "local and regional authorities."[9] The control of emissions from on-road and "off-road" or nonroad[10] motor vehicles, with certain exceptions, is the responsibility of ARB.[11]

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4. *Huron Portland Cement Co. v. City of Detroit,* 362 U.S. 440, 442 (1960).

5. *Hadacheck v. Sebastian,* 239 U.S. 394 (1915).

6. Reitze, "*A Century of Air Pollution Control Law*" (1991) 21 Envtl. L. 1549, 1576. See also, ARB website - http://www.arb.ca.gov/html/brochure/history.htm

7. In 1947, the state Air Pollution Control Act was enacted, authorizing the creation of an Air Pollution Control District in every California county. Prohibitions upon visible smoke were the first air pollution rules, followed by bans on backyard burning of trash. *See* ARB website: http://www.arb.ca.gov/html/brochure/history.htm

8. Health & Safety Code §40000. All citations herein to the Health & Safety Code and Vehicle Code are to the California Codes.

9. The term "local or regional authority" means the governing body of any city, country or district. Health & Safety Code §39037. "'District' means an air pollution control district or air quality management district created or continued in existence pursuant to provisions of Part 3 (commencing with Section 40000)." Health & Safety Code §39025.

10. Under California law "off-road" sources has the same meaning as "nonroad" sources under federal law. This memorandum will generally use the term "nonroad."

11. Health & Safety Code §40000, §43013(b), §43018.

Health & Safety Code §40449(a) explicitly provides that the creation of the SCAQMD has not preempted city police powers to regulate air pollution.[12] Therefore, California law does not preclude the City of Los Angeles from adopting an ordinance or rule regulating emissions sources, other than certain regulation of motor vehicles, that are not in conflict with SCAQMD rules. Whether the City has jurisdiction over trains and ships under California law (which are separately classified as "off-road" or nonroad sources, not as "motor vehicles" [13]) is discussed in the respective discussions of those topics, below.

C. FEDERAL PREEMPTION DOCTRINE

The federal preemption doctrine arises under the Supremacy Clause, Article VI, Clause 2 of the United States Constitution, which provides, in part, that "[t]his Constitution, and the Laws of the United States...shall be the supreme law of the Land; and the Judges of every State shall be bound thereby ...."

There are three bases on which a finding of federal preemption can be made. Congress often expressly addresses in a statute the extent to which it intends for federal legislation to preempt state law. This scenario is typically referred to as "express preemption." In addition to express preemption, courts recognize two types of implied federal preemption. In the absence of explicit statutory preemption language, when Congress legislates over a subject matter having common federal and state interests, the federal legislation will most likely be found to supercede inconsistent provisions in any state or local legislation attempting to regulate the same field. State law may also be preempted when it attempts to regulate in a field in which Congress has clearly indicated an intent to be the sole authority. This is often designated as "field preemption." State law may also be preempted if it actually conflicts with federal law to such an extent that it is either impossible for a member of the regulated community to comply with both sets of laws, or where compliance with the requirements of the state law would frustrate the full purposes and objectives of Congress in passing the federal law. This is often called "conflict preemption."[14]

The U.S. Supreme Court has held that any analysis involving claims that a state's exercise of its police power violates the Supremacy Clause should start "... with the assumption that the historic police powers of the States [are] not to be superseded by the Federal Act unless that was the clear

12 . Health & Safety Code §40449(a) provides "no provision of this chapter is a limitation of the power of any city or county included, in whole or in part, within the South Coast District to adopt any ordinance with respect to air pollution control which is stricter than the rules and regulations adopted by the South Coast District board and not in conflict therewith."

13. *See* California Health & Safety Code §43013(b).

14. *Florida Lime and Avocado Growers, Inc. v. Paul*, 373 U.S. 132 (1963); *Pagarigan v. Superior Court*, 102 Cal.App.4th 1121, 1129 (2002).

and manifest purpose of Congress."[15] The Supreme Court has also held that there is no presumption against preemption of state law "when the state regulates in an area where there has been a history of significant federal presence."[16] However, the Ninth Circuit Court of Appeals has applied the presumption against preemption to the CAA, holding that because the control of air pollution falls under the historic police powers of the states, the authority of the states to regulate in this area should be assumed not to have been preempted unless Congress clearly and manifestly indicates such an intention.[17]

In analyzing a federal preemption claim, it is of primary importance to determine the congressional intent behind the federal regulatory scheme through a review of any available direct or indirect evidence. Even where federal and state legislation appear to have the same overriding purpose, preemption may be found if the state statute significantly interferes with the "methods by which the federal statute was designed to reach that goal."[18]

D. CLEAN AIR ACT PREEMPTION OF CERTAIN LOCAL POWERS

Beginning in the late 1960's, certain local air quality regulatory powers over mobile pollution sources began to be preempted by amendments to the federal CAA. Through the formation of the United States Environmental Protection Agency (EPA) in 1970, and the passage of major amendments to the federal Clean Air Act (CAA) in 1970, 1977 and 1990, Congress provided the EPA with the responsibility for establishing national emission standards for new mobile sources of air pollution as well as standards of performance for certain categories of new stationary sources.

Section 101(a)(3) of the CAA states that "air pollution control at its source is the primary responsibility of States and local governments...." The California Attorney General[19] has summarized the CAA's preemption provisions as follows:

> [W]e note that the federal act contains the following provision: "nothing in this chapter shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce ... any requirement respecting

15. *Ray v. Atlantic Richfield Co.*, 435 U.S. 151, 157 (1978) (quoting from *Rice v. Santa Fe Elevator Corp.,* 331 U.S. 218 (1947).

16. *U.S. v. Locke*, 529 U.S. 89,107 (2000).

17. *Exxon Mobil Corp. v. EPA*, 217 F.3d 1246, 1255 (9th Cir. 2000).

18. *Id.*

19. 87 Ops. Cal. Atty. Gen. 96, n. 3 (July 12, 2004) (2004 Cal. AG LEXIS 24.

> control or abatement of air pollution ...." (42 U.S.C. §7416)[20] It also states that "nothing in [the federal act's provisions concerning motor vehicle emission standards] shall preclude or deny to any State or political subdivision thereof the right otherwise to control, regulate, or restrict the use, operation, or movement of registered or licensed motor vehicles." (42 U.S.C. §7543(d).)[21]

As discussed below, however, the CAA in §209(a) further provides, in part:

> No State or any political subdivision thereof shall adopt or attempt to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicles engines subject to this part.

Other provisions of §209 explicitly preempt certain other controls, and certain state and local regulation of ships and locomotives may also be preempted. Section 209 also allows a potential waiver for California, as discussed below. In addition, as discussed in §II.F below, it may be possible for the Port *acting as a proprietor* to take certain actions to reduce mobile source emissions.

1. On-Road Vehicular Emissions Standards and Regulations

a. Emissions Standards

In 1965, Congress amended the federal CAA to authorize the federal government (later EPA) to adopt emission standards for new on-road motor vehicles,[22] and, in 1967, Congress amended the CAA to preempt states and their political subdivisions from adopting and enforcing any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines.[23]

The CAA allows California to obtain a waiver to set its own vehicular emissions standards[24] and other states may "opt in" to the California standards.[25] The ARB has successfully requested and

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20. CAA §116, 42 U.S.C. §7416, provides in full: "Except as otherwise provided in sections 119(c), (e), and (f) (as in effect before the date of the enactment of the Clean Air Act Amendments of 1977), 209, 211(c)(4), and 233 (preempting certain State regulation of moving sources) nothing in this Act shall preclude or deny the right of any State or political subdivision thereof to adopt or enforce (1) any standard or limitation respecting emissions of air pollutants or (2) any requirement respecting control or abatement of air pollution; except that if an emission standard or limitation is in effect under an applicable implementation plan or under section 111 or 112, such State or political subdivision may not adopt or enforce any emission standard or limitation which is less stringent than the standard or limitation under such plan or section."

21. CAA §209(d) is 42 U.S.C. §7543(d).

22. Air Pollution Control Act of 1965, Pub. L. No. 89-272, title II, §202 (1965).

23. Air Quality Act of 1967, Pub. L. No. 90-148, at §2, 81 Stat. 485, § 208 (1967). *See* Reitze, *supra,* 21 Envtl. L. at 1589, n. 227m, citing Krier & Ursin, *Pollution & Policy, a Case Essay on California and Federal Experience with Motor Vehicle Air Pollution 1940-1975* (1977).

24. 42 U.S.C. §7543(b).

obtained many waivers of federal preemption for on-road California emission standards.[26] The Administrator of EPA must grant California a waiver, unless he or she finds that the specific conditions set forth in the CAA §209(b) exist.[27]

In 2004, the U.S. Supreme Court in *Engine Manufacturers' Association v. SCAQMD (EMA v. SCAQMD),* found that SCAQMD's attempt to impose fleet rules fell within the scope of preemption under §209(a) as enforcement or adoption of an "emissions standard."[28] Most recently, however, on remand the District Court in *EMA v. SCAQMD* held that the SCAQMD's fleet rules "as applied to state and local government actors, fall within the market participant doctrine and are therefore outside the scope of §209 [of the Clean Air Act]."[29]

b. In-Use and Idling Regulations

The CAA does *not* preempt state and local authorities from regulating the operation of motor vehicles through certain "in-use" requirements. Section 209(d) provides:

> Nothing in this part shall preclude or deny to any state or political subdivision thereof the right otherwise to control, regulate or restrict the use, operation, or movement of registered or licensed motor vehicles.[30]

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25. CAA §177; 42 U.S.C. §7507.

26. *See*, e.g., *California State Motor Vehicle Pollution Control Standards; Waiver of Federal Preemption; Decision* 33 F.R. 101060 (July 16, 1968), 58 F.R. 4166 (January 13, 1993), 61 F.R. 53371 (October 11, 1996).

27. CAA §209(b), 42 U.S.C. §7543(b). The section, as amended, provides in relevant part that the ARB must determine that the adopted state standards will be, in the aggregate, at least as protective of public health and welfare as applicable federal standards and that no waiver shall be granted if the Administrator finds that--
    (A) the determination of California is arbitrary and capricious,
    (B) California does not need the adopted standards to meet compelling and extraordinary conditions, or
    (C) The adopted standards and accompanying enforcement procedures are not consistent with section 202(a) of the CAA.

    The phrase "consistent with section 202(a)" has been interpreted by EPA to mean that the adopted state standards and procedures are technically feasible, giving appropriate consideration to the cost of compliance within the time provided for compliance. The Administrator will also consider whether federal and state procedures impose inconsistent certification requirements (that is, whether certification can be accomplished with one test vehicle in the course of the same test. *See, California State Motor Vehicle Pollution Control Standards; Waiver of Federal Preemption; Decision* 61 FR 53371 (October 11, 1996).

28. *EMA v. SCAQMD*, 541 U.S. 246 (2004).

29. *EMA v. SCAQMD,* U.S.D.C. No. 00-09065 (C. Dist. CA), at 23. The EMA is likely to appeal this decision to the Ninth Circuit. The Central District's decision and the market participant exception is discussed in more detail in §II.F.2 of this memorandum, below.

30. 42 U.S.C. 7543(d).

Thus, while the California Legislature designates ARB as the air pollution control agency for all purposes set forth in federal law,[31] and specifically grants ARB primary authority over the regulation of motor vehicles,[32] public entities such as cities and ports are not precluded by the CAA from placing certain in-use requirements on trucks that service the port.[33] Thus, the City of Los Angeles is not precluded by the CAA from regulating trucks at the Port to reduce idling.

Recently the California Attorney General opined that a city may "enact an ordinance restricting vehicle engine idling for the purpose of controlling or mitigating vehicles emissions."[34] The Attorney General found that Health & Safety §40000 did not give ARB exclusive state authority over idling.[35] The opinion cited Heath & Safety Code §40717(h), which allows a city to adopt transportation control measures more stringent than those of the district if they are otherwise authorized by law, as well as Health & Safety Code §41509, which provides that the air pollution provisions do not limit the power of a local agency to regulate or abate nuisances. The Attorney General concluded that the police power provides the requisite authority for the City to adopt an anti-idling ordinance.[36] This theory could be used to implement measure HDV 19 through a Port-wide rule or City ordinance.

State law already requires marine terminals to operate in a manner that does not cause the engines on trucks to idle or queue for more than 30 minutes while waiting to enter the gate into the marine terminal.[37] As with federal preemption, discussed above, a state statute can preempt local regulation when the local regulation "duplicates, contradicts or enters an area fully occupied by general law…."[38] Health & Safety Code §40720 contains several exceptions, and on its face, would not conflict with or preempt a local regulation that limits idling within the terminal.[39] However, the city ordinance would have to be crafted so it would not conflict with §40720.

31. Health & Safety Code §39602.

32. Health & Safety Code §40000.

33. On the other hand, the CAA does not grant *additional* local powers to regulate air quality irrespective of *state* preemption. See *Southeastern Oakland County Recovery Authority v. City of Madison Heights*, 5 F 3rd 166, 168-169 (6th Cir. 1993) (holding that the CAA did not prevent application of a Michigan state law preempting local siting restriction on trash-to-energy plant: "The CAA does not allow local ordinances to bypass an express limitation placed on local governments by a state.").

34. 87 Ops. Cal. Atty. Gen. 96 (July 12, 2004) (2004 Cal. AG LEXIS 24).

35. 2004 Cal. AG LEXIS 24, p. 10.

36. 2004 Cal. AG LEXIS 24, p. 10.

37. Health & Safety Code §40720.

38. *Sherwin-Williams Co. v. City of Los Angeles*, 4 Cal. 4th 893, 897 (1993).

39. SB 761 (Lowenthal), currently pending in the legislature, would establish a turn time limit within terminals and reduce the exemptions in §40720.

A city ordinance also may be preempted by state law if it enters a field which the legislature has fully occupied, either expressly or by implication.[40] It does not appear that §40720, or the CARB rule limiting heavy duty truck idling (which does not apply to queuing or certain other idling situations and which expressly provides that it is not in conflict with local idling control measures that are equal to or more stringent than the adopted regulation) fully occupies the entire field of regulating vehicle idling so as to preclude local action.[41]

c. On-Road Fuel Requirements

Section 211 of the CAA requires that fuel and fuel additives for on road sources be registered with the EPA,[42] and grants the EPA authority to prohibit particular fuel/additives from being manufactured or sold.[43] Further, §211(c)(4) expressly preempts states and political subdivisions from imposing a control or prohibition on motor vehicle fuels and fuel additives "for purposes of motor vehicle emissions control" under certain circumstances.[44] Once EPA makes a finding that no control (of a motor vehicle fuel or fuel additive characteristic or component) is necessary or if EPA has established a control or prohibition of such characteristic or component, then preemption applies under §211(c)(4)(A). However, the State of California is not subject to preemption under §211(c)(4)(A), and other states may adopt or enforce a motor vehicle fuel specification that would otherwise be preempted if EPA makes a finding of necessity under the terms of §211(c)(4)(C). If EPA has made neither the finding cited above nor established a control or prohibition for a motor vehicle fuel or fuel additive characteristic or component, then a state or local agency is not preempted under the CAA from establishing a control or prohibition for that motor vehicle fuel or fuel additive characteristic or component. Lastly, a state or local agency may establish a control or prohibition for a characteristic or component of a motor vehicle fuel or fuel additive that would otherwise be preempted under CAA §211 if the control or prohibition is established for purposes other than for motor vehicle emission control. See CAA §211(c)(4)(A).

2. <u>Nonroad Emission Standards</u>

a. Emissions Standards

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40. Preemption by implication may be found where "(1) the subject matter has been so fully and completely covered by general law as to clearly indicate that it has become exclusively a matter of state concern; (2) the subject matter has been partially covered by general law couched in such terms as to indicate clearly that a paramount state concern will not tolerate further or additional local action; or (3) the subject matter has been partially covered by general law, and the subject is of such a nature that the adverse effect of a local ordinance on the transient citizens of the state outweighs the possible benefit to the "locality." *Sherwin-Williams Co., supra*, 4 Cal. 4th at 898 (citation omitted).

41. Title 13, CCR §2485.

42. 42 U.S.C. §7545 (a)-(b)

43. *Id*. at §7545(c).

44. *Id.* At §7545(c)(4)(A).

In 1990, the CAA was amended to authorize EPA to adopt emission standards and other requirements related to the control of emissions from nonroad sources.[45] Under the CAA, nonroad vehicles and engines include cargo handling equipment, harbor craft, ships and locomotives.[46] Issues unique to ships and locomotives are discussed in later sections, below.

Congress established a two-tiered preemption prohibiting states and their subdivisions from adopting emission standards and other requirements related to the control of emissions from certain nonroad sources.[47] Specifically, under §209(e)(1), states and their political subdivisions, including California, are preempted from adopting and enforcing emissions standards for new nonroad engines under 175 horsepower used in farm and construction and for new locomotives and locomotive engines.[48]

Further, under §209(e)(2), states are "implicitly" preempted from adopting emission standards and other requirements for all other nonroad vehicles and equipment not expressly preempted under §209(e)(1).[49] This implied preemption provision has been interpreted to apply to both new and used equipment and vehicles.[50] However, similar to the motor vehicle regime, California may seek authorization from EPA to adopt and enforce its own nonroad emissions standards and other requirements (other than for those sources that are expressly preempted under §209(e)(1)).[51] Further, as with the waiver for motor vehicles, the Administrator must grant California's request for authorization, unless the Administrator makes specific findings that the criteria for denying a waiver have been met.[52] California has requested and received authorization to adopt its own emission standards and regulations for several nonroad regulations.[53]

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45. 42 U.S.C. §7547.

46. CARB proposes to adopt cargo handling equipment regulations in November 2005. ARB, *Planned Measures Affecting Off-Road Cargo Handling Equipment and Locomotives* (draft October 27, 2004).

47. 42 U.S.C. §7543(e).

48. 42 U.S.C. §7543(e)(1).

49. 42 U.S.C. §7543(e)(2).

50. *EMA v. EPA,* 88 F.3d. 1075 (D.C. Cir. 1996). Further, the court in *EMA v. EPA* also held that in terms of the emissions "standards and other requirements" that states are preempted from adopting, "other requirements" refers only to ancillary enforcement mechanisms such as certificates and inspections, as in the motor vehicle preemption regime. *See id*. at 1093-1094.

51. 42 U.S.C. §7543(e)(2).

52. *Id.* The criteria for denying an authorization request are similar to those for denying a motor vehicle waiver under 42 U.S.C. §7543(b).

53. EPA granted California its first nonroad authorization for the Utility and Lawn and Garden Regulation in July 1995 (60 FR 37440). Since then ARB has also received authorizations to adopt its Offroad Heavy-Duty Diesel Engines over 175hp Regulation (60 Fed. Reg. 48981)[September 21, 1995]), Offroad Recreational Vehicles (61 Fed. Reg. 69003 [December 31, 1996]), and Small Offroad Engine Durability Requirements (68 Fed. Reg. 65702

b. In-Use and Idling Regulations

Certain state and local in-use requirements for nonroad vehicles and equipment are not preempted under the CAA.[54] Indeed, all jurisdictions, including cities and ports, may implement measures such as mass-emission limits, hours of use, fuel specification standards, and permitting of sources.[55] However, EPA has taken the position that retrofit requirements for nonroad sources are not permissible in-use requirements, but rather preempted emissions control standards.[56] California law gives ARB jurisdiction over nonroad emission sources, but, with certain exceptions (e.g. districts are prohibited from regulating portable equipment registered in the California Portable Equipment Registration Program; restrictions placed on districts with regard to regulating locomotives[57]) the regional authorities continue to have authority over nonvehicular sources, to the extent not preempted by federal law.[58]

SCAQMD and NRDC believe that under state law, local authorities including cities and counties may establish in-use and idling requirements stricter than those set by law or by ARB for "nonvehicular" (nonroad) sources,[59] such as locomotives, marine vessels, and certain types of cargo handling equipment, to the extent not preempted under federal law.[60] Later enactments clearly confer regulatory authority over locomotives and other mobile sources on ARB.[61] SCAQMD and NRDC further believe that the air districts and cities and counties have concurrent authority with ARB over nonroad engines and vehicles because they are nonvehicular

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[November 21,2003]. Additionally, EPA has found a number of ARB amendments to the above regulations to be within the scope of the aforementioned waivers.

54. *See Control of Air Pollution; Determination of Significance for Nonroad Sources and Emission Standards for New Nonroad Compression-Ignition Engines At or Above 37 Kilowatts,* 59 F.R.31306 (June 17, 1994); *Air Pollution Control; Preemption of State Regulation for Nonroad Engine and Vehicle Standards*, 59 F.R. 36969 (July 20, 1994); and *EMA v. EPA,* 88 F.3d 1075.

55. *See* 40 CFR Pt. 89, Subpt..A, App. A.

56. *Id.*

57. Health & Safety Code §41753, §40702.

58. *See* Health & Safety Code §40000.

59. Health & Safety Code §39002.

60. Vehicle Code §415, §670.

61. *See*, e.g., Health & Safety Code §43018(d)(2), §43013(b).

sources under state law.[62] The railroads (hereafter "Rail") believe that air districts and cities and counties have no authority under California or federal law over locomotives.[63]

c. Nonroad Fuel Requirements

Section 211 of the CAA grants EPA the authority to regulate the manufacture or sale of nonroad fuel and fuel additives.[64] In contrast to motor vehicle fuels and fuel additives, CAA §211(c)(4)(A) does not preempt state or local controls or prohibitions related to specifications or components of nonroad fuels or fuel additives.[65] At the same time, a state or local control that regulates both motor vehicle fuel and nonroad fuel is preempted to the extent that the state or local control respects a characteristic or component of motor vehicle fuel or fuel additive regulated by EPA under §211(c)(1). For the purposes of CAA §209, EPA characterizes sulfur limits on fuel used by nonroad sources as a permissible (i.e., non-preempted) in-use requirement.[66]

3. Locomotives

Locomotives are classified as nonroad vehicles under the CAA, and, as stated, all states are expressly preempted from adopting and enforcing emission standards and other requirements related to emissions control for new locomotives.[67] Under its final rule for locomotives and locomotive engines, EPA has crafted very broad preemption. In contrast to all other rulemakings for on-road motor vehicles and nonroad vehicles and equipment, "new" has been defined to include not only factory-new locomotives, but also remanufactured locomotives and locomotive engines.[68] Additionally, for purposes of preemption, the useful life period for locomotives and engines has been defined to be 133 percent of the locomotive's and engine's useful life.[69]

62. Manaster & Selmi, *California Environmental Law and Land Use Practice,* §41.06(2).

63. *See* Clean Air Act §209(e)(1); 40 CFR §85.1601 et seq.

64. 42 U.S.C. §7545 (a)-(b).

65. *See*, e.g., 69 Fed. Reg. 38958, at 39072-39073 (June 29, 2004).

66. 40 CFR Pt. 89, Subpt. A, App. A: "EPA believes that states are not precluded under section 209 from regulating the use and operation of nonroad engines, such as regulations on hours of usage, daily mass emissions limits, or *sulfur limits on fuel*; nor are permits regulating such operations precluded, once the engine is no longer new." (Emphasis added.)

67. 42 U.S.C. §7543(e)(1)(B) preempts emissions standards or other requirements relating to the control of emissions from locomotives and, in SCAQMD's view, under EPA regulations, no California waiver is permitted for locomotives that are new, remanufactured, or within 133% of their useful life. In EPA's and Rail's view, no California waiver is permitted for any other locomotives, either.

68. *Emission Standards for Locomotives and Locomotive Engines*, 63 F.R. 18978, 18979-18980 (April 16, 1998).

69. *Id*., at 18984, 18993. The net effect of EPA's regulations is that virtually all locomotives are considered to be "new," regardless of their age. SCAQMD believes that this aspect of EPA's regulations is inconsistent with the CAA, in which Congress explicitly stated its intent to provide an absolute preemption only for "new" locomotives. Rail believes EPA's regulations are consistent with the CAA and Congress' intent to provide an absolute preemption for all locomotives. Rail also notes that the statute of limitations in Clean Air Act §307(b)

However, as discussed above, SCAQMD and NRDC believe that certain "in use" restrictions such as fuel sulfur content limits, daily mass emissions limits, and operational restrictions may not be preempted. Rail believes, however, such restrictions are either standards or "other requirements" that are preempted.

California law gives ARB jurisdiction for establishing emission standards and regulations for locomotives.[70] Additionally, the state legislature prohibits local air districts from adopting any order, rule or regulation that specifies the design of equipment, type of construction, or particular method to be used in reducing the release of emissions from locomotives.[71] ARB has adopted rules effective January 1, 2007 that require the use of low sulfur diesel fuel in intrastate locomotives.[72]

Additionally, ARB has entered into a Memorandum of Understanding with the Union Pacific Railroad and Burlington Northern Santa Fe Railroad that will require fleet average emissions for locomotives operating in the SCAQMD.[73] By 2010 the fleet average shall not exceed the federal Tier 2 NOx emission standards. This will result in accelerated replacement of higher emitting locomotives from the SCAQMD.

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bars litigation concerning this aspect of EPA's current regulations and that this issue involves speculation about future changes to EPA regulations during the possible lengthy life of the NNI plan.

70. Health & Safety Code §43013(b).

71. Health & Safety Code §40702.

72. ARB, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking* (October 1, 2004); ARB, *Planned Measures Affecting Off-Road Cargo Handling Equipment and Locomotives* (draft October 27, 2004).

73. *Memorandum of Mutual Understandings and Agreements South Coast Locomotive Fleet Average Emissions Program,* July 2, 1998.

4. Ships

a. Existing State and Local Regulation of Ships

The federal air pollution statutes in effect prior to the CAA were held not to preempt certain local vessel regulations, including prohibitions on visible smoke.[74] SCAQMD has set limits on visible smoke from vessels (among other sources) where violators are subject to criminal prosecution.[75] The state of Alaska has used aggressive enforcement of visible smoke prohibitions (made part of the Alaska SIP) to encourage cruise ships to electrify while at dock and to use cleaner fuels.[76]

b. Clean Air Act Regulation of Ships

Marine vessels are not specifically included in the CAA's definition of either "nonroad engine" or "nonroad vehicle," but legislative history purportedly establishes that Congress intended for them to be treated as such, and the EPA has consistently done so.[77] EPA has issued regulations limiting NOx emissions from "Category 3" marine diesel engines on U.S.-flagged vessels.

i. Foreign Flag Issues

In 2003, EPA decided to defer the question of whether or not the CAA provides the Agency with the authority to establish emissions standards for engines on foreign-flagged marine vessels, but decided even if the Agency had such authority, it would not exercise such discretion (i.e., to establish standards for foreign-flagged marine vessels) at the present time.[78] EPA deferred the question of legal authority or, alternatively, states that it exercised its discretion not to extend emissions standards to foreign-flagged vessels on the grounds that such deferment or exercise of

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74. In *Huron Portland Cement Co. v. City of Detroit* 362 U.S. 440, 442 (1960), the U.S. Supreme Court upheld local smoke prohibitions against a preemption claim. Although the case was decided prior to enactment of the Clean Air Act, the Court's analysis remains sound. The Department of Justice reply brief in the Intertanko litigation, at p. 14, concedes that the Clean Air Act "expressly provides a role for states in establishing certain anti-pollution rules that apply to vessels" citing 42 U.S.C. §7511(b)(f). See: http://www.usdoj.gov/osg/briefs/1999/3mer/2mer/98-1701.mer.rep.pdf

75. SCAQMD Rule 401. *See also*, Cruise Ship Environmental Task Force, *Report to the Legislature: Regulation of Large Passenger Vessels in California* (August 2003) 34.

76. Cruise Ship Environmental Task Force, *Report to the Legislature: Regulation of Large Passenger Vessels in California* (August 2003) 83.

77. The National Association of Attorneys General, *Floating Cities, Urban Problems: A Report by the National Association of Attorneys General Cruise Ship Workgroup* (2002) at p. 29 finds that "cruise ships would most likely be mobile sources categorized as 'nonroad vehicles' powered by 'nonroad engines' and would thus be governed by regulations implemented under 42 U.S.C. §7547." (Footnotes omitted.)

78. See 68 Fed. Reg. 9746, at 9759 (February 28, 2003).

discretion may help to facilitate the adoption of more stringent consensus international standards.[79]

EPA has committed to complete an additional rulemaking to consider the establishment of a more stringent set of emissions standards ("tier 2") for marine diesel engines with per-cylinder displacement at or above 30 liters or more ("category 3") no later than April 27, 2007 and, as part of that future rulemaking, to consider whether to apply such standards to foreign-flagged vessels.[80] In deferring the question of legal authority, EPA concluded that the emissions effects of not applying the emission standards to foreign-flagged vessels would be minimal because EPA expected that foreign vessels would comply with the MARPOL Annex VI standards[81] whether or not they are also subject to regulatory standards set forth for U.S.-flagged vessels in 40 CFR part 94. The D.C. Circuit upheld EPA's decision to defer the question of legal authority to establish emissions standards for foreign-flagged marine vessels.[82] Though not yet ratified by the U.S. Senate, the MARPOL Annex VI standards went into effect on May 19, 2005.

Previously, when EPA first established emissions standards for new marine diesel engines,[83] the Agency had not applied the emission standards to engines on foreign-flagged vessels based on its conclusion that such engines that are installed on vessels that come into the United States temporarily are not considered imported under the U.S. customs laws and thus are not considered "new" for the purposes of EPA's authority under §213 of the CAA to establish emission standards for nonroad engines.[84] EPA based its interpretation on an extension of the CAA definitions of "new motor vehicle" and "new motor vehicle engine" (see CAA §216(3)) to the term "new nonroad engine" for which the CAA itself provides no specific definition, but has since agreed to re-consider the issue (by April 2007) in recognition of the ambiguity of the term "new nonroad engine" under the CAA and in light of the various considerations that distinguish marine applications from the on-road vehicle context.

79 *Id*.

80. See *Id*. and 40 CFR §94.8(a)(2)(ii).

81. Annex VI sets a global limit of 4.5% sulfur content of fuels for marine vessels, with provision for a 1.5% limit in "SOx Emission Control Areas," and limits on NOx emissions. See IMO website - http://www.imo.org/Conventions/contents.asp?doc_id=678&topic_id=258#30

82. See *Bluewater Network v. EPA*, 372 F.3d 404 (2004).

83. 64 Fed. Reg. 73300, December 29, 1999.

84. See 67 Fed. Reg. 37548, at 37565 (May 29, 2002).

Certain commentators have suggested that EPA does have jurisdiction over foreign-flagged vessels[85] and that emissions reductions beyond the MARPOL Annex VI requirements are needed.[86]

ii. Preemption of Ship Emissions Standards

As noted in §II.D.2 above, ship engines are classified as nonroad engines under the CAA. Therefore, as discussed in §II.D.2, state and local governments are preempted from adopting or enforcing "any emissions standard or other requirement relating to the control of emissions" from nonroad sources, including ships.[87] As discussed below, state and local governments may adopt certain regulations regarding the use and operation of marine vessels, to the extent not preempted by other federal laws. California may seek from EPA a waiver from CAA preemption to adopt and enforce emissions standards and other requirements applicable to marine vessels, as discussed below in §II.F.2.c.

iii. California Law on Ship Regulations

California law gives ARB the authority to regulate marine vessels to the extent permitted by federal law.[88] ARB has not yet adopted emissions standards for large marine vessels, but has announced a potential rulemaking.[89] ARB's regulatory authority over ships in California is not exclusive, however because ocean going vessels are not motor vehicles.[90] Ocean going vessels are under the jurisdiction of the districts and cities and counties to the extent not preempted.[91] The California Air Resources Board was also granted authority to regulate marine vessels by Health & Safety Code §43013(b), as amended in 1988. However, even after the enactment of

85. Cruise Ship Environmental Task Force, *Report to the Legislature: Regulation of Large Passenger Vessels in California* (August 2003) 79; Comment (Lickel), *Regulating Foreign Vessels Under the Clean Air Act* (2002) 3 San Diego Int'l L.J. 145, 175.

86. National Association of Attorneys General, *Floating Cities, Urban Problems: A Report by the National Association of Attorneys General Cruise Ship Workgroup* (2002) 29, n. 154; Cruise Ship Environmental Task Force, *Report to the Legislature: Regulation of Large Passenger Vessels in California* (August 2003) 32 (Annex VI is only projected to reduce marine vessel emissions by about 3% in the South Coast Air Basin).

87. CAA §209(e).

88. California Health & Safety Code §43013(b).

89. ARB, *Planned Measures for Commercial Ships and Harbor Craft* (draft October 27, 2004).

90. Ocean-going ships are not motor vehicles. California law defines "motor vehicle" as "a vehicle that is self-propelled." Vehicle Code §415(a). A "vehicle" is "a device by which any person or property may be propelled, moved, or drawn upon a highway, excepting a device moved exclusively by human power or used exclusively upon stationary rails or tracks." Vehicle Code §670. Because they do not operate on the highway, ocean going vessels are not "vehicles."

91. Health & Safety Code §40000.

this statute, the districts retain concurrent authority to regulate nonvehicular sources, including ships.[92]

iv. In-Use Ship Regulations

EPA regulations for the control of emissions from new and in-use nonroad compression engines provide an exception to the general rule of federal preemption in those instances where a state regulates the use and operation of existing nonroad engines.[93] This interpretation was upheld by a federal appellate court in *EMA v. U.S. EPA*, 88 F.3d 1075, 1093-94 (D.C. Cir. 1996). The Part 89 regulations further provide that hours of usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines are examples of state in-use regulations that the EPA believes would not be preempted under the CAA. However, in the EPA's opinion, states would be precluded from adopting regulations that require the retrofit of used nonroad engines unless a waiver of §209 preemption is granted by the Agency.[94]

There is some debate over the extent of the "in-use" ship exception to preemption. A report of the National Association of Attorneys General suggests that states may impose "in-use" restrictions upon vessels, including limits on the sulfur content of marine diesel fuel and ship operational limitations.[95] But the report finds "there remains a question" whether states have been preempted, by a pervasive federal regulatory scheme, from imposing equipment requirements on vessels, such as sulfur "scrubbers" or engine modifications for NOx reduction.[96]

Given that marine vessel engines fall within the CAA's definition of nonroad engines, they should be subject to similar treatment with respect to the authority of states to adopt use and operation requirements, potentially including limits on the sulfur content of fuels in marine engines. However, PMSA believes such a position needs to be considered in light of 40 C.F.R. §89.1(b)(4), which provides that Part 89 regulations do not apply to marine engines regulated under 40 C.F.R. Part 94, which covers emission standards for Category 3 marine diesel engines on domestic vessels. PMSA believes it is unclear whether the types of in-use requirements authorized by the EPA for those categories of nonroad engines regulated under Part 89 would also be held to extend to marine diesel engines on ocean-going vessels, for which the need for uniform national standards is arguably a much higher priority. EPA views the Agency's interpretation set forth in appendix A of subpart A to part 89 as applicable to all nonroad engines, including locomotive and marine engines. PMSA believes, to the extent Part 89 applies here,

92. Manaster & Selmi, *California Environmental Law and Land Use Practice*, §41.06(2).

93 . 40 C.F.R. Part 89.

94. *See* 40 C.F.R. Part 89, Appendix A to Subpart A

95. National Association of Attorneys General, *Floating Cities, Urban Problems: A Report by the National Association of Attorneys General Cruise Ship Workgroup* (2002) 31.

96. *Id*. at 31, n. 179.

any emission control measures requiring the retrofit of existing engines on such vessels falls within §209 preemption.

SCAQMD and NRDC believe that operational restrictions on ships, as well as fuel requirements, are clearly not preempted by the Federal CAA. Therefore, the City of Los Angeles would not need either EPA or CARB approval to adopt an ordinance regulating the operation or fuel usage of marine vessels. Similarly, SCAQMD and NRDC believe the City could adopt an ordinance requiring mass emission caps for ship operations.[97]

5. Stationary Source Emissions Controls Are Not Preempted

Although establishment of certain mobile source emission standards have been preempted by state and federal law, the CAA and related California state air quality laws have not disturbed the traditional power of cities and counties to regulate non-mobile stationary sources of emissions. Local regulation of stationary sources is explicitly permitted so long as such regulations are at least as stringent as those adopted by state or regional air quality agencies.[98] Health & Safety Code §39002 provides that "local and regional authorities may establish stricter standards than those set by law or by the state board for non-vehicular sources."[99] Thus, the Port may adopt rules or regulations controlling emissions of stationary sources so long as they are at least as stringent as similar requirements imposed under any other federal or state laws or regulations. However, there are few stationary sources of emissions within the Port.

E. OTHER POTENTIAL LIMITATIONS UPON MUNICIPAL POWERS

1. The Shipping Act of 1984

As a marine terminal operator, the Port is obligated to comply with the Shipping Act of 1984, a federal statute implemented and regulated by the Federal Maritime Commission.[100] Section 10(d)(1)[101] of the Shipping Act requires the Port to establish "just and reasonable" regulations and practices relating or connected with receiving, handling, storing or delivering property. Section 10(d)(4) states: "No marine terminal operator may give any undue or unreasonable preference or advantage" or impose "any undue or unreasonable prejudice or disadvantage" with respect to any person.

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97. 40 C.F.R. Part 89, subpart A, App. A.

98. *Western Oil and Gas Association v. Monterey Bay Unified Air Pollution Control District,* 49 Cal.3d 408 (1989) ("The board's control measure is a *minimum* standard for regulation by districts throughout the state.")

99. See also, Health & Safety Code §40449(a) and §40402(g); *People ex rel. Deukmejian v. County of Mendocino*, (1984) 36 Cal. 3d 476; *Legislative Analyst Report: "Diesel Emissions"* to the San Francisco Board of Supervisors (August 14, 2001) text at note 56.

100. The Shipping Act of 1984, as modified by the Ocean Shipping Reform Act of 1998, 46 U.S.C. §1701 et seq.

101. 46 U.S.C. §1709(d)(1).

Generally speaking, the Shipping Act of 1984 requires the Port to treat all of its tenants and customers with equal consideration. Under §10(d)(1), any control measure to implement the NNI policy, including any action taken through the Port's tariffs or leases, must be "just and reasonable." Control measures implemented through tariffs and leases may not create an unreasonable preference or advantage in favor of one Port customer or lessee over another. Likewise, tariffs and leases may not unreasonably prejudice or impose an unreasonable disadvantage on any customer or lessee.[102]

2. The Commerce Clause

a. In General

The Commerce Clause of the United States Constitution grants Congress the power to regulate commerce with foreign nations and among the states, and limits State power to "erect barriers against interstate trade.[103] This affirmative grant of power in the Commerce Clause has been interpreted to limit state and local governments from interfering with interstate or foreign commerce.[104] These implicit constitutional prohibitions have come to be known as the "dormant Commerce Clause" and the "dormant Foreign Commerce Clause," respectively. To determine whether a regulation violates the dormant Commerce Clause or the dormant Foreign Commerce Clause, the courts apply different levels of scrutiny depending on whether the regulation discriminates against interstate or foreign commerce, or whether the regulation's effect on interstate or foreign commerce is only "incidental" to an otherwise legitimate regulatory purpose. Finally, the courts have made a more extensive inquiry into all regulations that burden foreign commerce.

Under the dormant Commerce Clause, facially discriminatory state or local laws that discriminate against interstate commerce in favor of intra-state commerce are invalid unless the law serves a legitimate local purpose that cannot be served as well by available nondiscriminatory means.[105] However, nondiscriminatory regulations that create only an "incidental" burden on interstate commerce are valid "unless the burden imposed on such commerce is clearly excessive in relation to the putative local benefits."[106] As stated by the Supreme Court, "(t)he Commerce Clause significantly limits the ability of states and localities to regulate or otherwise burden the flow of interstate commerce, but it does not elevate free trade above all other values. As long as a state does not needlessly obstruct interstate trade or attempt

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102. See, National Association of Attorneys General, *Floating Cities, Urban Problems: A Report by the National Association of Attorneys General Cruise Ship Workgroup* (2002) at 61-62.

103. U.S. Const. Art. 1, §8, cl. 3; *Maine v. Taylor*, 477 U.S. 131, 137 (1986).

104. *Maine v. Taylor*, 477 U.S. 131, 137 (1986).

105. *Id*. at 138. In *Maine v. Taylor* the Supreme Court upheld a facially discriminatory statute serving to protect the state's fisheries where the purpose could not be served as well by available nondiscriminatory means.

106. *Pike v. Bruce Church, Inc.,* 397 U.S. 137, 142 (1970).

to 'place itself in a position of economic isolation' (citation omitted), it retains broad regulatory authority to protect the health and safety of its citizens and the integrity of its natural resources."[107]

b. Regulations Discriminating Against Interstate or Foreign Commerce.

If a state or local regulation affirmatively discriminates either on its face or in practical effect against interstate or foreign commerce, "the burden falls on the State [or local government] to demonstrate both that the statute serves a legitimate local purpose, and that this purpose could not be served as well by available nondiscriminatory means.[108] "'Discrimination' simply means differential treatment of in-state and out-of-state economic interests that benefits the former and burdens the latter."[109] Similarly, a regulation discriminates against foreign commerce when it prefers domestic commerce over foreign commerce.[110] Such discriminatory regulations are "virtually *per se* invalid" under the dormant Commerce Clause and the dormant Foreign Commerce Clause.[111] Rail and PMSA believe that some NNI measures under consideration may discriminate on their face against out-of-state or foreign commerce. Whether any of the measures in practice results in a preference for in-state operations or favors domestic commerce over foreign commerce are fact-based questions that merit further consideration. To the extent that a measure favors domestic commerce, SCAQMD and NRDC believe that the local air pollution problems create a legitimate local purpose that cannot be served by less discriminatory means. Rail and PMSA do not concur.

The Supreme Court has also stated that where Congress has authorized a state to regulate, "any action taken by a State within the scope of the congressional authorization is rendered invulnerable to Commerce Clause challenge."[112] Regulation of nonroad engines within the

107. *Maine v. Taylor*, *supra*, 477 U.S at 151.

108. *Maine v. Taylor*, 477 U.S. at 138; *Kraft General Foods v. Iowa Dept. of Revenue & Finance,* 505 U.S. 71, 81 (1992) ("Absent a compelling justification, . . . a State may not advance its legitimate goals by means that facially discriminate against foreign commerce."); *City of Philadelphia v. New Jersey,* 437 U.S. 617, 626-29 (1978) (same).

109. *Oregon Waste Systems Inc. v. Dept. of Environmental Quality*, 511 U.S. 93, 99 (1994).

110. *Kraft General Foods*, 505 U.S. at 79.

111. *Oregon Waste Systems*, 511 U.S. at 99 (dormant Commerce Clause); N*ational Foreign Trade Council v. Natsios,* 181 F.3d 38, 67 (1st Cir. 1999) (dormant Foreign Commerce Clause), affirmed on other grounds in *Crosby v. National Foreign Trade Council*, 530 U.S., 363 (2000).

112. *Western & Southern Life Ins. Co. v. State Board of Equalization*, 451 U.S. 648, 652-653 (1981) (citations omitted).

scope of a future federal authorization (see §II.F.2.c, below) would be immune from Commerce Clause challenge.

c. Regulations Having an Incidental Effect on Interstate or Foreign Commerce.

A different and less demanding test applies in judging the validity of state or local regulation that does not discriminate on its face against out-of-state or foreign business, but nevertheless has some incidental effect on it.

i. Non-discriminatory Regulations Having an Incidental Effect on Interstate Commerce

If a regulation's effect on interstate commerce are only incidental, it will be upheld under the dormant Commerce Clause unless the burden imposed on interstate commerce is clearly excessive in relation to the local benefits.[113] Courts have upheld certain environmental restrictions against Commerce Clause challenges. Before the adoption of the Clean Air Act, the Supreme Court upheld a city ordinance prohibiting visible smoke emissions from boilers of ships engaged in interstate commerce, where the ordinance did not discriminate against interstate commerce and the goal of the regulation was to reduce air pollution.[114] The Supreme Court has also upheld a state law prohibiting use of plastic nonreturnable milk containers, finding that the incidental burden imposed on interstate commerce was not clearly excessive "in light of the substantial state interest in promoting conservation of energy and other natural resources and easing solid waste disposal problems."[115] More recently, the Ninth Circuit upheld a facially neutral municipal ordinance limiting the noise level of a local airport and limiting the number of jet flights out of the airport.[116] In these cases the courts found that the burdens of the statute on interstate commerce did not outweigh the benefits to the locality. In particular, the Ninth Circuit held: "[T]he [facially neutral] ordinance would violate the commerce clause only if the particular means chosen to achieve its goals were irrational, arbitrary or unrelated to its goals.[117]

Most recently, however, the Ninth Circuit determined that a California Public Utility Commission order requiring railroads operating in the state to develop performance-based train make-up standards would place an undue burden on interstate commerce.[118] Reasoning that any rule regarding the make-up of a train would have "extra-territorial effects in a number of different states" and could create a "patchwork regulatory scheme," the court concluded that

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113. *Pike v. Bruce Church, Inc.,* 137, 142 (1970).

114. *Huron Portland Cement Co. v. City of Detroit*, 362 U.S. 440, 448 (1960).

115. *Minnesota v. Clover Leaf Creamery Co.,* 449 U.S. 456, 472-73 (1981).

116. *Alaska Airlines, Inc. v. City of Long Beach*, 951 F.2d 977, 983 (1992).

117. *Id*. at 984.

118. *Union Pacific R.R. Co. v. California Public Utilities Comm'n*, 346 F.3d 851, 871-72 (9th Cir. 2003).

"[u]nder Supreme Court precedent, such extra-territorial burden is constitutionally infirm."[119] The Supreme Court on the same ground has struck down state laws seeking to regulate the length of trucks and trains while they operated within a state, holding:

> The principle that, without controlling Congressional action, a state may not regulate interstate commerce so as substantially to affect its flow or deprive it of needed uniformity in its regulation is not to be avoided by "simply invoking the convenient apologetics of the police power ...."[120]

Although the Court recognized in those cases that a local actor may have legitimate health and safety reasons for such regulation, it found that the purported safety benefit was unsupported by the record and the adverse impact on interstate commerce outweighed the local state interest.[121]

Rail and PMSA believe that the full range of burdens reaching beyond the footprint of the Port's facilities and into the realm of interstate commerce by means of many of the proposed NNI control measures will be high. Furthermore, Rail and PMSA believe if other port operators or other facilities in the stream of commerce adopt similar measures, it will create a "patchwork regulatory scheme," making compliance difficult if not impossible. Thus, the burden on the free flow of interstate commerce associated with many of the measures will be significant. Rail and PMSA believe, at this time, without the benefit of factual bases on which the benefits and burdens of each of the measures may properly be evaluated, it is not possible to assess which of the proposed NNI control measures will be able to withstand Dormant Commerce Clause scrutiny.[122]

SCAQMD and NRDC believe that the NNI measures would withstand a challenge under the Dormant Commerce Clause because the health and environmental benefits of the measures would be substantial and would likely be found to outweigh any burdens imposed on interstate commerce.

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119. *Id*. at 872 (*citing Raymond Motor Transp., Inc. v. Rice*, 434 U.S. 429, 445-46 (1978); *Southern Pacific Co. v. Arizona*, 325 U.S. 761, 775 (1945); *Healy v. Beer Inst.*, 491 U.S. 324, 336 (1989)).

120. *Southern Pacific Co. v. Arizona,* 325 U.S. 761, 780 (1945) (train length); *see also Kassel v. Consolidated Freightways Corp.*, 450 U.S. 662 (1981) (truck length).

121. *See also CSX Transp., Inc. v. City of Plymouth*, 92 F. Supp. 2d 643, 659-63 (E.D. Mich. 2001) (striking down state law regulating rail operations at road intersections as invalid under the Commerce Clause) *aff'd on other grounds*, 283 F.3d 812 (6th Cir. 2002).

122. EPA has stated: "State emissions controls that are not preempted by the Clean Air Act may violate the Commerce Clause of the U.S. Constitution by imposing an undue burden on interstate commerce." 63 F.R. at 18994 (April 16, 1998).

The NNI measures are being evaluated and quantified separately and concurrently by the Financial Working Group.

ii. Non-discriminatory Regulations Having an Incidental Effect on Foreign Commerce

A more extensive constitutional inquiry is required of courts analyzing the validity of a state regulation that burdens commerce with foreign nations.[123] Because it is crucial to the efficient execution of the nation's foreign policy that "the Federal Government . . . speak with one voice when regulating commercial relations with foreign governments,"[124] any regulation that frustrates the ability of the Federal Government to do so is invalid under the dormant Foreign Commerce Clause.[125] This inquiry is a fact-dependent one. The Supreme Court has upheld certain measures affecting foreign commerce against challenges based on the one-voice doctrine.[126] Thus, whether any of the measures frustrates the ability of the federal government to speak with one voice (for example, by interfering with the goals or implementation of international treaties or conventions) merits further consideration.

3. Statutes and Agreements Governing Railroads

a. ICC Termination Act

State and local railroad regulation have been preempted to a significant extent. In the ICC Termination Act of 1995 (ICCTA), 49 USC §§10101-11908, Congress created the Surface Transportation Board (STB), a new regulatory agency within the US Department of Transportation, and broadened the express preemption provision of the former Interstate Commerce Act. As amended by the ICCTA, §10501(b) now provides:

> The jurisdiction of the Board over – (1) transportation by rail carriers, and the remedies provided in this part with respect to rates, classifications, rules (including car service, interchange, and other operating rules), practices, routes, services and facilities of such carriers; and (2) the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities, even if the tracks are located, or intended to be located, entirely in one state, is exclusive. Except as otherwise provided in this part, the remedies provided under this part with respect to regulation of rail transportation are exclusive and preempt the remedies provided under federal and state law.

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123. *Japan Line, Ltd. v. County of Los Angeles*, 441 U.S. 434, 446 (1979); *South-Central Timber Development Inc. v. Wunnicke*, 467 U.S. 82, 100 (1984).

124. *South-Central Timber*, 467 U.S. at 100.

125. *Japan Line*, 441 U.S. at 446.

126. Barclays Bank PLC v. Franchise Tax Board, 512 U.S. 298, 320-31 (1994).

Thus, §10501(b) makes the STB's jurisdiction over rail transportation "*exclusive.*" Rail notes that the courts and the STB have held that preemption extends to all rail transportation, regardless of whether the STB directly regulates the particular operation at issue.[127] Moreover, "transportation" is defined broadly to include "a locomotive, car, vehicle, vessel, warehouse, wharf, pier, dock, yard, property, facility, instrumentality, or equipment of any kind related to the movement of passengers or property, or both, by rail, regardless of ownership or an agreement concerning use."[128]

As the courts have observed, "[i]t is difficult to imagine a broader statement of Congress's intent to preempt state regulatory authority over railroad operations" than this statutory provision.[129] The courts and the STB have read §10501(b) expansively to preempt state or local actions that would put state or local authorities in a position to interfere with construction or operation of rail facilities.[130] Thus, courts have held that certain state and local zoning, environmental, noise, nuisance, land use, building permit, demolition, and condemnation laws and regulations are preempted insofar as they could interfere with railroad construction or operations.[131] These cases

127. *See, e.g., Cedarapids, Inc. v. Chicago, Central & Pac. R.R. Co.,* 265 F.Supp.2d 1005, 1013-1014 (N.D. Ia. 2003) (STB's exclusive jurisdiction extends to railroad tracks and operations over which it has no licensing authority); *Flynn v. Burlington Northern and Santa Fe Ry.,* 98 F.Supp. 2d 1186, 1189-90 (E.D. Wa. 2000)(STB's exclusive jurisdiction over construction and operation of railroad fueling facility preempts local environmental permitting requirements, even if STB does not regulate such construction or operations; *Cities of Auburn and Kent, WA – Petition for Declaratory Order – Burlington Northern R.R. Co. – Stampede Pass Line,* STB Fin. Dkt. No. 33200, 1997 WL 362017, *7, 2 S.T.B. 330, 341 (1997) ("Congress intended to . . . leav[e] the construction and disposition of auxiliary tracks entirely to railroad management"), *aff'd sub nom. City of Auburn v. United States,* 154 F.3d 1029 (9th Cir. 1998); *Joint Petition for Declaratory Order – Boston and Maine Corp. and Town of Ayer, MA,* 2001 WL 458685, *4 (served May 1, 2001) (listing court cases holding that ICCTA preemption applies even in cases where STB lacks licensing and conditioning authority). *See also United Transp. Union v. STB,* 183 F.3d 606, 612 (7th Cir. 1999) (while STB has exclusive jurisdition over spur track, it lacks authority to regulate spur track).

128. 49 U.S.C. §10102(9).

129. *City of Auburn,* 154 F.3d at 1030 (quoting *CSX Transp., Inc. v. Ga. Pub. Serv. Comm'n,* 944 F. Supp. 1573, 1581 (N.D. Ga. 1996)).

130. In addition to the express language of §10501, the long history of federal regulation of railroads provides further support for an expansive reading of the statute. *See, e.g., City of Auburn,* 154 F.3d at 1029. *See also United States v. Locke,* 529 U.S. 89, 107 (2000) (no presumption against preemption of state law "when the State regulates in an area where there has been a history of significant federal presence"); *CSX Transp., Inc. v. Williams,* __ F.3d __ , 2005 WL 1023044, *6 (case for federal preemption of local law seeking to regulate hazardous materials transportation particularly strong in light of long-standing federal regulation of nation's rail system); *but see Florida East Coast Railway v. City of West Palm Beach*, 266 F.3d 1324, 1329 (11th Cir. 2001)(noting that in enacting a zoning ordinance, the City was "acting under the traditionally local police power of zoning and health and safety regulation" instead of regulating in the area of railroad regulations -- an area with significant federal presence).

131. *See, e.g., Green Mountain R.R. Corp. v. State of Vermont,* 404 F.3d 638, 641-45 (2d Cir. 2005) (state environmental permitting of transload facility in rail yard preempted); *Friberg v. Kansas City S. Ry.,* 267 F.3d 439, 443 (5th Cir. 2001) (state statute restricting trains from blocking intersections preempted); *City of Auburn,* 154 F.3d at 1029-31 (state and local environmental and land use regulation of rail facilities and operations preempted); *Dakota, Minn. & Eastern R.R. v. State of South Dakota,* 236 F. Supp.2d 989, 1005-08 (S. S.D. 2002) (revisions to state's eminent domain law preempted where they added new burdensome qualifying requirements to railroad eminent domain power), *aff'd on other grounds,* 362 F.3d 512 (8th Cir. 2004); *Wisc. Central Ltd. V.*

do not expressly address whether potential exceptions to preemption under the market participant or municipal-proprietor doctrines may apply, as discussed below in §II.F.2.

The STB is an independent decisional body that courts have stated is "uniquely qualified to determine whether state law . . . should be preempted" under the ICCTA.[132] The STB decisions are reviewable by the federal circuit courts of appeal. The STB too has read §10501(b) broadly to preempt local permitting or regulatory requirements that could unduly interfere with a railroad's construction or operating plans.[133]

Even with this expansive reading of the preemptive scope of the ICCTA, the courts and the STB have determined that "not all state and local regulations are preempted."[134] "[F]ederal courts recognize that the [ICC] Termination Act preempts most pre-construction permit requirements imposed by states and localities."[135] "'State and local permitting or preclearance requirements (including environmental requirements) are preempted because by their nature they unduly interfere with interstate commerce.'"[136] However, other requirements, such as "[e]lectrical, plumbing and fire codes, direct environmental regulations enacted for protection of the public health and safety, and other generally applicable, non-discriminatory regulations and permit

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City of Marshfield, 160 F. Supp.2d 1009, 1014 (W.D. Wisc. 2000) (attempt to use a state's general eminent domain law to condemn an actively used railroad passing track, for purposes of building a highway, preempted); *Soo Line R.R. v. City of Minneapolis,* 38 F. Supp.2d 1096 (D. Minn. 1998) (local permitting regulation regarding demolition of buildings in rail yard preempted); *Norfolk S. Ry. v. City of Austell,* 1997 WL 1113647 (N.D. Ga. 1997) (local zoning and land use regulations preempted); *Village of Ridgefield Park v. New York, Susquehanna & W. Ry.,* 750 A.2d 57 (N.J. 2000) (complaints about rail operations under local nuisance law preempted); *Burlington Northern and Santa Fe Ry. v. City of Houston,* S.W.3d, 2005 WL 1118121 (Tex. App. 2005) (interpretations of state condemnation law that would prevent condemnation of city land required for construction of rail line preempted).

132. *Green* Mountain*,* 404 F.3d at 642; *Ga. Pub. Serv. Comm'n,* 944 F. Supp. At 1584 (*quoting Medtronic, Inc. v. Lohr,* 518 U.S. 470, 496 (1996).

133. S*ee, e.g.,, North San Diego County Transit Dev. Bd. – Petition for Declaratory Order,* STB Fin. Dkt. No. 34111, 2002 WL 1924265 (served Aug. 21, 2002) (California Coastal Commission regulation of construction of rail siding preempted); *Town of Ayer,* 2001 WL 458685, *5-7 (determining that state and local permitting, environmental review, and noisome trade ordinance were preempted; also determining that the Safe Drinking Water Act and the Clean Water Act were used as a "pretext" to halt the construction of an automobile unloading facility); *Borough of Riverdale – Petition for Declaratory Order – The New York, Susquehanna & W. Ry.,* STB Fin. Dkt. No. 33466, 1999 WL 715272 (served Sept. 10, 1999) (local zoning concerning railroad's construction and operation of transload facility preempted).

134. *Green Mountain,* 404 F. 3d at 643-44 ("what is preempted is the permitting process itself, not the length or outcome of that process in particular cases")...

135. *Id. at 642.*

136. *Id.* (*quoting Town of Ayer,* 2001 WL 458685 at *5).

requirements would seem to withstand preemption."[137] In determining whether a state or local requirement is preempted under §10501(b), courts and the STB have looked into whether that requirement could interfere with interstate rail operations, and found preemption where there such interference could result.[138]

Rail notes that most of the cases that have upheld state or local regulations against an ICCTA preemption challenge have done so on the ground that the activities involved are not integral to the provision of rail transportation services.[139] Rail believes that, insofar as the NNI measures address activities that are integral to the provision of rail transportation services, they will raise ICCTA preemption issues. Rail believes that if a measure is regarded as a regulatory permitting or pre-clearance requirement, it will be held preempted by the ICCTA. Rail believes that a measure may be upheld only if it is regarded as a generally applicable, non-discriminatory regulatory requirement, and will not interfere with rail operations. SCAQMD and NRDC note that the STB has made clear "that state or local regulation is permissible where it does not interfere with interstate rail operations, and that localities retain certain police powers to protect public health and safety."[140]

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137. *Id.* at 643 (*citing Village of Ridgefield Park*, 750 A.2d at 54. *See* also *State of Oklahoma v. Burlington Northern & Santa Fe Railway Co.*, 2001 Ok. Civ. App. 55, 24 P.3d 368 (2000) (holding that administrative law judge's decision requiring railroad to repair fence separating railroad right-of-way from landowner's property is not preempted under the ICCTA, because it has no impact on railroad's operations); *Town of Ayer*, 2001 WL 458685 at *7(local agency may impose reasonable and nondiscriminatory environmental measures which do not unduly burden interstate commerce or unduly restrict the railroad from conducting its operations); *Borough of Riverdale,* 1999 WL 715272 at (certain environmental and land use regulations would be subject to a "fact-bound" analysis of whether a particular restriction interferes with railroad operations and interstate commerce).

138. *See, e.g., Green Mountain,* 404 F.3d at 644-45; *Friberg,* 267 F.3d at 443; *City of Auburn,* 154 F.3d at 1030-31; *City of Marshfield,* 160 F. Supp.2d at 1014; *CSX Transp., Inc. – Petition for Declaratory Order,* STB Fin. Dkt. No. 34662, 2005 WL 584026, slip op. at 8 (served March 14, 2005); *Jones v. Union Pacific R.R.,* 79 Cal. App. 4th 1053, 1060 (2000).

139. *See, e.g., Florida East Coast Ry. v. City of West Palm Beach,* 266 F.3d 1324, 1332-37 (11th Cir. 2001) (operation of aggregate business by non-railroad company on railroad property is not rail "transportation"); *Native Village of Eklutna v. Alaska R.R. Corp.,* 87 P.3d 41, 57 (Alaska 2004) (railroad's operation of a gravel quarry not integrally related to rail operations); *In re Appeal of Vermont Railway,* 171 Vt. 496, 769 A.2d 648, 654-55 (2000) (local regulatory constraints on truck operations do not interfere with railway operations); *State of Oklahoma v. Burlington Northern and Santa Fe Ry.,* 24 P.3d 368, 371-372 (Ok. 2000) (local order that railroad repair three-tenths of mile of fence does not have any impact on railroad's interstate operations); *Jones v. Union Pacific R.R.,* 79 Cal. App. 4th 1053, 1060-61 (Cal. 2000) (where plaintiff alleged horn blowing and idling locomotives served no transportation purpose, but was done solely to harass plaintiff homeowners, triable issue existed regarding whether railroad's activity was integrally related to its operations); *Town of Milford, MA – Petition for Declaratory Order,* STB Fin. Dkt. No. 34444, 2004 WL 1802301, slip op. at 2-4 (served Aug. 12, 2004) (operation of steel fabrication business by non-railroad on railroad property is not rail "transportation"); *Hi Tech Trans, LLC – Petition for Declaratory Order – Newark, NJ,* STB Fin. Dkt. No. 34192 (Sub-No. 1), 2003 WL 21952136, slip. op. at 5-7 (operation of transload facility by non-railroad, not under the auspices of a railroad, not rail "transportation").

140. *Borough of Riverdale Petition for Declaratory Order re The New York Susquehanna and Western Railway Corporation*, *supra* at p. 4.

SCAQMD and NRDC believe that to the extent certain NNI measures are classified as health and safety regulations, they would not be subject to preemption under the ICCTA, as long as the factual inquiry shows that the regulations do not unduly interfere with interstate rail operations. SCAQMD and NRDC believe that none of the ICCTA cases cited by Rail deal with the situation where the rail facility is located upon state land held in trust by a port, such as the Port of Los Angeles. Therefore, SCAQMD and NRDC believe that it is unlikely that the ICCTA would be found to preempt the Port's permitting authority or regulatory authority over Port-owned property, should approval be sought for a rail facility or operations. SCAQMD and NRDC believe that the Port could avoid preemption under the ICCTA (or violation of the Commerce Clause) through application of the market participant or municipal proprietor exceptions discussed in §II.F.2, below.[141]

Rail believes that there is no doubt under the case law that rail operations both inside and outside the Port are an integral part of the interstate rail network , and that the NNI control measures being proposed with respect to rail are likely to be found to interfere with those operations in violation of the ICCTA. Rail notes that courts have specifically held under the ICCTA that the fact that a state or locality controls land or easements used or required for railroad operations does not entitle the state or locality to use its control to impose regulatory conditions on interstate rail operations.[142] More generally, courts have held that states and localities cannot escape federal preemption by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate commerce.[143]

b. Legal Issues Relating to South Coast MOU

Locomotives operating throughout the South Coast Air Basin (SCAB) --- including rail yards --- are subject to the requirements of Memorandum of Mutual Understandings and Agreements -- South Coast Locomotive Fleet Average Emissions Program, dated as of July 2, 1998, between CARB, UPRR and BNSF (MOU). The MOU requires the entire locomotive fleet, including all line-haul, local and switch locomotives, operated by UPRR and BNSF line-haul locomotive fleet in the South Coast Air Basin to achieve a 5.5 g/bhp-hr NOx fleet average by 2010.

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141. SCAQMD and NRDC believe that the cases cited by Rail below for the proposition that “states and localities cannot escape federal preemption by using their proprietary or contractual control of property” are not instructive on either the scope of ICCTA’s preemption provisions or the application of the market participant or municipal proprietor exceptions under the present facts. Such cases were not decided under ICCTA, but rather the dormant Commerce Clause or ERISA. Further, the cases are factually distinguishable, *see* §II.F.2, below, and thus, do not preclude application of either exception by the Port to implement the NNI measures. SCAQMD and NRDC note that neither the market participant nor the municipal proprietor exceptions have been rejected or applied in the context of the rail provisions of the ICCTA.

142. *See, e.g., State of South Dakota,* 236 F.Supp.2d at 1005-08; *City of Houston,* 2005 WL 18121, *5-7.

143. *See, e.g., Western Oil and Gas Assoc. v. Cory,* 726 F.2d 1340, 1342-43 (9th Cir. 1984) (state’s proprietary control of tidelands did not permit it to use its leasing activities to escape Commerce Clause scrutiny); *Western State Bldg. & Trade Council v. Spellman,* 684 F.2d 627, 631 (9th Cir. 1982) (state’s proprietary control of waste disposal site did not permit it to impose regulatory constraints on interstate commence); *Air Transport Assoc. of America v. City of San Francisco*, 992 F.Supp. 1149, 1163-64, 1179-80 (N.D. CA 1998) (city’s proprietary control of airport did not permit it to impose contractual conditions on airlines that conflicted with dormant Commerce Clause and ERISA).

The South Coast MOU has remained in effect without amendment or modification since 1998. This legal contract remains in full force and effect now and will remain in effect, subject to the termination clause discussed below.

The MOU provides for termination "in the event that the State of California or any political subdivision thereof takes any action to establish (i) locomotive emission standards; (ii) any mandatory locomotive fleet average emissions standard; or (iii) any requirement applicable to locomotives or locomotive engines and within the scope of the preemption established in the Final EPA National Locomotive Rule." Accordingly, action to adopt any measures in the NNI plan that fall within one of these categories could lead to termination of the MOU and loss of the emissions reductions that would otherwise occur under the MOU.

Measure R7 (Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1) and R10 (Idling Controls for Switcher and Line Haul Locomotives) set performance based "Emissions Standards" that would apply to new locomotives.[144] Adoption of these measures, if adopted as regulations, constitute "action to establish . . . locomotive emission standards" and thus could jeopardize the MOU, unless an exception to preemption applies, as discussed below.

Measures R9 (ARB Diesel Fuel for Class 1 Railroad Locomotives) and R11 (Efficiency Improvements on In-Use Class 1 Rail Equipment), could set performance based "Emissions Standards" that would apply to new locomotives, in which case adoption of these measures, if adopted as regulations, would constitute "action to establish . . . locomotive emission standards" and thus could jeopardize the MOU, unless an exception to preemption applies, as discussed below. A critical issue is whether they would impose "in use" requirements that are permissible under §209(e). To the extent R9 and R11 do not "affect how a manufacturer designs or produces new . . . locomotives or locomotive engines," they would not be preempted.

SCAQMD and NRDC believe that Measure R9, as a sulfur limit in fuel burned in nonroad engines," falls within the traditional category of "in use" requirements not falling within the scope of preemption," unless such measures require design modifications to the locomotive's engine. If the railroads decide to make equipment modifications as a method of compliance with this measure – but where the modifications are not necessary to use the cleaner fuel – then SCAQMD and NRDC believe that this measure would not fall within the scope of preemption. Rail believes that, as currently proposed, R9 involves retrofits and other design changes to locomotives, including requirements involving the addition of auxiliary fuel tanks, and therefore that it is preempted under the EPA Rule and its adoption would jeopardize the MOU.

Whether measure R11 constitutes an "emissions standard" subject to the termination clause is likewise related to whether the efficiency improvements can be achieved without modification of the engine or by application of controls (e.g., by increased lubrication or other adjustments). To the extent the improvements would require modification of the engine or other locomotive

144. SCAQMD and NRDC believe that R10 could be revised to avoid preemption by not requiring equipment modifications. Rail believes revisions will require additional review by the NNI Task Force, including technical, financial and legal review.

modifications, then this measure would fall within the scope of EPA's preempting regulations. However, modification of the rail cars (for example, to reduce friction) would not fall within the §209(e) preemption, which only covers modifications to the locomotive and locomotive engine. Therefore, to the extent efficiency improvements can be made without modification of the locomotive engine or locomotive (such as by modification of the rail cars), this measure would not fall within the scope of CAA preemption.[145]

Rail believes that R11 would establish an equipment standard because the efficiency improvements would include application of emissions reductions technology. The railroads note that there are inherent connections between engine efficiency and engine design (which make diesel electric locomotives among the most efficient and lowest emitting transportation power trains) as well as inherent connections between engines and the fuels they are designed to consume. Thus, the railroads believe that measures R9 and R11 would be preempted and their adoption would jeopardize the MOU.

To the extent that measures R7, R9, R10 or R11 establish requirements that could trigger the MOU's termination clause, SCAQMD and NRDC believe the Port could reasonably argue that it could implement the measures as a market participant or municipal-proprietor, without triggering the termination clause of the MOU because such implementation would not establish a regulation or a "standard," but rather consist of proprietary actions by the Port. For example, SCAQMD and NRDC believe that as the port negotiates a lease for a railroad yard on port property, it arguably could require that the locomotives calling on the yard meet a cleaner standard and install idling controls.

Rail notes that the MOU does not contain any exception for governmental action, and they believe that therefore the market participant and municipal proprietor exceptions would not apply, and such action could lead to termination of the MOU. Rail also believes that Port adoption of R7, R9, R10 or R11 thus creates a material risk that the entire South Coast will lose the benefits of the South Coast MOU without any certainty that those measures will survive challenge or provide compensating emissions reductions.

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145. In addition, SCAQMD and NRDC believe that EPA's regulations, to the extent they purport to absolutely preempt controls on engines that are not "new" as that term is used in the Clean Air Act in describing "new motor vehicles"(42 U.S.C. sec. 7550(3)), are in conflict with the Clean Air Act's provision that the absolute preemption applies only to "new" locomotives or engines, and that EPA should accordingly interpret or revise its regulations to correct this deficiency at its earliest opportunity. The railroads believe EPA's regulations are consistent with the Clean Air Act and Congress' intent to provide an absolute preemption for locomotives. The railroads also note that the statue of limitations in Clean Air Act §307(b) bars litigation concerning this aspect of EPA's current regulations and that this issue involves speculation about future changes to EPA regulations during the possible lengthy life of the NNI plan.

sailing school students."[151] Equipment and material subject to regulation under §3306 "may not be used on any vessel without prior approval of the Secretary."[152] Under §3306, the Coast Guard exercises similar jurisdiction over non-tank vessels as that provided for under the PWSA regarding tank vessels.

The U.S. Supreme Court has, however, acknowledged that, under statutes intended to insure the safety of vessels, a role remains for state and local regulation of "local ports and waters under appropriate circumstances."[153] Appropriate circumstances may include efforts derived from a state's residual powers to abate air pollution to protect public health and the environment.[154] A control measure that requires modifications to a vessel or a vessel's operating practices must not conflict with Coast Guard requirements.

PMSA believes, based on applicable U.S. Supreme Court precedent, the outcome of any potential challenge to an NNI control measure directed at ocean-going vessels may depend, in large part, on the extent to which the particular measure encroaches upon the Coast Guard's regulatory authority under either Titles I or II of the PWSA. With respect to matters covered under Title II, the Court has held that Congress intended to subject the field to uniform federal regulation. Accordingly, "only the Federal Government may regulate the 'design, construction, alteration, repair, maintenance, operation, equipping, personnel qualification, and manning' of tanker vessels." *Locke*, 529 U.S. at 110-111. On the other hand, the Court has held that Title I authorizes a state "to regulate its ports and waterways, so long as the regulation is based on 'the peculiarities of local waters that call for special precautionary measures'." *Locke,* 529 U.S. at 109 *(*quoting from *Ray*, 435 U.S. at 171). The measure must also not conflict with any regulations promulgated by the Coast Guard, or with an express determination by the Coast Guard that no regulations concerning the particular subject matter are necessary. *Locke*, 529 U.S. at 109-110; *Ray*, 435 U.S. at 171-172, 178. Accordingly, NNI control measures directed at ocean-going vessels that can survive a field preemption claim under Title II may be allowed under Title I to the extent they "do not affect vessel operations outside the [port's] jurisdiction, do not require adjustment of systemic aspects of the vessel, and do not impose a substantial burden on the vessel's operation" within those areas subject to the port's jurisdiction. *Locke*, 529 U.S. at 112.

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151. 46 U.S.C. §3306(a)(1).

152. 46 U.S.C. §3306(b)(1).

153. *See*, *e.g. Locke*, 529 U.S. at 108-109.

154. *See Ray*, 435 U.S. at 165 (distinguishing regulations that fall within the preemptive scope of the PWSA from the smoke stack opacity ordinance in *Huron Portland Cement Co. v. City of Detroit*, 362 U.S. 440 (1960); *see also Grand Canyon Dories, Inc. v. Idaho Outfitters and Guides Bd*., 709 F.2d 1250, 1254 (9th Cir. 1983) (holding that a local licensing requirement for all commercial raft outfitters and guides was not preempted by the Federal Boat Safety Act of 1971).

However, SCAQMD and NRDC do not believe that the preemptive scope of Title II is as broad as portrayed above. [155] In its analysis of the scope of Title II's preemptive reach, the *Ray* opinion relied upon its prior decision in *Huron Portland Cement Co. v. Detroit,* stating that it did "not question in the slightest the prior cases holding that enrolled and registered vessels must conform to reasonable, nondiscriminatory conservation and environmental protection measures imposed by a State."[156] In *Huron*, a local rule imposing criminal penalties for failing to comply with a local smoke abatement code was not preempted by federal maritime laws even though "*[s]tructural alterations* would be required in order to insure compliance with the Code."[157] The *Huron* Court held that "there is no overlap between the scope of the federal ship inspection laws and that of the municipal ordinance here involved. For this reason we cannot find that the federal inspection legislation has pre-empted local action."[158] The lack of overlap derived from the fact that "[t]he thrust of the federal inspection laws is clearly limited to affording protection from the perils of maritime navigation…[while] the sole aim of the Detroit ordinance is the elimination of air pollution to protect the health and enhance the cleanliness of the local community."[159] Accordingly, SCAQMD and NRDC believe that the NNI control measures, like the local ordinance in *Huron*, could withstand a federal preemption challenge. Moreover, even PMSA acknowledges above that federal preemption under Title II is limited to "regulation" concerning the "design, construction, alteration…" of "tanker vessels." Accordingly, Title II does not limit the Port's ability to impose air quality measures in its proprietary capacity such as in a lease condition applicable to tanker and all other ocean-going vessels.

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155 In addition, SCAQMD and NRDC disagree with PMSA's interpretation of *Locke* as providing for broad preemption under Title I. The statement in *Locke* quoted by PMSA is taken out of context. The entire quote reads: "Local rules not preempted under Title II of the PWSA pose a minimal risk of innocent noncompliance, do not affect vessel operations outside the jurisdiction, do not require adjustment of systemic aspects of the vessel, and do not impose a substantial burden on the vessel's operation within the local jurisdiction itself." This statement was made in the context of explaining why the Court in *Ray* upheld state rules requiring a tug escort for certain vessels and why local pilot rules for registered vessels have historically been upheld, and the Court was not opining on the breadth of Title I preemption generally. Indeed, under the broader reading of this language urged by PMSA, the regulation in *Huron* would not pass muster, but obviously the Court was not intending to overturn that holding.

156. *Ray*, 435 U.S. at 164 (quoting *Douglas v. Seacoast Products, Inc.*, 431 U.S. 265, 277 (1977); citing *Manchester v. Massachusetts*, 139 U.S. 240 (1891); *Huron*, 362 U.S. 440) (internal citations omitted)).

157. *Huron*, 362 U.S. at 441, 446 (emphasis added).

158. *Id*. at 446.

159. *Id*. at 445.

b. Offshore Geographical Jurisdictional Limitations

Certain proposed control measures seek to reduce emissions from marine vessels, including foreign flag marine vessels, heading to or from the Port. Such measures raise the issue of the offshore geographical jurisdiction of the Port to adopt and enforce measures to control air emissions and vessel operations beyond the Port's physical boundaries.

PMSA notes that in 1947, the U.S. Supreme Court held that the United States, rather than the individual coastal states, had "paramount rights in and power over" those submerged lands and overlying waters located within three miles of the coast. *United States v. California*, 332 U.S. 19 (1947). Largely in response to that decision, Congress adopted the Submerged Lands Act in 1953, which granted the State of California and other coastal states ownership of all submerged lands extending out three nautical miles from their respective coastlines. 43 U.S.C. §1301, *et seq.* Pursuant to the Outer Continental Shelf Lands Act, adopted in that same year, Congress declared that all submerged lands located seaward and outside of those submerged lands that had been granted to the states (commonly referred to as Outer Continental Shelf Lands) would remain subject to the jurisdiction of the United States. 43 U.S.C. §1331, *et seq.*

The Secretary of the Department of Interior was subsequently delegated with the responsibility for establishing rules and regulations governing the leasing of lands on the Outer Continental Shelf, as well as for the "enforcement of safety, environmental, and conservation law and regulations" with respect to activities conducted thereon. 43 U.S.C. §1334(a). In *California v. Kleppe*, 604 F.2d 1187 (9th Cir. 1979), the Ninth Circuit Court of Appeals, in a case involving offshore oil drilling, held that the Outer Continental Shelf Lands Act provided the Department of Interior with exclusive authority to regulate air quality on the Outer Continental Shelf, based in large part on its conclusion that providing "simultaneous jurisdiction" to the Environmental Protection Agency would be contrary to congressional intent. *Id.* at 1193-1194. Efforts by the State of California and the County of Santa Barbara to assert regulatory authority over air pollution sources associated with offshore oil platforms located on the Outer Continental Shelf, but immediately outside of the three-mile limit, have also been invalidated based on the conclusion that state and local entities lacked jurisdiction to regulate such sources in federal waters. *California v. Exxon Corp.*, No. 78-2849 RMT (GX) (C.D.Cal. 1978).

PMSA notes that in its 1990 Amendments to the federal Clean Air Act, Congress mandated that the EPA establish requirements for the control of emissions from sources - including equipment, activities, or facilities - located on the Outer Continental Shelf. 42 U.S.C. §7627. In 1992, the EPA adopted regulations implementing this requirement, which are currently codified at 40 C.F.R. Part 55. In 1994, the Administrator of EPA Region IX delegated to the SCAQMD authority to implement its Part 55 Outer Continental Shelf Program within 25 miles of the California coastline. *See* 59 Fed. Reg. 36065 (July 15, 1994). This delegation was limited to the regulation of air emissions tied to Outer Continental Shelf sources, and did not extend to the regulation of ocean-going vessels traveling through this area on their way to a U.S. port.

The SCAQMD and NRDC believe that SCAQMD or the Port/City of Los Angeles may potentially seek to support efforts to regulate offshore emissions from ocean-going vessels under the traditional police power authority accorded state and local governments. However, PMSA believes that such measures may constitute an impermissible regulation of extraterritorial conduct. PMSA notes that there exists established precedent that states and localities do not possess the authority to regulate activities beyond their territorial boundaries, even if such conduct may adversely impact the health and welfare of their citizens. *Bigelow v. Virginia*, 421 U.S. 809, 822-825 (1975); *see, e.g., Huntington v. Attrill*, 146 U.S. 657, 669 (1892) (holding that "[l]aws have no force of themselves beyond the jurisdiction of the State which enacts them, and can have extra-territorial effect only by the comity of other States"). Further, PMSA notes that Article XI, §7 of the California Constitution only confers on cities the power to make and enforce *within their jurisdictional limits* any local, police, sanitary, and other ordinances and regulations not in conflict with general laws. Cal. Const., Art. XI, §7; *see* also *Suter v. City of Lafayette*, 57 Cal.App.4th 1109, 1118 (1997).

PMSA notes that, as set forth above, Congress only granted the State of California ownership of those submerged lands located within three nautical miles of the coastline under the Submerged Lands Act. Perhaps in recognition of this limited ownership grant, the California Legislature has chosen to define coastal waters, at least under the Water Code, by reference to this three-mile limitation. Cal. Water Code §13181. Further, in recently-adopted legislation addressing emissions from cruise ships, the Legislature limited its regulation of onboard incineration to operations within three miles of the California coast, and then only in a manner consistent with federal law. Cal. Health and Safety Code §39632. PMSA believes that the Port/City of Los Angeles possesses no direct regulatory authority outside their territorial boundaries, absent evidence that either governmental entity has received an express grant from the State providing it with ownership of, or authority to control activities occurring on, submerged lands located within three nautical miles of its coastal boundary.

SCAQMD and NRDC note that, despite the three geographical mile limit on California's territory, courts have held that in limited situations states may assert regulatory jurisdiction beyond that limit. For example, states may apply their pilotage requirements 30 or more miles from the coast. *Gillis v. State of Louisiana*, 294 F.3rd 755, 761 (5th Cir. 2002) (33 miles). *Wilson v. McNamee*, 102 U.S. 572, 573-74 (1881) (about 50 miles). *The Whistler*, 13 F. 295, 296 (D.Or. 1882) (about 30 miles). The *Gillis* court held that 43 U.S.C. §1312, part of the Submerged Lands Act, addresses only who retains title to submerged land, not the regulation of the waters above. *Gillis, supra,* 294 F.3rd at 761.

SCAQMD and NRDC note that there is also a series of cases holding that states may regulate extraterritorial activities, such as fishing on the high seas adjacent to their coasts either by residents of that state or residents of other states when there is a sufficient nexus with the state in question. For example, in *Jacobson v. Maryland Racing Commission*, 261 Md. 180 (1971) the Court of Appeals held that a nonresident had become a "racing citizen" of that state such that he could be punished for sale of a horse in violation of a Maryland claim-racing law although the sale occurred in another state. Alaska applied the same principle to nonresidents crabbing on the high seas in violation of Alaska law, noting the contacts with the state and services supplied. *State of Alaska v. Bundrant,* 546 P.2d 530 (1976). The court cited the "general proposition that acts done outside a jurisdiction which produce detrimental effects inside it justify a state in punishing he who caused the harm as if he had been present at the place of its effect." *State of Alaska v. Bundrant, supra,* at 555; *see also, State of Alaska v. Sieminski,* 556 P.2d 929 (1976) at 933 (holding that the state may regulate outside its territorial jurisdiction against persons having a certain minimum relationship or nexus with the state, which nexus "can be satisfied in any number of ways"). These cases rely in part on *Skiriotes v. Florida*, 313 U.S. 69 (1941) at 77, in which the U.S. Supreme Court held that a state may govern the conduct of its citizens upon the high seas with respect to matters in which the state has a legitimate interest and where there is no conflict with acts of Congress. *See also, Felton v. Hodges,* 374 F.2d 337 (1967)(holding Florida may regulate commercial fishing beyond the seaward boundary of the state). Finally, there is a principle derived from the so-called "landing law cases," where courts have upheld states assertion of jurisdiction once a vessel has landed over conduct that occurred beyond the territorial confined of a state, if that regulation facilitates conservation of a state resource. *State of Alaska v. Sieminski, supra,* 556 P.2d at 931.

SCAQMD and NRDC contend that all of these principles appear applicable to the NNI measures. At the least, the SCAQMD and NRDC believe operators of vessels that make more than occasional visits to the port and make use of port services could be held to be "shipping citizens" of the state for purposes of regulating certain aspects of their conduct beyond the territorial limits of the state. For example, fuel requirements and vessel speed limitations would appear to be analogous to the rules which governed the location of fishing and type of fishing gear which were upheld in the above cases. It is likely that numerous vessel operators would have sufficient nexus with the port to be subject to its regulation.[160] At a minimum, the SCAQMD and NRDC believe that ships owned by on-shore facilities, as well as those owned by companies making more than occasional visits, would have sufficient nexus. The situation at the port fits within the principle that a state may regulate conduct occurring beyond its borders where the conduct results in detrimental effects (i.e., air pollution) within the state. SCAQMD and NRDC believe it is also possible that the port could adopt requirements having effect beyond the territorial jurisdiction of the state under the market participant or municipal proprietor theories, and as conditions of entry to the Port.

PMSA believes that the SCAQMD and NRDC are misplaced in their reliance on selected pilotage and fishing regulation decisions to support the proposition that the port may have the authority to regulate emissions from activities occurring well outside of California's traditional three-mile limit. First, such a result would directly conflict with those federal statutes referenced above, which provide the federal Department of Interior and the EPA with the express authority to adopt environmental regulations covering activities conducted on the Outer Continental Shelf (expressly including the authority to control air emissions), and those cases which have upheld efforts by the federal government to assert this authority beyond the three-mile limit reserved to the states. Contrary to the position offered by the SCAQMD and NRDC, the PMSA believes that the U.S. Supreme Court has clearly articulated a general rule that ownership of submerged

160.. Although the above cases dealt with the state laws or regulations rather than local ordinances, the SCAQMD and NRDC believe that the same principles of nexus would apply to allow the port to regulate visiting vessels.

lands is presumed to include the right to regulate activities on water overlying these lands. *See U.S. v. State of Alaska*, 521 U.S. 1, 5 (1997).

PMSA further believes that those decisions cited by the SCAQMD and NRDC reflect the special treatment afforded state efforts to regulate in the noted areas (at least as of the dates of the decisions), and accordingly have limited general applicability to the situation at hand. First, in two of the pilotage decisions referenced by the SCAQMD and NRDC, the courts highlighted the fact that this was an area of law in which Congress indicated its intent not to limit, or otherwise disturb, the regulatory powers of the states. *Gillis*, 294 F.3d at 761-762; *Wilson*, 102 U.S. at 574-575. PMSA believes that Congress has shown no such deference with respect to federal environmental regulation of activities in U.S. waters.

PMSA also believes cases cited by the SCAQMD and NRDC as authorizing states to regulate fishing beyond the three-mile limit also appear to reflect a special interest in, or need by the state to regulate, the particular resource at issue. For example, in *State of Alaska v. Bundrant*, 546 P.2d 530 (1976), the court noted that while crab initially developed within the State of Alaska's three-mile limit, they subsequently migrated outside this area into deeper water. Were the State of Alaska prohibited from adopting crabbing regulations covering activities outside of its three-mile limit, the court reasoned that it would be "totally unable to protect and preserve what are functionally its fisheries resources." *Id.* at 551; *see e.g., Felton*, 374 F.2d at 339. Many of the fishing regulation decisions also appear to have involved conduct by citizens or residents of the state in question, and not to have presented implications on foreign commerce and international law. *Skiriotes*, 313 U.S. at 72-73. In fact, in the *State of Alaska* decision, the State confirmed that the regulations at issue were not being, and would not be, applied to foreign nationals. *State of Alaska*, 546 P.2d at 540.

PMSA notes that many of the fishing regulation decisions cited by SCAQMD and NRDC appear to have been based, at least in part, on the fact that Congress had not adopted conflicting federal legislation. Shortly after the issuance of the last of the referenced decisions, Congress passed the Fishery Conservation and Management Act of 1976, now known as the Magnuson-Stevens Fishery Conservation and Management Act. *See*, 16 U.S.C. §1801, *et seq.* As part of this federal statute, Congress has asserted, subject to limited exceptions, exclusive federal authority over fishery management activities in the 200-mile exclusive economic zone. Accordingly, it is possible that each of the fishing regulation decisions cited by SCAQMD and NRDC has been effectively superseded by federal law.

SCAQMD notes that it has an existing Rule 1142 regulating loading, lightering, ballasting, and housekeeping events which applies in South Coast Waters, defined as a subset of California Coastal Waters as defined in 17 C.C.R. §70500(b)(1). Under this definition, California Coastal Waters extend anywhere from 27 miles to as much as 90 miles from the coast. This definition was originally adopted as part of Appendix A to the ARB Staff Report, "Status Report Regarding Adoption by Local Air Pollution Control Districts of Rules for the Control of Emissions from Lightering Operations" ARB Agenda Item 78-4-1 (February 23, 1978), and it is SCAQMD's understanding that ARB intended for local district regulation to extend to the limit of the defined "California Coastal Waters."

PMSA acknowledges that the definitions for the terms "South Coast Waters" found in SCAQMD Rule 1142 and "California Coastal Waters" contained in 17 C.C.R. §70500(b)(1) appear to be based on a definition originally developed by staff at the California Air Resources Board in the late 1970s or early 1980s. This definition was purportedly adopted based upon the results of modeling conducted by ARB meteorologists which indicated that emissions from sources located as far out to sea as the maximum referenced offshore distance could result in onshore impacts. Industry representatives repeatedly challenged the basis for the ARB's offshore impacts determination. They also disputed the conclusion that the State of California has the authority to regulate activities occurring beyond the three-mile limit, even if such impacts could be documented. PMSA believes these challenges are still valid, and is unaware of any court having upheld the authority of the Air Resources Board or the SCAQMD to regulate activities occurring up to 90 miles offshore of the Southern California coastline.

SCAQMD believes that, the reasoning of the courts described earlier allowing regulation of activities within and beyond state waters would apply equally to foreign nationals. Further, the courts have applied U.S. law to foreign-flagged vessels. *See e.g. Cunard S.S. Co. v. Mellon*, 262 U.S. 100 (1923), *Strathearn S.S. Co. v. Dillion*, 252 U.S. 348 (1919). In *Patterson v. Bark Eudora*, 190 U.S. 169, 178 (1902), the U.S. Supreme Court held that conditions may be imposed on a vessel's permission to enter domestic ports: "... the implied consent to permit them to enter our harbors may be withdrawn, and if this implied consent may be wholly withdrawn it may be extended upon such terms and conditions as the government sees fit to impose."

SCAQMD and NRDC believe that modern international law reaffirms the principle of conditions on permission to enter the port. The United Nations Convention on the Law of the Sea, Article 211, Paragraph 3[161] recognizes the right of coastal states to establish "requirements for the prevention, reduction and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports…." Moreover, Article 21 of the U.N. Convention on Law of the Sea specifies that coastal states may adopt regulations applicable to foreign vessels in territorial seas for the preservation of the environment and control of pollution. While paragraph 2 of that article limits such regulations from applying to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules and standards, this limitation "does not affect the right of the coastal state to establish and enforce its own requirements for port entry…." Message of President Clinton Transmitting U.N.C.L.O.S. to the Senate, October 7 1994, p.16.[162] SCAQMD and NRDC believe that the Port of Los Angeles will be able to use this theory, and the other authorities described above, to establish pollution control requirements as conditions applicable to foreign-flagged vessels on permission to enter the Port. PMSA notes that messages of the President do not have force and effect of law and that any control requirements must be consistent with any limitations imposed by applicable federal and state laws and constitutions.

161. http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

162. http://lugar.senate.gov/sfrc/presidentialmessage.pdf

5. Equal Protection Issues

Some of the control measures of the NNI Task Force are proposed for gradual implementation, as mitigation measures in connection with lease renewals, construction projects, etc., at the time new or amended leases or new projects are proposed, instead of across-the-board application of the measure to all Port facilities at the same time through a general Port rule. Such a policy of gradual implementation can be expected to eventually reach most terminals and other port facilities, but not necessarily all. During the time there is a differential application of environmental requirements, Port tenants and others subject to more stringent restrictions may claim that it is unfair to impose requirements differentially and assert a Port obligation to compensate them for such differential costs, because of a competitive disadvantage; a claim that might also arise under the Shipping Act. Case law indicates that such differential application normally would not support an equal protection claim, at least so long as there is some rational basis for the Port's action (absent intentional improper singling out of a particular tenant).[163] However, over time differential costs could become substantial especially where some facilities never have the control measure imposed because lease amendments and new construction projects are never sought. Port tenants could be expected to assert that the Port should consider these differential costs during the mandatory compensation adjustment negotiations required every five years under Los Angeles City Charter §607(b). In addition to concerns about the legal impact of competitive disadvantages between various Port facilities *within* the Port of Los Angeles, there is also a policy concern that could be raised with respect to the problem of competitive disadvantages between the Port of Los Angeles and other Southern California and West Coast ports, should only the Port of Los Angeles institute control measures. However, this is generally a policy issue and may not raise legal issues. This policy issue should be carefully considered in recommending whether the Port should act alone or whether it would be more beneficial to adopt region-wide or statewide rules.

F. THE PORT'S POWERS TO ACT TO REDUCE EMISSIONS

1. The Range of Possible Port Actions

The Port can take a variety of actions to improve air quality at the Port, subject to the legal constraints discussed above. First, the Port can take (and has taken) environmentally progressive direct actions such as the purchase of its own clean fleet vehicles, including electrified and natural gas vehicles.

Second, the Port can work with Port tenants and others to carry out voluntary and incentive-based voluntary air quality programs, such as the Vessel Speed Reduction Program, the Diesel Oxidation Catalyst (DOC) Program to install DOCs on yard equipment at Port terminals and the Gateway Cities Program (to which the Port already has contributed substantial monies) to subsidize the purchase of clean new trucks and take older dirtier trucks out of service.

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163. *See, Stubblefield Construction Co. v. City of San Bernardino* (1995) 32 Cal. App. 4th 687, 713; *Genesis Environmental Services v. San Joaquin Valley Unified Air Pollution Control Dist.* (2003) 113 Cal. App. 4th 597.

Third, as a landlord (holding Port lands in trust for the state of California), the Port, again subject to the legal constraints including federal preemption, the Shipping Act, ICCTA and the Commerce Clause, and certain other legal constraints may be able to include certain environmental requirements and restrictions in Port leases, permits, and other Port project approvals.[164]

Fourth, subject to the legal constraints noted above, the Port may be able to charge differential fees to encourage reductions of emissions, as suggested in a number of the control measures recommended by the Task Force. The report of the National Association of Attorneys General suggests that ports might provide a fees discount for ships that meet targets for reduced sulfur and NOx emissions, but does not provide an analysis of the port's legal authority to do so.[165] California case law holds that municipalities can allow certain reductions or exceptions from taxes and fees where there is a rational basis.[166]

Fifth, the Board of Harbor Commissioners can establish environmental policies by adopting Board resolutions, such as the recent policy requiring cleaner yard tractors at the time terminal leases are approved or renewed.[167] Subject to City Council approval, the Board also may be able to adopt certain mandatory environmental requirements of general application through amendment of the Port's tariff, such as a requirement that ships calling on the Port use lower sulfur fuel, so long as they do not conflict with the CAA, the Commerce Clause, the Shipping Act or other preemptive federal or state law.

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164. The California Environmental Quality Act requires that the Port exercise its powers to mitigate significant environmental impacts through all available feasible mitigation measures when approving Port projects. See Public Resources Code §21000(d) ("The capacity of the environment is limited, and it is the intent of the Legislature that the government of the state take immediate steps to identify any critical thresholds for the health and safety of the people of the state and take all coordinated actions necessary to prevent such thresholds being reached."), §21001(b) (It is the policy of the state to: "Take all action necessary to provide the people of this state with clean air . . . "), and §21002.1(b) ("Each public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so.").

165. National Association of Attorneys General, *Floating Cities, Urban Problems: A Report by the National Association of Attorneys General Cruise Ship Workgroup* (2002) at 31, n. 180, citing Kageson, *Economic Instruments for Reducing Emissions from Sea Transport,* AIR POLLUTION & CLIMATE SER. No. 11 at 1 (July 1999).

166. *City and County of San Francisco v. Flying Dutchman Park, Inc.* (2004) 122 Cal. App. 4th 74 (exemption from parking fee for military, hotel guests and apartment residents upheld).

167. Board of Harbor Commissioners Resolution No. 6164.

2. <u>Port Proprietary Powers May Avoid Conflicts with Federal Law</u>

Certain proprietary powers have been recognized as potentially avoiding a preemptive effect: the "market participant exception" and the "municipal-proprietor exception" to preemption. Rail and PMSA believe that the "market participant" doctrine and the "municipal proprietor" exception, discussed below, are different names for the same doctrine.[168] SCAQMD and NRDC believe that these are two distinct doctrines discussed by two different lines of cases, as discussed below.

a. Market Participant

As discussed below, when acting in a proprietary fashion, local actors have sometimes been permitted to take actions that would otherwise be preempted by federal laws. A local actor's ability to take such actions has been referred to as the "market participant," exception.

The market participant exception first arose in the context of the U.S. Supreme Court's Dormant Commerce Clause jurisprudence.[169] Subsequently, the exception has been applied outside the context of the Dormant Commerce Clause as an exception to other federal statutes. For example, in *Building and Construction Trades Council v. Associated Builders and Contractors* (referred to hereinafter as "*Boston Harbor*"),[170] the Court applied the market participant exception to find that certain local action was not preempted by the National Labor Relations Act ("NLRA"). Rail notes that although the U.S. Supreme Court's decision in *Boston Harbor* expanded the market participant doctrine outside the context of the Dormant Commerce Clause, the Court did not hold that market participant applied as an exception to each and every preemptive federal statute.

The U.S. Court of Appeals for the Ninth Circuit, as well as other federal circuit and district courts, have addressed the application of the market participant exception to various federal preemptive statutes. These courts have taken a case by case approach to determining whether application of the market participant exception in the context of a particular statute is both consistent with Congressional intent and the purpose of the particular statute.[171] Although the U.S. Supreme Court has only considered the application of market participant as an exception to one statute, the NLRA in *Boston Harbor*, the Ninth Circuit and other circuit and district courts have applied market participant as an exception to other preemptive federal statutes.[172]

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168. *See Tocher v. City of Santa Ana*, 219 F.3d 1040, 1049-50 (9th Cir. 2000)(finding city's discretion in procuring towing services protected by municipal proprietor exception). The court in *Tocher* noted that the municipal proprietor exception has also been called "market participant." *Id.*.

169. *See e.g., Hughes v. Alexandria Scrap Corp.*, 426 U.S. 794 (1976).

170. 507 U.S. 218 (1993)

171. *See e.g., Tocher*, 219 F.3d at 1050 (examining the language and purpose of the preemptive statute at issue in deciding whether the market participant exception applies).

172. *See e.g., Sprint Spectrum L.P. v. Mills,* 283 F.3d 404 (2nd Cir. 2002)(applying exception to Telecommunications Act to uphold lease agreement between school district and private party); *Tocher*, 219 F.3d 1040 (applying exception to Federal Administrative Authorization Act, as amended by ICCTA, with respect to motor vehicle provisions, to uphold city ordinance); *Associated General Contractors v.*

In applying the market participant exception, courts have considered two principal issues:

i. Does the Particular Statute at Issue Allow for a Market Participant Exception?

In determining whether POLA may avoid federal preemption in implementing NNI control measures via the market participant exception, a threshold question exists concerning whether the federal statutes which may preempt those control measures, as previously discussed in this memorandum, also allow for a market participant exception. Under the statute by statute analysis adopted by the Ninth Circuit, a court will look to the Congressional intent and purpose behind each such statute to determine whether the market participant exception applies. The parties disagree as to application of the market participant doctrine to the Clean Air Act, ICCTA, and other statutes discussed in this memorandum, and will set forth their separate positions on this issue below.

Rail and PMSA believe that the broad preemptive language in certain federal statutes such as ICCTA and the Clean Air Act, as previously discussed in this memorandum, belie the argument that Congress intended to leave room for a market participant exception in those statutes. The courts have observed that "[I]t is difficult to imagine a broader statement of Congress's intent to preempt state regulatory authority over railroad operations" than that found in ICCTA.[173] Furthermore, the purpose of both ICCTA and the Clean Air Act in creating a uniform regime of federal regulation of trains and air quality would be impeded by the existence of a market participant exception in these contexts.

With respect to the CAA, NRDC notes that on May 6, 2005, the U.S. District Court for the Central District of California held that the SCAQMD's fleet rules[174] "as applied to state and local government actors, fall within the market participant doctrine and are therefore outside the scope of §209 [of the Clean Air Act]."[175] The District Court acknowledged that, while "Congress is free to preempt state proprietary actions if it so wishes . . . [i]t was not the 'clear and manifest purpose of Congress' to preempt state proprietary actions under Section 209,"[176] and thus, the market participant doctrine applied to that section.[177] The U.S. Supreme Court had previously

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Metropolitan Water District, 159 F.3d 1178 (9th Cir. 1998) (applying exception to ERISA to uphold labor agreements); *EMA. v. SCAQMD*, U.S.D.C. No. 00-09065 (C.D. Cal. 2005) (applying exception to CAA). The EMA is likely to appeal this decision to the Ninth Circuit.

173. *City of Auburn v. United States*, 154 F.3d 1025, 1030 (9th Cir. 1998)(quoting *CSX Transp. Inc. v. Ga. Pub. Serv.Comm'n*, 944 F.Supp. 1573, 1581 (N.D. Ga. 1996)).

174. The fleet rules require operators of certain on-road government fleets, including transit buses and trash trucks, to purchase clean alternative fuel vehicles when adding to or replacing vehicles in their on-road fleets.

175. *EMA v. SCAQMD*, U.S.D.C. No. 00-09605 (C.D. Cal. 2005) at 23.

176. *EMA v. SCAQMD*, U.S.D.C No. 00-09065 (C. Dist. CA), at 9, 10 (citing *Exxon Mobil Corp. v. U.S. EPA*, 217 F.3d 1246, 1255 (9th Cir. 2000) for the proposition that the Supreme Court is highly deferential to state law in areas traditionally regulated by the states, and that "[a]ir pollution prevention falls under the broad police powers of the states").

determined in this case that the fleet rules were preempted under §209 of the Clean Air Act.[178] Rail and PMSA note that the District Court did not reach the question whether the market participant doctrine provided an exception to CAA preemption with respect to private fleet operators. Rail and PMSA believe that the Supreme Court's opinion forecloses the application of any market participant exception under the CAA to private fleets and note that most of the proposed NNI control measures involve private fleets. SCAQMD and NRDC believe that the Supreme Court merely determined that the fleet rules were emissions standards within the scope of CAA preemption.[179] It remanded the case to the District Court to determine whether the public or private rules "can be characterized as internal state purchase decisions" exempt from preemption.[180]

As to the ICCTA, SCAQMD and NRDC believe that the preemptive force of the ICCTA's rail provisions are not limitless,[181] and that ICCTA preemption extends only to "*regulation* of railroads." [182] They believe that although the ICCTA rail preemption provision is broad, the statutory language and legislative history do not evince a clear intent by Congress to preempt state or local proprietary conduct. Further, SCAQMD and NRDC believe that a court could apply the market participant exception to the ICCTA's rail provisions, just as it has to numerous

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177. *Id.* at 6-11.

178 *See EMA. v. SCAQMD*, 541 U.S. 246 (2004).

179. Rail and PMSA note, however, that SCAQMD and NRDC themselves addressed the private fleet question in their brief to the District Court on remand, and conceded: "Defendants [i.e., SCAQMD and NRDC] agree that applications of the Fleet Rules involving federal and purely private fleets that have no contractual or other connection to the government are *not internal state purchase decisions*." Opposition of SCAQMD and NRDC to Plaintiffs' Motion for Order Implementing Supreme Court's Decision, filed October 25, 2004, at 2 (emphasis added). Rail and PMSA also note that the District Court also stated that "the Fleet rules as they pertain to state and local governments are narrow enough in scope that they do not constitute broad social regulation" (slip op. at 15) and "even if the Fleet Rules would not be proprietary if applied to the federal government or private actors, they are still proprietary when applied to state and local governments (slip op. at 20). SCAQMD and NRDC believe that Rail and PMSA's reference to private fleets "that have no contractual or other connections with the government" is wholly irrelevant because it is precisely *because of such* connections with the government (the Port) that the market participant exception applies to many NNI measures. SCAQMD and NRDC note that many proposed NNI measures are applicable to sources such as port tenants that have leases or other contractual connections to the government, whether direct or indirect. SCAQMD and NRDC believe that such connections place those measures squarely within the scope of the market participant exemption. This is in sharp contrast to the "purely private fleets that have no contractual or other connection to the government" that were considered in the Fleet Rule litigation, such as contracts between private schools and private bus contractors, where there was no contract with any governmental entity, and thus the market participant exception would not apply.

180 *Id.* at 259.

181. *See City of Creede, Co--Petition for Declaratory Order*, STB Finance Docket No. 34376 (May 3, 2005), 2005 WL 1024483 at *5 ("While the section 10501(b) preemption is broad and far-reaching, there are, of course, limits.")

182. H.R. Conf. Rep. No. 104-422, at 95 (1995), reprinted in 1995 U.S.C.C.A.N. at 807 (emphasis added).

other statutes, as noted in footnote 172, above. Moreover, courts have already applied the exception to the motor vehicle provisions of the ICCTA.[183]

Rail believes that, as uniformly interpreted by the courts and STB, the statutory language and legislative history of the ICCTA evince a clear intent by Congress to preempt any kind of state or local requirement that interferes with rail operations. As the courts have repeatedly observed, "[i]t is difficult to imagine a broader intent to preempt state regulatory authority over railroad operations."[184] Rail notes that the courts and the STB have specifically rejected the suggestion that the ICCTA preempts only traditional "economic regulation" of railroads.[185] Moreover, the courts have expressly distinguished the limited "price, route, or service" ICCTA preemption provision applicable to motor carrier operations from the expansive "exclusive" federal jurisdiction preemption provision applicable to rail operations.[186]

ii. **Is the Local Authority Acting as a "Market Participant" or as a "Regulator"?**

Assuming that the applicable preemptive federal statute allows for a market participant exception, the next step of the analysis requires a court to examine the nature of the proposed action to determine if it is truly proprietary in nature or regulatory. The U.S. Supreme Court has alternately inquired "whether the challenged program constituted direct state participation in the market,"[187] thus falling under the umbrella of the exception, or whether the local actor has imposed conditions via contract "that have a substantial regulatory effect outside of [the market in which the local actor is a participant],"[188] thereby losing the shield of market participant.

In *Boston Harbor*, the Supreme Court applied the market participant exception in the context of federal preemption under the NLRA. The Court upheld the Massachusetts Water Resources Authority's ("MWRA") bid specification requiring each successful bidder to abide by the terms of a project labor agreement. The non-union plaintiffs in the case argued that the agreement, which dictated labor conditions between two private parties – the contractors and their

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183. *Cardinal Towing & Auto Repair, Inc. v. City of Bedford*, 180 F.3d 686 (5th Cir. 1999); *Tocher*, 219 F.3d at 1048-49.

184 *City of Auburn*, 154 F.3rd at 1030 (quoting *CSX Transp, Inc v. Ga. Pub. Serv. Commin,* 944 F.Supp. 1573, 1581 (N.D. Ga. 1996).

185. *See, e.g., Green Mountain*, 404 F.3d at 644-45; *Friberg v. Kansas City,*, 267 F.3d 439, 443 (5th Cir. 2001); *City of Auburn*, 154 F.3d at 1030-31; *Wisc. Central Ltd. v. City of Marshfield*, 160 F. Supp.2d 1009, 1014 (W.D. Wisc. 2000); *CSX Transp., Inc. – Petition for Declaratory Order*, STB Fin. Dkt. No. 34662, 2005 WL 584026, slip op. at 8 (served March 14, 2005).

186. *See, e.g., Green Mountain R.R.. Corp. v. Vermont,* 404 F.3d 638, 645 (2d Cir. 2005).

187. W*hite v. Massachusetts Council of Construction Employers*, 460 U.S. 204, 208 (1983)(applying market participant exception to mayor's executive order requiring the workforce for city construction projects to be at least half city residents).

188. *South-Central Timber Development, Inc. v. Wunnicke,* 467 U.S. 82, 97-98 (1984)(refusing to apply market participant exception to Alaska's contractual requirement that surplus timber purchased from the state be processed within Alaska).

employees – interfered with the collective bargaining process and thus was preempted by the NLRA. The Court disagreed, holding that the MWRA was acting as a "proprietor" rather than a "regulator," and stated:

> To the extent that a private purchaser may choose a contractor based upon that contractor's willingness to enter into a prehire agreement, a public entity as purchaser should be permitted to do the same. Confronted with such a purchaser, those contractors who do not normally enter such agreements are faced with a choice. They may alter their usual mode of operation to secure the business opportunity at hand, or seek business from purchasers whose perceived needs do not include a labor project agreement. In the absence of any express or implied indication by Congress that a State may not manage its own property when it pursues its purely proprietary interests, and where analogous private conduct would be permitted, this Court will not infer such a restriction.[189]

By contrast, in *South-Central Timber Development, Inc. v. Wunnicke*, the Supreme Court refused to apply the market participant exception to permit the state of Alaska to insert a provision in its contracts for the sale of state-owned timber that would require the purchaser to process the timber within the state of Alaska. The Court expressly rejected the proposition that the State of Alaska had unfettered discretion to choose the terms on which it would contract with private parties.[190] The Court stated:

> The market-participant doctrine permits a State to influence 'a discrete, identifiable class of economic activity in which [it] is a major participant.' Contrary to the State's contention, the doctrine is not *carte blanche* to impose any conditions that the State has the economic power to dictate, and does not validate any requirement merely because the State imposes it upon someone with whom it is in contractual privity...Unless the 'market' is relatively narrowly defined, the doctrine [market-participant] has the potential of swallowing up the rule that States may not impose substantial burdens on interstate commerce…[191]

While the LWG reached agreement on the general outlines of the market participant exception, its members hold different views as to the breadth of the exception and its applicability to specific NNI control measures. In the following sections, certain members will discuss their respective positions regarding application of the market participant exception to the NNI control measures.

189. 507 U.S. at 231-232.

190. 467 U.S. at 95-96.

191. *Id.* at 97-98 (citation omitted).

SCAQMD and NRDC Position:

SCAQMD and NRDC believe that the Port's implementation of the NNI control measures through its leases, contracts, permits, or a port-wide rule could be characterized as proprietary conduct that is exempt from federal preemption under the market participant exception. As outlined above, Supreme Court jurisprudence indicates that the essential inquiry in determining if the exception applies is whether the government action is "proprietary" in nature as opposed to "regulatory."[192]

In advancing this inquiry, the Supreme Court has expressly acknowledged that "[w]hen a State owns and manages property . . . it must interact with private participants in the market place," and in so doing, it is not subject to preemption simply because it acts within an otherwise preempted area.[193] In fact, courts have found government actions to be proprietary under the market participant exception in situations where it dictates contract terms related to the management of its property. For example, as discussed above, in *Boston Harbor*, the Supreme Court permitted a state agency, under the market participant exception, to require a labor agreement as a condition for bids on a public construction project.[194] Additionally, in *Sprint Spectrum L.P. v. Mills*, the Second Circuit applied the market participant exception to permit a school district to impose certain lease conditions on a telecommunications company that leased space on the roof of a high school to construct a cell tower.[195] The lease condition limited the amount of radio frequency emissions that could be emitted from the tower to levels 13,000 times below the federal maximum based on health and safety concerns.[196] Holding that the lease condition was not preempted under the Telecommunications Act,[197] the court found that the school district acted as any private landowner might act, and imposed lease conditions that any private property owner would be free to demand.[198] The Ninth Circuit has also acknowledged that where the government has "merely proposed the terms of contracts, and entered into those contracts", it acts as a proprietor, not a regulator,[199] and that government rules that guide the

192. *See e.g.*, *Boston Harbor*, 507 US at 227-33.

193. *See Boston Harbor,* 507 U.S at 227.

194 *See id.* at 233.

195. *Sprint Spectrum L.P. v. Mills.*, 283 F.3d 404 (2nd Cir. 2002).

196. *See id.* at 408, 410-11.

197. *See id.* at 412.

198. *Id.* at 421.

199. *See Associated General Contractors of America*, 159 F.3d at 1184.

formation of contracts to which the government is a party is the "classic example" of the government acting as a market participant.[200]

SCAQMD and NRDC believe that the Port's setting of requirements through its leases and other contractual arrangements is the archetypal example of the exercise of the Port's proprietary powers, similar to the Massachusetts government setting labor contract requirements in *Boston Harbor* and the school district setting radio frequency limits in its leases in *Sprint Spectrum.*[201]

Further, the purpose of the NNI measures -- to protect public health and safety, and the environment -- is an acceptable proprietary motive. In *Hughes v. Alexandria Scrap*, the U.S. Supreme Court found that the protection of the environment was a "commendable" as well as "legitimate" proprietary motive, and upheld Maryland's statutory scheme for ridding the state of old inoperable automobiles under the market participant exception.[202] The Central District in *EMA v. SCAQMD* similarly noted that private actors make take the environment into consideration when making proprietary decisions, stating: "Private actors may consider more than cost or availability in making procurement decisions."[203] Further, as noted above, in *Sprint Spectrum*, the court applied the market participant exception to uphold a lease condition aimed at protecting the health and safety of school children.[204] Thus, below, Rail and PMSA give far too much weight to the Fifth Circuit's decision in *Cardinal Towing & Auto Repair v. City of Bedford* when implying that "efficient performance" is the only acceptable proprietary motive. Moreover, even if the Fifth Circuit's opinion were controlling, the environmental purpose of the NNI Measures is tied to the Port's economic interests given its obligation to mitigate under CEQA and its duty not to harm the surrounding public.[205]

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200. *See Tocher*, 219 F.3d at 1049.

201. *See Boston Harbor*, 507 U.S. 218; *Sprint Spectrum L.P.*, 283 F.3d 404. A number of circuit court cases also support the Port's imposition of the NNI measures through its leases or contracts. *See e.g., Babler Bros., Inc. v. Roberts*, 995 F.2d 911 (9th Cir. 1993) (upholding Oregon statute that required contractors to pay their employees overtime wages on public projects); *Building and Construction Trades Department, AFL-CIO v. Allbaugh*, 295 F.3d 28, 39 (D.C. 2002) (upholding federal Executive Order proscribing the prohibiting or requiring of project labor agreements in federally-funded construction projects); *Associated General Contractors of America*, 159 F.3d 1187 (upholding state agency's bid specification for certain public projects, which required bidders to agree to the terms of project labor agreements).

202. *Alexandria Scrap., Corp.,* 426 U.S. at 809 (upholding state statute under market participant exception).

203. *EMA v. SCAQMD*, U.S.D.C No. 00-09065 (C. Dist. CA), at 14; see also id. at 16 (environmental motive, alone, "is not sufficient to remove the Fleet Rules from the purview of the market participant exception").

204. *Sprint Spectrum L.P.*, 283 F.3d at 410.

205. Rail and PMSA argue below that the market participant exception should not apply here because the port has powers that a private party does not, such as the ability to impose the NNI measures. However, the Port's power, as a landlord, to require conditions in its leases or contracts is no different than the powers any other lessor or contracting party might exercise. Further, Rail and PMSA's position misconstrues the market participant exception, the essence of which is to allow the government to act through its contracts precisely in situations where it has powers that private persons do not. Thus, to argue that the exception should not apply to the port

Additionally, implementing the NNI control measures under, for example, a blanket port-wide rule applicable to all tenants, would not transform the measures into "regulations." In *Building and Construction Trades Department, AFL-CIO v. Allbaugh*, 295 F.3d 28, 39 (D.C. 2002), the court specifically rejected the notion that government action is necessarily regulatory when it acts through blanket rules, rather than ad hoc contracting decisions. In that case, the court upheld a federal Executive Order under the market participant exception, even though it took the form of a "blanket, across-the-board" rule prohibiting all federal agencies and all entities receiving federal assistance for a construction project from prohibiting or requiring bidders or contractors to enter into project labor agreements.[206] Moreover, the Ninth Circuit in *Big Country Foods, Inc. v. Board of Education* and *Babler Brothers v. Roberts* has also upheld *state statutes* having wide application under the market participant exception.[207] Accordingly, given the "form" of proprietary actions upheld by the courts, Rail and PMSA's characterization (below) of the NNI measures as a "sweeping set of control measures" (even if accurate), does not preclude application of the market participant exception.

Further, *South-Central Timber Development, Inc*. and *Washington State Blvd. & Constr. Trades Council v. Spellman*, which Rail and PMSA cite below, are distinguishable. In those cases, the court refused to uphold certain state actions under the market participant exception because the government attempted to influence a market in which the state was not a participant.[208] Here, the Port arguably participates in a market that is much larger in scope than the state's market in those cases. For example, the Port's "market" would include the setting of conditions on a terminal lease that require the use of cleaner ships, yard equipment, and other environmental requirements for the facility as a lease term., Additionally, the NNI measures could be tailored

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because it has powers that typical persons do not would eviscerate the doctrine, and be contrary to multiple court rulings, including *Engine Manufacturers (*SCAQMD unique authority to adopt Fleet Rules), *Alexandria Scrap Corp.* (government unique authority to develop car scrap program); and *Big Country Foods* (school district unique authority to control provision of school lunches).

206. *See Allbaugh*, 295 F.3d at 35-36 (stating: "there is simply 'no logical justification'" for holding that an executive order establishing a consistent contracting practice should be treated differently than individual contracting decisions, so long as both concerned the government acting as a market participant).

207. *See Big Country Foods, Inc*., 952 F.2d at 1179 (upholding Alaska statute requiring all schools to grant a bidding preference to Alaska milk harvesters who sold milk to the schools); *Babler Bros., Inc.*, 995 F.2d 911 (upholding Oregon labor statute that applied to the state, as well as to counties, school districts, and municipalities); *see also Tocher*, 219 F.3d 1040 (upholding city ordinance authorizing chief of police to establish rotational tow list); *EMA v. SCAQMD*, U.S.D.C No. 00-09065 (C. Dist. CA) (upholding local air district "fleet rules," which were in the form of regulations).

208. *See South-Central Timber Development, Inc.,* 467 U.S. at 98 (finding that while the state was a participant in the timber-selling market, the statute at issue regulated the timber-processing market); *Spellman,* 684 F.2d at 631 (finding that the state statute denied entry of waste at the state's borders, rather than at the site the state operated as a market participant).

to ensure that they do not have a substantial regulatory effect outside of the market in which the Port participates.[209]

Below, Rail and PMSA also rely on *Western Oil and Gas Association v. Cory*, 726 F.3d 1340 (9th Cir. 1984), aff'd by equally divided Court, 471 U.S. 81 (1985) and *Shell Oil Company v. City of Santa Monica,* 830 F.2d 1052 (9th Cir. 1987) for the proposition that the market participant exception may have no application in the context of restrictions placed on the use of state or municipally owned lands that are channels of interstate commerce. These cases, however, are expressly limited to narrow circumstances not applicable to the NNI measures.

The court in *Cory* precluded application of the market participant exception to state regulations governing the computation of rent for leased tide and submerged lands used for the placement and operation of oil pipelines.[210] The court reached its holding based on the location of plaintiffs' facilities, which gave the state a "monopoly" over the sites used by plaintiffs, and provided plaintiffs with "no choice" with whom to do business: "The permanency of plaintiffs' facilities does not permit them to 'shop around.' There is no other competitor to which they can go for the rental of the required strip of California coastline."[211] Here, it is not the case that the companies impacted by the NNI measures have "no choice" but to do business with the Port of Los Angeles, or that the Port has a monopoly over the channels of interstate commerce in which port operations could occur. Rather, shipping interests, for example, are free to choose from many ports in California and across the country, thus putting the Port of Los Angeles in the same position as other private landlords.[212] Further, the *Cory* decision has since been limited to

209. Additionally, *Spellman*, as well as *Hydrostorage, Inc. v. Northern Cal. Boilermakers Local Joint Apprenticeship Comm*., 891 F.2d 719 (9th Cir. 1989), which is also cited by Rail and PMSA below, are also distinguishable to the extent that the NNI measures do not establish civil or criminal penalties. *See Spellman*, 684 F.2d at 631 (statute established civil and criminal penalties); *Hydrostorage,* 891 F.2d at 730 (statute amounted to regulation because it required the state agency to monitor and enforce civil penalties for violations of the statute). Also, the *Spellman* court's statement that the statute was based on public safety rather than economic considerations cannot be considered dispositive to the court's holding that the market participant exception did not apply given the Supreme Court's decision in Alexandria Scrap., discussed above. *See Alexandria Scrap.,* 426 U.S. at 809; *see also Sprint Spectrum L.P.*, 283 F.3d at 410; *EMA v. SCAQMD*), at 14, 16 (environmental motive, alone, "is not sufficient to remove the Fleet Rules from the purview of the market participant exception").

210. *See* 726 F.2d at 1342-43.

211. *Id.*, at 1343.

212. Rail and PMSA also cite to the Northern District of California's decision in *Air Transportation Assoc. of American v. City of San Francisco*, 992 F.Supp 1149 (N.D. Cal. 1998) ("ATA") for the proposition that in ATA, the City's monopoly position allowed it to exert significantly greater economic power than a typical consumer and thus the market participant exception did not apply. However, the district court examined whether the government action at issue had a greater impact than an ordinary consumer only *after* concluding that the city did not act with a proprietary motive, but rather to reduce discrimination against persons with domestic partners. *See id*. at 1179-80. Here, as stated above, the Port does not have a monopoly and its proprietary motives are supported by case law. Further, it is important to note that significant applications of the ordinance in ATA (which prohibited the city from contracting with companies whose provision of employee benefits discriminated against employees with domestic partners) were upheld—including where work was performed by a contractor for the City anywhere within the United States. *See id*. at 1157, 1165, 1179 ("There is no question that the City is acting as a market participant when it implements the Ordinance: when the City enters into contracts that are subject to the Ordinance, it is directly participating in the marketplace by purchasing services or leasing property").

situations dealing with the *rates charged* for the leasing of a *subsurface pipeline easement* on *undeveloped* land.[213]

Rail and PMSA's reliance on *Shell Oil* is similarly unpersuasive. In that case, the court held that the City of Santa Monica's setting of franchise fees within a franchise agreement for a subsurface easement did not discriminate against interstate commerce, and that pipeline safety standards imposed within that agreement were not preempted by federal law.[214] As part of its decision, the court discussed the application of the market participant exception under the dormant commerce clause, and made it abundantly clear that its discussion was limited to the facts of that case—namely that Santa Monica's conduct, "the setting of franchise fees for easements under public streets," placed it outside the scope of the exception.[215] *Shell Oil* does not more broadly preclude the application of the market participant exception *whenever* a government entity dictates a contract term that relates to public land that is a channel of interstate commerce. Indeed, aside from the court's limiting statements on this issue, its discussion of the municipal-proprietor exception solidifies this conclusion. In determining whether Santa Monica acted in a proprietary or regulatory capacity when imposing safety standards in its franchise agreement, the court made no mention whatsoever of its earlier discussion regarding the holding of subsurface street easements in its sovereign capacity, and instead framed the dispositive inquiry as "whether Santa Monica was attempting to regulate third-party relations in the market..."[216] If holding a channel of interstate commerce in a sovereign capacity were determinative of regulatory conduct *outside of the realm of setting franchise fees for the use of public land*, the court would have certainly mentioned it.

Cory and *Shell Oil* illustrate that imposing fees for the use of subsurface lands could allow a state or its subdivision to allocate its rights to use publicly held transportation corridors in a manner that discriminates against interstate commerce.[217] Indeed, the setting of such fees raises

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213. In *Alamo Rent-A-Car, Inc. v. City of Palm Springs*, 955 F.2d 30, 31 (9th Cir. 1992), the court made clear that *Cory* should not be applied to improved public lands, such as airports: "In *Cory*, we struck down regulations for computing rent on the basis of the volume of oil passing through private pipelines on state land. There, however, 'the lands leased to plaintiffs [were] unimproved and . . . no services or facilities [were] provided by the State in conjunction with the lease.'" *Id*. at 31. Because court found that the airport's charges were reasonable under the Commerce Clause, it did not need to decide whether the market participant exception applied.

214. *See* 830 F.2d 1052.

215. *See id*. at 1058 ("Our holding that Santa Monica is not a market participant means only that in deciding whether, or on what terms, to grant a franchise for the use of public streets the city may not burden interstate commerce in a manner that violates the dormant commerce clause"); *see also id.* at 1058 fn. 5 (after noting that its holding was limited, the court reiterated: "We believe, however, that Santa Monica has not engaged in 'marketplace conduct' within the meaning of the market participant exception and that the city's action with respect to transportation corridors is 'the kind of action with which the Commerce Clause is concerned. . . We observe that this case involves only substreet easements controlled by the City in its sovereign capacity").

216. *Id.* at 1063 (ultimately concluding that the court need not determine whether the municipal-proprietor exception applied because federal law did not preempt the franchise agreement's safety standards).

217. *See e.g. id.* at 1157.

heightened concerns that the rates charged may be "disguised revenue raising measures" that do not compensate the state for the actual use of its land.[218] By contrast, the imposition of NNI measures are directly related to the use (and misuse) of the Port's land and exist to compensate for the polluting activities conducted on that land.

Accordingly, Cory and Shell are limited to a narrow set of facts, and thus, do not limit the application of the market participant exception here. In fact, to conclude otherwise would be contrary to the Supreme Court's decision several years later (1993) in *Boston Harbor*, where the state of Massachusetts acted as a market participant in requiring contractors that cleaned-up Boston Harbor—which the state presumably held in its sovereign capacity—to enter labor agreements.[219]

<u>Rail and PMSA Position</u>:

The Port of Los Angeles is a unique resource – "one of the world's largest trade gateways"[220] – and is located on state land held in trust and operated by the Port. While there is no doubt that the Port may enter into reasonable leases and contractual arrangements for use of the property it manages, there is equally no doubt, as the Supreme Court made clear in *South-Central Timber Development,* that the market participant doctrine does not give the Port "*carte blanche* to impose any conditions that [the Port] has the economic power to dictate" and does not "validate any requirement merely because [the Port] imposes it upon someone with whom it is in contractual privity."[221] The Ninth Circuit has emphasized that contractual provisions related to the use of publicly-owned lands are subject to particularly close scrutiny. In *Western Oil and Gas Association v. Cory,*[222] the court considered regulations promulgated by the California State Lands Commission regarding the computation of rent for the leasing of state-owned tidelands and submerged lands. California argued that its leasehold activities fell outside the limitation of the Dormant Commerce Clause because such activities constituted proprietary action and were thus shielded by the market participant exception.[223] The Ninth Circuit disagreed and refused to the apply the market participant exception, stating:

> The State owns and controls tidelands and submerged lands in its sovereign capacity. Although some of the lands are in the possession of local State entities or private interests, this does not mean that California becomes one of many competitors. The permanency of plaintiffs' facilities does not permit them to

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218. *See e.g., Cory*, 726 F.2d at 1345, 1344.

219. *See* 507 U.S. 218.

220. *See* <u>www.portoflosangeles.org</u>, "The Port of Los Angeles: An Economic Powerhouse."

221. *See South-Central Timber Development,* 467 U.S. at 97.

222. 726 F.2d 1340 (9th Cir. 1984).

223. *Id.* at 1342-1343.

> "shop around." There is no other competitor to which they can go for the rental of the required strip of California coastline…This control over the channels of interstate commerce permits the State to erect substantial impediments to the free flow of commerce. We therefore reject the State's contention that its leasing activities are not subject to Commerce Clause scrutiny.[224]

Although the Ninth Circuit has adopted a special standard for reviewing cases involving public lands, it has also rejected application of the market participant exception in other contexts as well.[225] Rail believes that read collectively the market participant cases stand for the proposition that a local government actor cannot be acting as a market participant unless the local actor seeks to advance its own discrete economic interests. In *Tocher* and *Cardinal Towing,* the Ninth and Fifth Circuits affirmed this reading of the exception. The courts made clear that the proposed local action must have the narrow goal of insuring "efficient performance" in local contractual relations and not a broader social policy aim in order to be sheltered by the market participant exception.[226] The "market participant" exception analysis seeks "to isolate a class of government interactions with the market that are so narrowly focused, and so in keeping with the ordinary behavior of private parties, that a regulatory impulse can be safely ruled out."

Therefore, POLA may not adopt a sweeping set of control measures through its contracts and leases in order to implement broad social policy regarding air quality under the guise of the market participant exception. Rail believes, more specifically, that a sweeping set of control measures requiring alterations to their locomotive fleets and fuel supplies, as a condition to picking up and dropping off interstate commerce, implemented through the Port's contracts and leases has more than an incidental impact, well beyond the contract or lease, and also indicates an intent to implement a general social policy, not the advancement of a particular economic interest of the Port. PMSA has the same concerns with respect to many of the proposed OGV measures.

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224. *Id.* at 1343 (citations omitted). Similarly, in *Shell Oil Company v. City of Santa Monica*, 830 F.2d 1052 (9th Cir. 1987), the Ninth Circuit rejected the City of Santa Monica's contention that its franchise fee requirements for the use of subsurface easements for an oil pipeline was sheltered by the market participant exception. The court held that "…like *Cory*, this case involves lands held in a sovereign capacity that are recognized transportation corridors for commerce." *Id.* at 1057.

225. *See, e.g., Hydrostorage, Inc. v. Northern Cal. Boilermakers Local Joint Apprenticeship Comm.*, 891 F.2d 719 (9th Cir. 1989), *cert. denied*, 111 S. Ct. 72 (1990)(rejecting application of the market participant exception where the state's action did not end with awarding of a contract, but instead constituted regulation); *Washington State Bldg. & Constr. Trades Council v. Spellman*, 684 F.2d 627 (9th Cir. 1982), *cert denied,* 461 U.S. 913 (1983) (finding the market participant exception did not apply to state action "based on public safety rather than economic considerations").

226. *See Tocher,* 219 F.3d at 1049; *Cardinal Towing,* 180 F.3d at 694*). See also Cardinal Towing, 180 F.3d at 693*. The Ninth Circuit in *Tocher* extensively discussed and relied upon the Fifth Circuit's analysis in *Cardinal Towing*. 219 F.3d at 1049-50.

SCAQMD and NRDC claim that this position misconstrues the market participant doctrine, the essence of which NRDC says is to allow the government to act through its contracts precisely in situations where it has powers that private persons do not. NRDC states that to argue the doctrine should not apply to the port because it has powers that typical persons do not would eviscerate the doctrine, and be contrary to multiple court rulings -- namely *Engine Manufacturers, Alexandria Scrap Corp,* and *Big Country Foods* -- which NRDC claims turn on the government's "unique authority" to develop the programs at issue.

As a threshold matter, PMSA and Rail believe the SCAQMD's and NRDC's proposed interpretation of the doctrine runs directly counter to the United State's Supreme Court's admonition in *South-Central Timber Development that* "[u]nless the 'market' is relatively narrowly defined, the doctrine [market participant] has the potential of swallowing up the rule that States may not impose substantial burdens on interstate commerce …."[227] Furthermore, PMSA and Rail do not believe the cases cited by SCAQMD and NRDC support their proposition. *Alexandria Scrap Corp.* and *Big Country Foods* are cases turning on the question of whether a state may favor its own residents when it *expends its own monies* to promote the destruction of automobile hulks or purchase milk for their schools.[228] Even assuming *Engine Manufacturers,* which is likely to be appealed, was correctly decided, it stands at most for the proposition that a subdivision of the state may choose to spend its procurement dollars on the good or the services that best meet its needs.[229] None of these cases suggest that a state or locality may use its contractual control over state-owned port facilities that are vital to interstate and foreign commerce to impose regulatory conditions that would otherwise be preempted by federal law. In fact, the Ninth Circuit, in yet again rejecting application of the market participant doctrine, stated in *Washington State Blvd. & Constr. Trades Council v. Spellman*:

> Further, 383 fails to qualify under either the market participant or quarantine theory exceptions to the Commerce Clause. The State's contention that it is a "market participant," thereby placing the initiative beyond the reach of the

227. 467 U.S. at 97-98.

228. For that reason, NRDC's reliance on dicta in *Alexandria Scrap* regarding "commendable" and "legitimate" purposes related to the environment is misplaced. The Court's reasoning in *Alexandria Scrap* is based on a state actor's authority to make certain purchasing decisions using state funds without running afoul of the Dormant Commerce Clause. The Court does not state or imply that the market participant exception is in any way broader in scope, or that federal preemption doctrines apply with any less force, when local environmental matters are at issue.

229. The Ninth Circuit has repeatedly rejected the market participant doctrine where the effect of the contractual conditions was regulatory rather than proprietary in nature. See *Hydrostorage, Inc. v. Northern Ca. Boilermakers Local Joint Apprenticeship Comm.,* 891 F.2d 719 (9th Cir. 1989), *cert. denied,* 112 L. Ed. 2d 46, 111 S. Ct. 72 (1990)*; Shell Oil Co. v. City of Santa Monica,* 830 F.2d 1052 (9th Cir. 1987), *cert. denied,* 487 U.S. 1235, 101 L. Ed. 2d 934, 108 S. Ct. 2901 (1988)*; Western Oil & Gas Ass'n v. Cory,* 726 F. 1340 (9th Cir. 1984), *aff'd,* 471 U.S. 81, 85 L. Ed. 2d. 61, 105 S. Ct. 1859 (1985)*; Washington State Bldg. & Constr. Trades Council v. Spellman,* 684 F.2d 627 (9th Cir. 1982), *cert. denied,* 461 U.S. 913, 103 S. Ct. 1891, 77 L. Ed. 2d 282 (1983)*;* [684 F.2d 627 (9th Cir. 1982), *cert. denied*, 461 U.S. 913, (1983)

> Commerce Clause, is unconvincing. The State argues that 383 is a proprietary measure enacted to limit the state's participation in the waste disposal market. Whether or not the State is a proprietor of the Richland site, the initiative is cast in state regulatory rather than in proprietary terms. The measure is based on [omitted] public safety rather than on economic considerations. The measure denies entry of waste at the state's borders rather than at the site the State is operating as a market participant.[230]

Rail and PMSA submit that the justification for the market participant exception is that fairness requires that local authorities, when engaged in proprietary behavior, must stand on equal footing with other private businesses.[231] The proposed NNI control measures are not typical of the behavior of similar private businesses who, in similar circumstances, would have no legal capacity to curtail emissions associated with the movement of consumer goods into and out of the United States and through multiple political subdivisions of the State of California and the individual states comprising the United States. Therefore, evenhandedness does not require POLA to enact the NNI control measures in order to compete with similarly situation parties in a similar market. The justification for the market participant exception is simply not integral to the development or promulgation of the NNI control measures.

In addition, under the Ninth Circuit's reasoning in *Cory* and *Shell Oil Company*, the market participant exception is extremely limited, if at all existent, in the context of restrictions placed on the use of state or municipally owned lands which are channels of interstate commerce.[232] Because of the unique concern that POLA may interfere with the free flow of interstate commerce by imposing contractual conditions affecting the leasing and use of port administered state lands, the market participant exception should not apply.

Rail and PMSA would emphasize as well that the U.S. Supreme Court has held in *South-Central Timber Development* that a State may not impose conditions that have a substantial regulatory effect outside of the particular market in which it is a participant. Imposition of the NNI control measures will extend well beyond the footprint of any Port facility, well beyond the limited proprietary market in which the Port participates, and well into the stream of commerce. Thus, the Port is foreclosed from invoking the shield of market participant.

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230. 684 F.2d 627 (9th Cir. 1982) *cert denied,* 461 U.S. 913.

231. *See White v. Massachusetts Council of Construction Employers, Inc.*, 460 U.S. 204 (1983) n.3 (stating that "*Evenhandedness* suggests that, when acting as proprietors, States should similarly share existing freedoms from federal constraints, including the inherent limits of the Commerce Clause.").

232. It has been suggested that there may be some inconsistency between *Cory* and *Shell Oil Company,* on the one hand, and *Alamo Rent-A-Car, Inc. v. City of Palm Springs,* 942 F.2d 629 (9th Cir. 1991), on the other hand. *There* is no inconsistency. The market participant exception was not invoked or implicated in *Alamo Rent-A-Car.* The issue was simply whether the airport fee at issue passed muster under the dormant Commerce Clause. The court found that it did.

Further, PMSA and Rail also note that in *Air Transport Association of America v. City of San Francisco,*[233] the district court found that the market participant exception to the dormant Commerce Clause did not apply insofar as the municipal requirement at issue (that contractors provide equal employee benefits to spouses and domestic partners) could have a regulatory affect on airline companies' out-of-State activities.[234] The District Court also found no market participant exception to ERISA's express preemption clause in light of the City's "monopoly position" at the airport which allowed it to exert significantly-greater economic power in airport-related transaction than a typical consumer.[235] PMSA and Rail believe many of the factors relied upon by the district court in invalidating the San Francisco ordinance as applied to airport operators would apply equally to the NNI control measures and their impacts on Port operators or lessees.

In fact, the district court's analysis in *Air Transport Association* underscores what is wrong with NRDC's claim that any Port actions to set requirements like the proposed NNI control measures through leases and contractual arrangements are "archetypal" examples of the exercise of the Port's proprietary powers, similar to a state agency setting labor contract requirements in *Boston Harbor* or the school district setting radio frequency limits in a lease in *Sprint Spectrum*. As the district court pointed out in *Air Transport Association*: [236]

> In Boston Harbor, the Court held that States and local governments, when they are directly participating in the marketplace, are not free to take any action that a private party could take in that role. . . . When States pursue policy objectives, even in the marketplace, they play a characteristically governmental role and are more powerful than private parties, the Court observed. *Id.* [507 U.S. at 229] Therefore, where federal law bars State regulation in a certain field, States may not pursue their policy goals in that field either through generally-applicable legislation or through proprietary actions.

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233. 992 F. Supp. 1149 (N.D. Cal. 1998).

234. *Id.* at 1163-64.

235. *Id.* at 1179-1180.

236. *Id.* at 1178.

The district court emphasized that the only reason that the Supreme Court upheld the contractual conditions at issue there was that "[t]he Court concluded that the agency had 'no interest in setting policy' when it imposed those conditions."[237] Since the City in *Air Transport Association* "had policy goals in mind" and wielded more economic power at the Airport than the ordinary consumer, the district court held under *Boston Harbor* that the market participant exception did not shield the City's contractual requirements from federal preemption.[238]

PMSA and Rail believe that there is no serious question that the entire NNI initiative is policy-driven, and that the Port would necessarily have policy goals in mind in setting any lease or contractual requirements that included the proposed NNI measures. Further, PMSA and Rail believe that there is no question that the Port wields tremendous economic power as a result of its monopoly control of the Port. Thus, if direct regulation of activities in the Port would be preempted by federal law, the Port cannot invoke the market participant exception to impose by contract requirements that could not be imposed by state or local law or regulation The broad reading of the exception advocated by the NRDC would allow the exception to swallow the general rule of preemption and result in a patchwork of impermissible and unworkable local regulation.

The district court's analysis in *Air Transport Association* also points up the fallacy in NRDC's heavy reliance on the Second Circuit's decision in *Sprint Spectrum.* In that case, the Second Circuit found that the market participant exception applied to the "plainly proprietary" and "nonregulatory" safety condition that School District imposed regarding the placement of a single cellular communications tower on a single high school building.[239] Citing *Cardinal Towing* and *Boston Harbor,* the Second Circuit held that this was a case where the "'government interaction [] with the market [is] so narrowly focused, and so in keeping with the ordinary behavior of private parties, that a

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237. *Id.* at 1178 (*citing Boston Harbor,* 507 U.S. at 229). *See also Boston Harbor,* 507 U.S. at 232 ("There is no question but that MWRA was attempting to ensure an efficient project that would be completed as quickly and effectively as possible at the lowest cost.") Similarly, the D.C. Circuit emphasized in *Building and Construction trades Dep't, AFL-CIO v. Allbaugh,* 295 F.3d 28, 35 (D.C. Cir. 2002) that "the Government unquestionably is the proprietor of its own funds, and when it acts to ensure the most effective use of those funds, it is acting in a proprietary capacity." NRDC cites *Albaugh* for the proposition that the Port may implement the proposed NNI control measures through a blanket port-wide rule applicable to all tenants, without transforming the measures into "regulations." But this misses the primary point that *Albaugh*, like *Boston Harbor,* involved a government agency acting just like a private consumer, and seeking efficient, low-cost performance by contractors. The proposed NNI control measures are not designed to attain low-cost performance of Port operations. On the contrary, they are designed to achieve regional regulatory emissions goals in pursuit of an NNI policy.

238. NRDC suggests that *Babler Brothers, Inc. v. Roberts,* 995 F.2d. 911 (9th Cir. 1993), stands for the proposition that the market participant exception can support state statutes with wide application. As the district court pointed out in *Air Transport Association,* however, "[t]here was no apparent reason . . . For the Ninth Circuit to suspect that the State law at issue in *Babler* interfered with federal labor policy." 992 F.Supp. at 1179. The district court properly concluded, therefore, that *Babler* did not expand the scope of the market participant exception articulated in *Boston Harbor. Id.*

239. 283 F.3d at 420-421.

regulatory impulse can safely be ruled out.'"[240] The Second Circuit emphasized that this was a case in which the cell phone company could escape the lease condition by locating its tower on another property owner's building.[241] There was no evidence that the School District had either the ability or the motivation to attempt to impose any kind of cell tower policy or to affect what the cell phone company could do generally in the market.[242] As the district court emphasized in *Air Transport Association,* in a situation in which a local authority "wields no more power than an ordinary consumer," it has more contractual leeway.[243] But where, as with the proposed NNI control measures, the Port has enormous economic leverage, and the proposal is that it use its leverage to require major operational changes that would otherwise be preempted by federal law, it cannot invoke the market participant exception to do by contract what it could not do by direct regulation.

No court has adjudicated the extent to which the proprietary powers of a port may allow imposition of air quality measure that might otherwise be preempted. The case law on the market participant exception suggests, however, that if the proposed NNI control measures would otherwise be preempted by federal law, the Port could not avoid that preemption by using lease conditions and other contractual measures to implement the NNI policy. Accordingly, it would be imprudent for the Port to rely on the market participant exception as the legal basis for Port adoption of the NNI plan.

b. Municipal-Proprietor

The second possible exception to preemption, the municipal-proprietor exception, has been recognized in the airport noise regulation arena.[244] In *Burbank v. Lockheed Air Terminal, Inc.,* 411 U.S. 624, 635 (1973), the U.S. Supreme Court struck down, as preempted by federal law, a noise curfew for the then privately operated Burbank Airport that had been adopted by the Burbank City Council. The Court held that federal law gave sole jurisdiction over airport noise to the FAA and the federal EPA. However, in footnote 14, the Court also made it clear that it was not addressing the situation where an airport was owned by the municipality that was seeking to impose the noise restriction, because in that situation the municipality possessed proprietary powers. Footnote 14 states, in full:

> The letter from the Secretary of Transportation also expressed the view that "the proposed legislation will not affect the rights of a State or local public agency, *as the proprietor of an airport*, from issuing regulations or establishing requirements as to the permissible level of noise which can be

240. *Id.* at 420 (*citing Cardinal Towing,* 180 F.3d at 693).

241. *Id.* at 421.

242. *Id.* at 420-421.

243. 992 F.Supp. at 1180.

244. *Burbank v. Lockheed Air Terminal, Inc.*, 411 U.S. 624, 635, n.14 (1973).

> created by aircraft using the airport. Airport owners *acting as proprietors* can presently deny the use of their airports to aircraft on the basis of noise considerations so long as such exclusion is nondiscriminatory." (Emphasis added.) This portion as well was quoted with approval in the Senate Report. *Ibid*.
>
> Appellants and the Solicitor General submit that this indicates that a municipality with jurisdiction over an airport has the power to impose a curfew on the airport, notwithstanding federal responsibility in the area. But, we are concerned here not with an ordinance imposed by the City of Burbank as "proprietor" of the airport, but with the exercise of police power. While the Hollywood-Burbank Airport may be the only major airport which is privately owned, many airports are owned by one municipality yet physically located in another. For example, the principal airport serving Cincinnati is located in Kentucky. Thus, authority that a municipality may have as a landlord is not necessarily congruent with its police power. We do not consider here what limits, if any, apply to a municipality as a proprietor.[245]

Pursuant to footnote 14 of the *Burbank v. Lockheed* opinion and the extensive line of cases elaborating on the municipal-proprietor exception, "it is generally accepted that airport proprietors may exercise their proprietary powers to control noise by promulgating noise abatement and curfew regulations, provided that such regulations are fair, reasonable, non-discriminatory, and do not unduly affect the free flow of interstate commerce."[246] For example, the Ninth Circuit came to the conclusion that airport proprietors should have the power to "enact noise ordinances under the municipal-proprietor exemption if it has a rational belief that the ordinance will reduce the possibility of liability *or* enhance the quality of the City's human environment."[247] However, to date, the municipal-proprietor exception as described above has only been applied in the context of municipal airport noise regulation.

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245. 411 U.S. at 635, n. 14 (italics in original).

246. Dempsey, *Local Airport Regulation: The Constitutional Tension Between Police Power, Preemption & Takings,* 11 Penn St. Envtl. L. Rev. 1, 36 (2002)

247. *Alaska Airlines v. City of Long Beach,* 951 F.2d 977, 982 (9thCir. 1991) (italics added), quoting *Santa Monica Airport Association v. City of Santa Monica,* 659 F.2d 100, 104, n.5 (9th Cir. 1981). *See also*, *Clay Lacy Aviation v. City of Los Angeles*, 2001 U.S. Dist. LEXIS 15673 (C.D. Cal. 2001) *Nat'l Bus. Aviation Ass'n v. City of Naples Airport Auth.*, 162 F. Supp. 2d 1343 (D. Fla., 2001) (ban on Stage 2 jets upheld; good overview of noise preemption cases); *Nat'l Helicopter Corp. v. City of New York*, 137 F.3d 81 (2d Cir. 1998); *City and County of San Francisco v. FAA*, 942 F.2d 1391 (9th Cir. 1991); and *Global Int'l Airways Corp. v. Port Auth. of N.Y. & N.J.*, 727 F.2d 246, 248 (2d Cir. 1984).

The Port could argue that the municipal-proprietor exception might apply to municipally owned seaports, upon a showing of the public benefits resulting from a reduction of port-related air emissions or reduction in any potential port liability or liability of emissions generators within the port. If overall South Coast Air Basin emissions are not reduced to comply with CAA standards the Port and other state and local governmental agencies face severe sanctions, including loss of federal funding for transportation infrastructure serving the Port under CAA §179. The U.S. Supreme Court in *Burbank* recognized the existence of a municipality's proprietary powers, which may not be preempted, even though the statute before the court did not mention such powers. Such powers have since been expressly recognized by statute in the field of airport regulation.[248] However, the Port could argue that a municipality's proprietary powers are not dependent upon express statutory language, and may be recognized by the courts from an analysis of the relevant law and facts.

NRDC and SCAQMD believe that seaports and airports are analogous for purposes of the municipal-proprietor exception to preemption. They further believe that if applications of the NNI control measures were found to be preempted, a court would find that the same concerns from the airport noise line of cases allow for the municipal-proprietor exception in the context of seaports reducing emissions. Accordingly, they believe that the court would find that the measures serve to both limit potential tort liability of the seaport and "enhance the quality of the City's human environment."[249]

PMSA and Rail also do not believe that the "municipal proprietor" exception in connection with airport noise cases provides any more or different shield against preemption than the "market participant" exception. *See Tocher,* 219 F.3d at 1049 (equating "municipal proprietor" and "market participant" exceptions). As discussed below, the entire line of airport noise cases arose out of a single footnote in a Supreme Court decision, *City of Burbank v. Lockheed Air Terminal, Inc.,*411 U.S. 624, 635 n. 14 (1973), in which it declined to address the issue whether, as the proprietor of an airport, a state or local authority could impose noise curfews. The courts later found in the cases listed below that under the Federal Aviation Act Congress did not intend to preempt a municipal airport proprietor's right to enact noise ordinances. *See, e.g., Santa Monica Airport Assoc. v. City of Santa Monica,* 659 F.2d 100, 103-104 (1981). All of the cases addressing the airport noise question do so in the unique context of the FAA and the "peculiarities and special features of the regulatory scheme in question." *Burbank,* 411 U.S. at 638.

248. *See* 49 U.S.C. §41713(b)(3)

249. *Alaska Airlines v. City of Long Beach,* 951 F.2d at 982

Finally, Rail and PMSA believe that the municipal-proprietor exception has narrow applicability and does not apply to municipally operated seaports, particularly those served by interstate railroads. They further believe that no federal regulatory scheme, similar to the statutory scheme interpreted in airport noise line of cases,[250] exists that would allow municipally owned seaports to enforce emission controls.[251] Moreover, much of the property upon which the Port operates is State property and does not belong to the City. Accordingly, they believe that the municipal–proprietor variation of the market participant doctrine is unlikely to shield NNI control measures that interfere with interstate rail and marine vessel operations.

c. Authorization/Waiver for the Port to Avoid Preemption

Where the Port's regulatory powers are unclear, in addition to asserting proprietary defenses to preemption, the Port alternatively or additionally could submit the NNI measures to ARB for adoption and submittal to EPA for authorization pursuant to Clean Air Act §209. The CAA allows California to obtain a waiver to set its own vehicular emissions standards[252] and other states may "opt in" to the California standards.[253] As stated above, the ARB has successfully requested and obtained many waivers of federal preemption for on-road California emission standards. The Administrator of EPA must grant California a waiver, unless he or she finds that the specific conditions set forth in the CAA §209(b) exist.[254] Similar to the motor vehicle regime, California may seek authorization from EPA to adopt and enforce its own nonroad

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250. *City of Burbank*, 411 U.S. at 638 ("Our prior cases on pre-emption are not precise guidelines in the present controversy, for each case turns on the peculiarities and special features of the federal regulatory scheme in question.").

251. 49 U.S.C §41713. The preemption provision of subsection (b) provides: (b) Preemption.--(1) Except as provided in this subsection, a State, political subdivision of a State, or political authority of at least 2 States may not enact or enforce a law, regulation, or other provision having the force and effect of law related to a price, route, or service of an air carrier that may provide air transportation under this subpart...
(3) This subsection does not limit a State, or political subdivision of a state, or political authority of at least 2 States that owns or operates an airport served by an air carrier holding a certificate issued by the Secretary of Transportation from carrying out its proprietary powers and rights. 49 U.S.C. § 41713.

252. 42 U.S.C. 7543(b).

253. Clean Air Act §177; 42 U.S.C. §7507.

254. *Id*. The section, as amended, provides in relevant part that California must determine that the adopted state standards will be, in the aggregate, at least as protective of public health and welfare as applicable federal standards and that no waiver shall be granted if the Administrator finds that:

> The determination of California is arbitrary and capricious, California does not need the adopted standards to meet compelling and extraordinary conditions, or
>
> The adopted standards and accompanying enforcement procedures are not consistent with section 202(a) of the CAA.

Consistent with section 202(a) has been interpreted by EPA to mean that the adopted state standards and procedures are technically feasible, giving appropriate consideration to the cost of compliance within the time provided for compliance. The Administrator will also consider whether federal and state procedures impose inconsistent certification requirements (that is, whether certification can be accomplished with one test vehicle in the course of the same test. (.See *California State Motor Vehicle Pollution Control Standards; Waiver of Federal Preemption; Decision* 61 FR 53371 (October 11, 1996).

emissions standards and other requirements (other than for those sources that are expressly preempted under §209(e)(1)).[255] Further, as with the waiver for motor vehicles, the Administrator must grant California's request for authorization, unless the Administrator makes specific findings that the criteria for denying a waiver have been met.[256]

In its express terms, the Clean Air Act provides for EPA to grant a waiver or authorization only to California. State law provides that ARB is designated the air pollution control agency for all purposes set forth in federal law. Cal. Health & Safety Code §39602. This raises the question of whether a local government such as the City of Los Angeles, which has been granted authority under state law to regulate nonvehicular sources (H & S Code §40000) including nonroad engines and vehicles, may be granted authorization from EPA to adopt emission standards for nonroad engines and vehicles. Recently in connection with the South Coast Air Quality Management District's Fleet Rules, EPA has taken the position that a local rule must be adopted and submitted by the ARB before it may be granted a waiver of preemption under the provision for new motor vehicles. §209(b), 42 U.S.C. §7543(b). Although the issue is far from settled, in light of recent discussions with EPA, ARB understands that under CAA §209(e)(2) the City or Port may propose, or could adopt, standards for nonroad engines but to be effective such standards would need to be submitted to ARB for adoption, making of the necessary findings, and subsequent submittal to and authorization by EPA. A local jurisdiction could also petition ARB to adopt emission standards and other requirements related to the control of emissions at the Port of Los Angeles.

III. ANALYSIS OF NNI CONTROL MEASURES.

Below, the LWG analyzes certain "Proposed" and "Additional" NNI control measures for ocean-going vessels, harbor craft, cargo handling equipment, rail, and heavy-duty diesel vehicles.

The LWG has not analyzed any "Adopted" control measures because such measures have been or will be implemented. The LWG also has not analyzed any EPA or ARB "Proposed" NNI control measure because such measures are being developed by EPA or ARB.

Further, the LWG has not analyzed control measures consisting of voluntary incentive-based programs because the LWG does not believe that legal barriers exist that would prevent the Port from spending money on voluntary incentive programs, as long as the funds are spent in a nondiscriminatory manner.

Moreover, to the extent that certain NNI control measures require the Port to act in the event that a control measure does not result in the predicted emissions reductions, such backstop measures identified by the Port would need to be analyzed pursuant to the same legal principles discussed in the legal memorandum, at the time such measures are identified.

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255. 42 U.S.C. §7543(e)(2).

256. *Id.* The criteria for denying an authorization request are similar to those for denying a motor vehicle waiver under 42 U.S.C. §7543(b).

The legal issues mentioned in each of the analyses below are discussed in greater detail in the main body of the LWG memo, in the following sections:

Clean Air Act - §II.D.

Authorization/Waiver - §II.F.2.c.

The Shipping Act - §II.E.1.

U.S. Coast Guard Marine Safety Rules - §II.E.4.a.

Commerce Clause - §II.E.2.

Exceptions to Preemption - §II.F.2.

Equal Protection - §II.E.5.

WLW:bw

6/21/05

The Legal Working Group has prepared the following analysis of the NNI measures proposed for adoption by the Port.

OGV6: Reroute Cleanest Ships

This control measure would require shipping lines to re-route the cleanest ships (those meeting or exceeding IMO emission limits) to the Port of Los Angeles. Lease agreements or a port-wide rule would be the implementation mechanisms. The targeted participation rates are graduated, culminating in 100% participation for container and cruise ship terminals by 2012 and for all others by 2015.

A. Clean Air Act.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as OGV. EPA's nonroad engine rule expressly provides that states are not precluded under the Clean Air Act from regulating the use and operation of nonroad engines. 40 C.F.R. Part 89, Subpart A, App. A. While Part 89 states that it does not apply to ships regulated under 40 C.F.R. Part 94, an argument can be made that operational restrictions on ships are not preempted by the Clean Air Act.

SCAQMD and NRDC believe that, based upon IMO vessel penetration data showing that cleaner ships are currently available and will be available to meet the requirements of this measure, OGV6 would likely be characterized as an "in use" requirement, and not an "emissions standard," because modifications to the ship engines would not be required to comply with this measure.

PMSA believes that there is little to no evidence that foreign flag vessel operators have the flexibility to re-route vessels in such manner, or that the Port can enforce such requirements beyond its jurisdiction. SCAQMD and NRDC disagree.

B. Waiver or Authorization.

On the basis that this measure is not preempted by the Clean Air Act, waiver of preemption or authorization from EPA would not be necessary.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge.

D. United States Coast Guard Jurisdiction.

Since this measure does not require any physical modifications to the ship, it does not appear to conflict with any Coast Guard standards. The LWG is not currently aware of any conflict with any Coast Guard operational requirements.

E. Commerce Clause.

Given that this measure applies equally to in-state and out-of state and foreign OGVs, it would not appear to be facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

F. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements OGV6 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption and restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

OGV7: Low Emission Main Propulsion Engines

This measure will require the application of EPA's "Blue Sky Series" emission levels for Category 3 marine engines, which are about 80% below IMO standards for NOx. Implementation is scheduled for 2025. The measure calls for the Port to fund demonstration projects for retrofit and add-on control technology. The measure suggests a terminal-specific approach, with exceptions for non-repeat callers, etc.

A. Clean Air Act.

This section discusses whether OGV7 falls within the scope of preemption under the CAA. If any component of OGV7 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section E sets forth exemptions to federal preemption.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as OGV. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. This measure appears to fall within the scope of §209(e).

B. Waiver or Authorization.

If any component of OGV7 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

D. United States Coast Guard Jurisdiction.

In order to determine preemption under this Act, the Port would need to determine whether a requirement that ships meet optional "Blue Sky Series" emission standards conflicts with Coast Guard standards.

E. Commerce Clause.

Given that this measure applies equally to in-state and out-of state and foreign OGVs, it is not facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is “clearly excessive in relation to the putative local benefits.” SCAQMD and NRDC believe the Port will likely have a reasonable position that this measure will pass this test and PMSA and Rail believe it will likely not.

F. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements OGV7 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the “market participant” or the “municipal proprietor” exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

OGV9: Main Engine Fuel Improvement Program

OGV9 proposes modifications to an existing, voluntary program intended to subsidize a shift from the use of bunker fuel to 1.5% sulfur content residual fuel oil in both the auxiliary and main propulsion engines of ocean-going vessels calling on the Port of Los Angeles, beginning 40 nm from the California coast. It also proposes that a multi-port study be commissioned on the use of 0.2% or lower sulfur content residual fuel oil in both the main and auxiliary engines of these vessels. To the extent a Sulfur Emission Control Area ("SECA") is not implemented pursuant to OGV-10, or if the initial voluntary, incentive-based program does not obtain the intended participation rates (from 15% in 2006 to 100% in 2010), this program could become mandatory.

A. Clean Air Act.

This section discusses whether OGV9 falls within the scope of preemption under the CAA. If any component of OGV9 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section F sets forth exemptions to federal preemption.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as OGV. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. However, EPA recognizes an exception to preemption for the use and operation of existing nonroad engines, including usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines.

SCAQMD and NRDC believe that OGV9, as a "sulfur limit in fuel burned in nonroad engines," falls within the traditional category of such "in use" requirements not falling within the scope of preemption. PMSA notes that OGV9 does not address whether existing auxiliary and main engines are capable of burning 1.5% distillate without the installation of additional onboard equipment or engine modifications. SCAQMD and NRDC believe that lower sulfur fuel can be used in the engine without modification, so this measure would not be preempted.

B. Waiver or Authorization.

If any component of OGV9 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all marine vessels. To the extent that the measure is initially implemented by applying to some and not other terminals or shipping lines, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA believes that to the extent the Port implements OGV9 on a terminal-by-terminal basis, it would cause significant disparate impacts between terminals and operators and would be vulnerable to legal challenge.

D. United States Coast Guard Jurisdiction.

PMSA believes that onboard modifications may be required in order for any category of ocean-going vessel to burn 1.5% distillate as proposed in OGV9, while SCAQMD and NRDC believe that such modifications will not be necessary. PMSA also points out that it is unknown whether vessels would be required to alter their practices when entering, or operating within, the Port in order to make any fuel switches mandated by this measure. OGV9 could be subject to legal challenge to the extent vessel owners or operators attempting to comply therewith are forced into conflict with regulations or guidelines developed by the U.S. Coast Guard.

E. Commerce Clause.

Given that this measure applies equally to in-state and out-of state and foreign OGVs, it does not appear to be facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." PMSA believes, to the extent 1.5% distillate is readily available in the U.S. but not in jurisdictions outside of the United States, OGV-9 could be held to have the practical effect of discriminating against, foreign commerce. SCAQMD and NRDC believe that, given the likely availability of lower sulfur fuel inside and outside the U.S., especially in light of the European Union mandate that .1% fuel be used in EU ports starting in 2010, this measure would not violate the Commerce Clause because, as applied, the measure would have similar impacts on in and out-of-state and foreign OGVs, and, in addition, the Port could support this measure based on the need for emissions controls to protect public health.

PMSA does not believe it is a foregone conclusion that the proposed measure would not put an unacceptable burden on interstate commerce by potentially excluding vessel calls at the Port. PMSA also believes that there exists insufficient information to assume the availability of 1.5% distillate to foreign flagged vessels simply based on the EU mandate. The large majority of vessels calling on California ports are not calling on European ports.

F. Exceptions to Preemption.

SCAQMD and NRDC believe that if the Port implements OGV9 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

OGV11: Expanded Auxiliary Engine Fuel Improvement Program

Based on the results of the multi-port study proposed under OGV9, OGV11 is intended to "focus on shifting auxiliary engines to utilization of fuels of 0.2% or lower sulfur content." If OGV8 is not adopted in its present form, or if the initial voluntary, incentive-based program does not obtain the intended rates of participation (from 25% in 2006 to 100% in 2008), OGV11 would become a mandatory program.

A. Clean Air Act.

This section discusses whether OGV11 falls within the scope of preemption under the Clean Air Act ("CAA"). If any component of OGV11 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section E sets forth exemptions to federal preemption.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as OGV. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. However, EPA recognizes an exception to preemption for the use and operation of existing nonroad engines, including usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines. SCAQMD and NRDC believe that OGV11, as a "sulfur limit in fuel burned in nonroad engines," falls within the traditional category of such "in use" requirements not falling within the scope of preemption.

If modifications prove necessary for any category of regulated vessel to be able to comply with OGV11, PMSA believes such measures could cease to be classified as in-use regulations, and instead be deemed subject to federal preemption claims – either as *de facto* "emission standards" under Section 209 or on the theory that they conflict with federal requirements in an area that Congress has determined requires national uniformity.

PMSA also believes the Port lacks jurisdiction to dictate operations of vessels out to sea, and that OGV11 would be subject to legal challenge on that basis. SCAQMD and NRDC disagree.

B. Waiver or Authorization.

If any component of OGV11 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge. SCAQMD and NRDC disagree.

D. United States Coast Guard Jurisdiction.

PMSA believes that it is unclear whether onboard modifications would be required in order for some ocean-going vessels to burn 0.2% distillate in their auxiliary engines as proposed in OGV11. PMSA also believes that it is unknown whether vessels would be required to alter their practices when entering, or operating within, the Port in order to make any fuel switches mandated by this measure. SCAQMD and NRDC believe that modifications to the engine will likely not be necessary, nor will other changes need to be made that conflict with safety related coast guard rules. OGV-11 could be subject to legal challenge to the extent vessel owners or operators attempting to comply therewith are forced into conflict with safety-related regulations or guidelines developed by the U.S. Coast Guard.

E. Commerce Clause.

To the extent this measure applies equally to in-state and out-of state and foreign OGVs, it is not facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits."

PMSA believes that given that MARPOL Annex VI appears to only provide for a 1.5% sulfur fuel content for marine vessels operating within those jurisdictions officially designated as Sulfur Emission Control Areas, it appears possible that 0.2% distillate may not be readily available to many foreign-flagged vessels. If it were the case that .2% distillate fuel were available in the U.S. but not outside the U.S., OGV11 could be held to have the practical effect of discriminating against, foreign commerce.

However, SCAQMD and NRDC believe that .2% distillate fuel will likely be available outside of the U.S. to satisfy this measure because fuel providers are starting to make the cleaner sulfur fuel available in advance of the requirement of the European Union that ships calling on EU ports use .1% distillate fuel while at berth, SCAQMD and NRDC therefore believe that this measure would not violate the Commerce Clause because, as applied, the measure would have similar impacts on in and out-of-state and foreign

OGVs, and, in addition, the Port could support this measure based on the need for emissions controls to protect public health.

PMSA believes insufficient information presently exists to assume the availability of 0.2% distillate to foreign flagged vessels based on the EU, or otherwise. The large majority of vessels calling on California ports do not call on European ports.

F. Exceptions to Preemption and Commerce Clause

SCAQMD and NRDC believe that if the Port implements OGV11 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

OGV12: Expanded Main Engine Fuel Improvement Program

Based on the results of the multi-port study proposed under OGV9, OGV12 is intended to "focus on shifting ship main engines to utilization of fuels containing 0.2% or lower sulfur content." OGV12 would initially be a voluntary, incentive-based program. However, if the intended rates of participation are not achieved (from 15% in 2008 to 90% in 2012), OGV12 would become mandatory.

A. Clean Air Act.

This section discusses whether OGV12 falls within the scope of preemption under the CAA. If any component of OGV12 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section E sets forth exemptions to federal preemption.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as OGV. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. However, EPA recognizes an exception to preemption for the use and operation of existing nonroad engines, including usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines. SCAQMD and NRDC believe that OGV11, as a "sulfur limit in fuel burned in nonroad engines," falls within the traditional category of such "in use" requirements not falling within the scope of preemption. If significant modifications prove necessary for any category of regulated vessel to be able to comply with OGV12, PMSA believes such measures could cease to be classified as in-use regulations, and instead be deemed subject to federal preemption claims – either as *de facto* "emission standards" under Section 209 or on the theory that they conflict with federal requirements in an area that Congress has determined requires national uniformity.

B. Waiver or Authorization.

If any component of this measure is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge; NRDC and SCAQMD disagree.

D. United States Coast Guard Jurisdiction.

As set forth above, PMSA believes that some type of onboard modifications would likely be required in order for ocean-going vessels to burn 0.2% distillate in their main propulsion engines for any appreciable duration. It is unclear whether these vessels would be required to alter their practices when entering, or operating within, the Port in order to comply with OGV12. SCAQMD and NRDC believe that modifications to the engine will likely not be necessary, nor will other changes need to be made that conflict with safety related coast guard rules. To the extent vessel owners or operators attempting to fulfill their obligations thereunder are forced into conflict with safety-related regulations or guidelines developed by the U.S. Coast Guard OGV-12 could be subject to legal challenge.

E. Commerce Clause.

To the extent this measure applies equally to in-state and out-of state and foreign OGVs, would not appear to be facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits."

PMSA believes that given that MARPOL Annex VI appears to only provide for a 1.5% sulfur fuel content for marine vessels operating within those jurisdictions officially designated as Sulfur Emission Control Areas, it appears possible that 0.2% distillate may not be readily available to many foreign-flagged vessels. If it were the case that .2% distillate fuel were available in the U.S. but not outside the U.S., OGV11 could be held to have the practical effect of discriminating against, foreign commerce.

However, SCAQMD and NRDC believe that .2% distillate fuel will likely be available outside of the U.S. to satisfy this measure because fuel providers are starting to make the cleaner sulfur fuel available in advance of the requirement of the European Union that ships calling on EU ports use .1% distillate fuel while at berth, SCAQMD and NRDC therefore believe that this measure likely would not violate the Commerce Clause because, as applied, the measure would have similar impacts on in and out-of-state and foreign OGVs, and, in addition, the Port could support this measure based on the need for emissions controls to protect public health.

PMSA believes insufficient information exists to assume availability of .2% distillate to foreign flagged vessels based on the EU mandate, or otherwise. The large majority of vessels calling on California ports do not call on European ports.

F. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements OGV12 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the “market participant” or the “municipal proprietor” exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

GV14: Retrofit/Repower Requirements for Infrequent Callers

This control measure would require for infrequent callers that their on-board auxiliary engines operated during unloading and loading operations to be retrofitted or repowered in order to achieve at least a 50% reduction target from their baseline emissions. The measure would require 50% of infrequent caller OGV to meet these requirements by 2010 and 100% by 2015.

A. Clean Air Act.

This section discusses whether OGV14 falls within the scope of preemption under the CAA. If OGV14 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section F sets forth exemptions to federal preemption.

This measure appears to fall within the scope of preemption by requiring a numerical percentage reduction in emissions from used nonroad vehicles.

B. Waiver or Authorization.

If any component of OGV14 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge. NRDC and SCAQMD disagree.

D. United States Coast Guard Jurisdiction.

In order to determine possible preemption, the Port would need to determine whether a requirement that OGVs be retrofitted or repowered to reduce emissions conflicts with Coast Guard standards
PMSA and Rail believe that any Port effort that requires modifications to the vessel is vulnerable to legal challenge.

E. Commerce Clause.

Given that this measure applies equally to in-state and out-of state and foreign OGVs, it is not facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

F. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements this control measure in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

OGV15: Expanded VSR Program

This control measure would make the current voluntary speed reduction program (VSR) mandatory if participation goals are not being achieved, and extends the distance from which the ship speeds are reduced to 12 knots from 20 to 40 nautical miles from Point Fermin.

A. Clean Air Act.

To the extent such a mandatory speed reduction requirement is within EPA jurisdiction, it would fall within the category of "in use" requirements, and therefore under EPA's regulation, 40 C.F.R. Pt. 89, Subpt. A, App. A, it would not be preempted. PMSA and Rail do not believe that any attempt by the Port to regulate vessel operations while in transit up to 40 miles away is within the jurisdiction of the Port/City, SCAQMD or ARB. SCAQMD and NRDC disagree.

B. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge. SCAQMD and NRDC disagree.

C. United States Coast Guard Jurisdiction

The Port and shipping lines are currently implementing a voluntary VSR program. To date there has been no showing that requiring implementation of the same program, but on a mandatory basis and for a longer distance, would conflict with Coast Guard standards under Title II or CFR, Title 46, especially given the lack of any apparent conflict with the current program. PMSA notes that speed reductions by certain vessels and not others in shipping lanes could result in safety concerns.

D. Commerce Clause.

To the extent this measure applies equally to in-state and out-of state and foreign OGV, it is not facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." As applied, the measure would appear to have similar impacts on in and out-of-state and foreign OGVs.

E. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

OGV16: Expanded AMP

This control measure would require that all terminals with leases with the Port of Los Angeles require AMP on a specified percentage of ship calls under a specified schedule.

A. Clean Air Act.

This section discusses whether OGV16 falls within the scope of preemption under the CAA. If any component of OGV16 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section E sets forth exemptions to federal preemption.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as OGV. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted.

SCAQMD and NRDC believe the port could argue that requiring ships to plug in to electric power at shore is an "in use" requirement, and not an emissions standard, and that therefore the measure would not be preempted under EPA regulations, 40 C.F.R. Pt. 89, Subpt. A, App. A. PMSA and Rail believe that the in use requirement would not apply because modifications to ocean going vessels would be required and therefore the Port would be preempted from enforcing OGV16.

B. Waiver or Authorization.

If any component of OGV16 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge, NRDC and SCAQMD disagree

D. United States Coast Guard Jurisdiction.

In order to determine preemption, the Port would need to determine whether a requirement that AMP be installed conflicts with Coast Guard regulations. SCAQMD and NRDC believe that given that the Port has required installation of AMP on vessels operated by China Shipping, this does not seem to be a problem.

PMSA believes that the retrofitting of vessels to allow the use of on-shore facilities is vessel specific and some vessels are not so designed, and this requirement could limit the number and types of vessels calling at the Port. Moreover, PMSA believes that any Port action requiring modifications to vessels could be preempted.

E. Commerce Clause.

Given that this measure applies equally to in-state and out-of state and foreign OGVs, it would not appear to be facially discriminatory. The key inquiry, therefore, would be whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

F. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements OGV16 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

G. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

HC7: Emulsified Fuels

This control measure requires, pursuant to a specified phase-in schedule, that certain HC use emulsified fuel while operating within District water boundaries. HC7 does not require any physical modifications to HC, and calls for the Port of Los Angeles to conduct a demonstration project on the applicability of emulsified fuel to ensure effectiveness.

A. Clean Air Act.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as HC. However, public entities are free to regulate the "use and operation of nonroad engines," such as regulations placing "sulfur limits on fuel . . . once the engine is no longer new." Accordingly, the Port can regulate the type of fuel used by HC under this measure.[257]

B. Waiver or Authorization.

Because this measure is not preempted by the Clean Air Act, waiver of preemption or authorization from EPA would not be necessary.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. However, HC7 will be implemented gradually, instead of across-the-board to all Port facilities at the same time.[258] During the period that this measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

D. Commerce Clause.

It is not clear whether there is a Commerce Clause issue with this measure. If this measure imposes requirements on out-of-state HC, such requirements could implicate the Commerce Clause, as is discussed with respect to other measures.

E. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on

[257] However, this control measure may still be subject to preemption under Section 209, if it requires HC engine modifications.

[258] The measure calls for 80% of HC, other than assist tugs and line-haul tugs, to use emulsified fuels in 2006. The 80% participation rate would then apply to line-haul tugs beginning in 2008. The measure does not specify how the 80% participation requirements will be implemented amongst various Port tenants.

some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application but other interests may disagree.

HC10: Retrofit Existing Harbor Craft

This control measure requires the retrofit of existing harbor craft propulsion and auxiliary engines with new add-on control systems such as DPFs, DPFs in combination with lean NOx catalysts, DOCs, or SCR. This measure will not be implemented until 2007, at the earliest, in order to allow technology manufacturers to achieve verification from ARB for these retrofit devices.

A. Clean Air Act.

This section discusses whether HC10 falls within the scope of preemption under the CAA. If any component of HC10 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section E sets forth exemptions to federal preemption.

Section 209(e)(2) of the Clean Air Act ("CAA") preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as HC. EPA has asserted that regulations requiring the retrofit of nonroad sources are preempted. Accordingly, based on EPA's statement, HC10 may fall within the scope of preemption under Section 209(e)(2).

B. Waiver or Authorization.

If any component of HC10 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals.

D. Commerce Clause.

It is not clear whether there is a Commerce Clause issue with this measure. If this measure imposes requirements on out-of-state HC, such requirements could implicate the Commerce Clause, as is discussed with respect to other measures.

E. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements HC10 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions. Others in the LWG believe that these exceptions do not apply here.

F. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application but other interests may disagree.

CHE8: Enhanced CHE Modernization

This control measure requires CHE (other than yard tractors) to use alternative fuel, on-road engines, Tier 3 and 4 nonroad engines, and retrofit devices. This control measure places requirements on both new purchases and the replacement or retrofit of existing equipment.

A. Clean Air Act.

This section discusses whether CHE8 falls within the scope of preemption under the Clean Air Act ("CAA"). If any component of CHE8 is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure, and Section E sets forth exemptions to federal preemption.

Section 209(e)(2) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new and used nonroad sources, such as CHE. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted.

1. Alternative Fuel Requirement.

CHE8 requires that certain new purchases of CHE, and a certain percentage of existing CHE, be replaced with equipment that run on alternative fuels. The U.S. Supreme Court has held that mandatory purchase requirements for alternative fuel vehicles may fall within the preemption provision for motor vehicles under Section 209(a) of the CAA. Thus, by analogy, it is possible that CHE8 may be subject to the preemption provision under Section 209(e)(2).

2. On-Road and Nonroad Engine Standard Requirement.

If the alternative fuel requirement is not feasible, CHE8 requires that new purchases of CHE, and a certain percentage of existing CHE, be replaced with equipment that meets certain on-road engine standards, or if infeasible, a specified nonroad engine standard. Regulations requiring CHE to meet particular engine standards (on or nonroad) will likely fall within the scope of preemption under Section 209(e)(2).

3. Retrofit Requirement.

CHE8 also requires that particular equipment utilize the highest level ARB-verified ECS available. As stated, EPA has taken the position that retrofit requirements for nonroad sources are preempted. Accordingly, based on EPA's statement, CHE8's retrofit requirement may fall within the scope of preemption under Section 209(e)(2).

B. Waiver or Authorization.

If any component of CHE8 is found to fall within the scope of preemption under Section 209(e), a waiver or authorization may be sought by the State from EPA to implement the measure.[259]

C. The Shipping Act of 1984.

Upon full implementation, this measure will treat all shipping lines and terminals equally by imposing the same requirements on all lines and terminals. To the extent that the measure is initially implemented by applying to some and not other terminals, however, the Port would need to show that its approach is "just and reasonable" and does not cause "unreasonable prejudice or disadvantage" to one shipping line and/or terminal as compared to others.

PMSA and Rail believe that to the extent it is implemented on a terminal-by-terminal basis, this measure could have a disparate impact on cost of operations and would be vulnerable to legal challenge.

D. Commerce Clause.

As written, implementation of CHE8 would not readily appear to create an unreasonable burden on interstate commerce.

E. Exceptions to Preemption.

SCAQMD and NRDC believe that if the Port implements CHE8 in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

F. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that

[259] ARB is currently developing a statewide regulation (CHE 9) that is similar to CHE 8. Measure CHE 8 states that if CHE 8 achieves less emissions benefits than CHE 9, it will be superseded. However, if CHE 9 is not fully implemented or does not achieve at least the emissions reductions shown for CHE 8, then CHE 8 will remain in place.

the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

R7: Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1

This control measure requires deployment of ultra-low emission locomotives by Class 1 freight railroads for out-of-Port switching and in-Port and out-of-Port line haul operations. The first phase would apply to Port-related switcher locomotives only, and the second phase would apply to all line haul locomotives handling Port-related traffic, including all locomotives on trains entering and departing the SCAB that carry Port-related traffic. It is contemplated that a dedicated locomotive fleet for the national fleet operating in the SCAB would likely be required for the line haul locomotives. Additionally, NOx reductions achieved under this measure could not be used to meet the railroads' commitment under the South Coast MOU. Monitoring/reporting would be required.

A. Clean Air Act.

This section discusses whether this measure falls within the scope of preemption under the CAA. If any component of this measure is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure under the CAA, Section D addresses the impact of the adoption or attempt to enforce measure R7 on the South Coast MOU, Sections C, E and F address preemption under the Commerce Clause, LBIA and ICCTA and Section G sets forth exceptions to federal preemption.

Section 209(e)(1) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new locomotives and new locomotive engines. In its Final National Locomotive Rule, EPA has crafted a very broad preemption in which EPA has defined "new" to include not only factory-new locomotives, but also remanufactured locomotives and locomotive engines. EPA also expanded the scope of preemption to cover a period equivalent in length to 133 percent of the useful life at which the locomotive or engine is manufactured or remanufactured

Regulations setting engine standards for new locomotives and new locomotive engines fall within the scope of preemption under Section 209(e)(1). Whether a waiver or exception to preemption could apply is discussed below.

B. Waiver or Authorization.

If any component of this measure is found to fall within the scope of preemption under Section 209(e), SCAQMD and NRDC believe that a waiver or authorization may be sought by the State from EPA to implement the measure. However, waiver or authorization under the Clean Air Act would be possible only for non-new locomotives. Given the broad scope of EPA's preemption regulation, very few locomotives would be eligible for authorization for California regulation under the EPA's regulation. Rail believes that a waiver would not be available for measure R7.

C. Commerce Clause.

Unless the measure was viewed as a *per se* violation of the Commerce Clause that discriminates against interstate commerce and is not narrowly tailored to achieve a legitimate local purpose, the courts would determine whether this measure would create a burden on interstate commerce that is “clearly excessive in relation to the putative local benefits.” SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

D. Impact on South Coast MOU.

The proposed locomotive emissions standards in measure R7 are within the scope of preemption established by EPA and provide grounds for termination of the South Coast MOU, unless an exception would apply. This would result in a loss of substantial emissions reductions that would otherwise occur within the SCAB under the MOU. However, SCAQMD and NRDC believe that requirements imposed by the Port acting as a market participant or under the municipal proprietor exception would not trigger the MOU’s termination clause. Rail notes that the MOU does not contain any exception for governmental action, and they believe that therefore the market participant and municipal proprietor exceptions would not apply, and such action could lead to termination of the MOU.

E. Locomotive Boiler Inspection Act.

Rail notes that if the measure required a redesign of locomotives, it could implicate the Locomotive Boiler Inspection Act (recodified at 49 U.S.C. 20701-20703), see *Napier v. Atlantic Coast Line Railroad*, 272 U.S. 605, 613 (1926).

F. ICC Termination Act (ICCTA).

Rail states that any attempt by the Port to impose the emissions standards for locomotives in this measure as a condition on its permitting of future railroad projects at the Port would be subject to challenge under the ICCTA in the courts or before the Surface Transportation Board. Rail further states that insofar as compliance with those standards was regarded as a permitting or preclearance requirement, it would likely be held preempted as a matter of law. If a factual inquiry were called for, the question would be whether such standards for locomotives would interfere with the railroads’ interstate operations.

G. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements this measure in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the “market participant” or the “municipal proprietor” exceptions.

PMSA and Rail note that Courts have not determined whether or to what extent the "market participant" and "municipal proprietor" concepts apply under the ICCTA or the Locomotive Boiler Inspection Act. SCAQMD and NRDC believe that a court would find the exceptions applicable to these statutes, while PMSA and Rail believe that a court would not.

PMSA and Rail also believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

R9: ARB Diesel Fuel for Class 1 Railroad Locomotives

This control measure requires that, by the end of 2007, all locomotives operated by Class 1 railroads which service the Port must meet the low sulfur fuel requirements that were adopted by the Air Resources Board for intrastate locomotives and harbor craft, commonly known as ARB diesel fuel. NOx reductions achieved under this measure could not be used to meet the railroads' commitment under the South Coast MOU. Monitoring/reporting would be required.

A. Clean Air Act.

This section discusses whether this measure falls within the scope of preemption under the CAA. If any component of this measure is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure under the CAA, Section D addresses the impact of the adoption or attempt to enforce measure R9 on the South Coast MOU, Sections C, E and F address preemption under the Commerce Clause, LBIA and ICCTA, and Section G sets forth exceptions to federal preemption.

Section 209(e)(1) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new locomotives and new locomotive engines. In its Final National Locomotive Rule, EPA has crafted a very broad preemption in which EPA has defined "new" to include not only factory-new locomotives, but also remanufactured locomotives and locomotive engines. EPA also expanded the scope of preemption to cover a period equivalent in length to 133 percent of the useful life at which the locomotive or engine is manufactured or remanufactured. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. Rail notes that state controls that are not explicitly preempted would also be preempted if they violate federal anti-tampering rules. 63 FR 18994. However, EPA recognizes an exception to preemption for the use and operation of existing nonroad engines, including usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines.

It is acknowledged that measure R9 will result in "potentially significant operational, logistical and equipment changes, including but not limited to, draining of tanks, installation of separate tanks or baffling of tanks." The railroads believe that, as currently proposed, R9 involves retrofits and other design changes to locomotives, including requirements involving the addition of auxiliary fuel tanks, and therefore that it would be preempted. SCAMD and NRDC believe that R9 is not preempted because it is an acceptable in-use fuel requirement and can be implemented in a manner so as to avoid affecting the design of the locomotive.

B. Waiver or Authorization.

If this measure is not preempted because it is a fuel measure as provided in EPA's nonroad engine rule, it would not require a waiver. If any component of this measure is found to fall within the scope of preemption under Section 209(e), SCAQMD and NRDC believe that a waiver or authorization may be sought by the State from EPA to implement the measure. If waiver is required, it would not be available for new locomotives or new locomotive engines, which under EPA's regulation includes remanufactured locomotives and locomotive engines and locomotive and locomotive engines within 133% of their useful life. Rail believes that a waiver would not be available for measure R9.

C. Commerce Clause.

Unless the measure was viewed as a *per se* violation of the Commerce Clause that discriminates against interstate commerce and is not narrowly tailored to achieve a legitimate local purpose, the courts would determine whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

D. Impact on South Coast MOU.

Rail believes that because this measure establishes an emissions standard or other requirement, it could lead to the termination of the South Coast MOU and the loss of emissions reductions that would otherwise occur under the MOU. SCAQMD and NRDC believe that this measure is an "in use" requirement and would not require design modifications to the locomotive engines, and thus does not fall within the scope of preemption, and would not trigger the termination clause of the MOU. Rail believes this measure involves retrofit and design changes to locomotives and, even if it did not, any "in-use" emissions requirement would trigger the termination clause.

SCAQMD and NRDC also believe that requirements imposed by the Port acting as a market participant or under the municipal proprietor exception would not trigger the MOU's termination clause. Rail notes that the MOU does not contain any exception for governmental action, and they believe that therefore the market participant and municipal proprietor exceptions would not apply, and such action could lead to termination of the MOU.

E. Locomotive Boiler Inspection Act.

Rail notes that if the measure required a redesign of locomotives, it could implicate the Locomotive Boiler Inspection Act (recodified at 49 U.S.C. 20701-20703), see *Napier v. Atlantic Coast Line Railroad*, 272 U.S. 605, 613 (1926).

F. ICC Termination Act (ICCTA).

Rail states that any attempt by the Port to impose the emissions standards for locomotives in this measure as a condition on its permitting of future railroad projects at the Port would be subject to challenge under the ICCTA in the courts or before the Surface Transportation Board. Rail further states that insofar as compliance with those standards was regarded as a permitting or preclearance requirement, it would likely be held preempted as a matter of law. If a factual inquiry were called for, the question would be whether such standards for locomotives would interfere with the railroads' interstate operations.

G. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements this measure in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail note that Courts have not determined whether or to what extent the "market participant" and "municipal proprietor" concepts apply under the ICCTA or the Locomotive Boiler Inspection Act. SCAQMD and NRDC believe that a court would find the exceptions applicable to these statutes, while PMSA and Rail believe that a court would not.

PMSA and Rail also believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

R10: Idling Controls for Switcher and Line Haul Locomotives

This control measure requires the installation of tamper proof idling control devices on all switcher and line haul locomotives serving the Port by the end of 2006. NOx reductions achieved under this measure could not be used to meet the railroads' commitment under the South Coast MOU. Monitoring/reporting would be required.

A. Clean Air Act.

This section discusses whether this measure falls within the scope of preemption under the CAA. If any component of this measure is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure under the CAA, Section D addresses the impact of the adoption or attempt to enforce measure R10 on the South Coast MOU, Sections C, E and F address preemption under the Commerce Clause, LBIA and ICCTA, and Section G sets forth exceptions to federal preemption.

Section 209(e)(1) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new locomotives and new locomotive engines. In its Final National Locomotive Rule, EPA has crafted a very broad preemption in which EPA has defined "new" to include not only factory-new locomotives, but also remanufactured locomotives and locomotive engines. EPA also expanded the scope of preemption to cover a period equivalent in length to 133 percent of the useful life at which the locomotive or engine is manufactured or remanufactured EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. Rail notes that state controls that are not explicitly preempted would also be preempted if they violate federal anti-tampering rules. 63 FR 18994. However, EPA recognizes an exception to preemption for the use and operation of existing nonroad engines, including usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines.

Rail believes that the proposed locomotive requirements in measure R10 are within the scope of preemption established by EPA. SCAQMD and NRDC believe that if the requirements are preempted,[260] an exception would apply.

B. Waiver or Authorization.

If any component of this measure is found to fall within the scope of preemption under Section 209(e), SCAQMD and NRDC believe that a waiver or authorization may be sought by the State from EPA to implement the measure. If waiver is required, it would

[260] SCAQMD and NRC believe that R10 could be revised to avoid preemption and termination of the MOU by not requiring equipment modifications. Rail believes revisions will require additional review by the NNI Task Force, including technical, financial and legal review.

not be available for new locomotives or new locomotive engines, which under EPA's regulation, Rail notes, includes remanufactured engines and engines within 133% of their useful life. Rail believes that a waiver would not be available for measure R10.

C. Commerce Clause.

Unless the measure was viewed as a *per se* violation of the Commerce Clause that discriminates against interstate commerce and is not narrowly tailored to achieve a legitimate local purpose, the courts would determine whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

D. Impact on South Coast MOU.

The proposed locomotive requirements in measure R10, as drafted, are within the scope of preemption established by EPA and provide grounds for termination of the South Coast MOU, unless an exception would apply. This would result in a loss of substantial emissions reductions that would otherwise occur within the SCAB under the MOU. However, SCAQMD and NRDC believe that requirements imposed by the Port acting as a market participant or under the municipal proprietor exception would not trigger the MOU's termination clause. Rail notes that the MOU does not contain any exception for governmental action, and they believe that therefore the market participant and municipal proprietor exceptions would not apply, and such action could lead to termination of the MOU.

E. Locomotive Boiler Inspection Act.

Rail notes that if the measure required a redesign of locomotives, it could implicate the Locomotive Boiler Inspection Act (recodified at 49 U.S.C. 20701-20703), see *Napier v. Atlantic Coast Line Railroad*, 272 U.S. 605, 613 (1926).

F. ICC Termination Act (ICCTA)

Rail states that any attempt by the Port to impose the emissions standards for locomotives in this measure as a condition on its permitting of future railroad projects at the Port would be subject to challenge under the ICCTA in the courts or before the Surface Transportation Board. Rail further states that insofar as compliance with those standards was regarded as a permitting or preclearance requirement, it would likely be held preempted as a matter of law. If a factual inquiry were called for, the question would be whether such standards for locomotives would interfere with the railroads' interstate operations.

G. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements this measure in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the “market participant” or the “municipal proprietor” exceptions.

PMSA and Rail note that Courts have not determined whether or to what extent the “market participant” and “municipal proprietor” concepts apply under the ICCTA or the Locomotive Boiler Inspection Act. SCAQMD and NRDC believe that a court would find the exceptions applicable to these statutes, while PMSA and Rail believe that a court would not.

PMSA and Rail also believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

4. Statutes and Agreements Governing Vessels

a. U.S. Coast Guard Regulations.

Certain of the proposed emission control measures applicable to ocean-going vessels may be subject to preemption if they require vessel modifications or alterations in operating practices that are in conflict with rules or regulations adopted by the U. S. Coast Guard under authority of the Port and Waterways Safety Act ("PWSA"),[146] or 46 U.S.C. §3306 ("§3306") which governs the regulation and inspection of vessels.

The PWSA was enacted in 1972 in response to the *Torrey Canyon* oil spill, and “contains two Titles . . . designed to insure vessel safety and the protection of the navigable waters, their resources, and shore areas from tanker cargo spillage.”[147] Under Title I, the Coast Guard is authorized to “construct operate, maintain improve, or expand vessel traffic services, consisting of measures for controlling or supervising vessel traffic or for protecting navigation and the marine environment.”[148] Title II applies to tanker vessels and requires the Coast Guard to issue safety-related regulations "for the design, construction, alteration, repair, maintenance, operation, equipping, personnel qualification, and manning" of tankers carrying dangerous cargo.[149]

The U.S. Supreme Court addressed the preemptive impact of certain Coast Guard vessel safety requirements issued pursuant to the PWSA in both *Ray, et al. v. Atlantic Richfield Co., et al.*, 435 U.S. 151 (1978) and *U.S. v. Locke,* 529 U.S. 89 (2000). In evaluating potentially conflicting requirements imposed upon tankers under authority of Washington State law, the Court began its analysis by concluding that the general assumption against preemption is not triggered in this area, which Congress has determined requires national uniformity and where the "federal interest has been manifest."[150]

Based on the *Locke* and *Ray* decisions, NNI control measures that require tankers to install additional onboard equipment or modify existing equipment, in conflict with Coast Guard standards promulgated under Title II (for which the Court has held that federal law prevails), would be vulnerable to legal challenge under the PWSA.

Section 3306 applies to all vessels subject to Coast Guard Inspection and requires the Coast Guard to issue safety-related regulations "for the design, construction, alteration, repair, and operation of those vessels, including superstructures, hulls, fillings, equipment, appliances, propulsion machinery, auxiliary machinery, boilers, unfired pressure vessels, piping, electric installations, and accommodations for passengers and crew, sailing school instructors, and

146. *See* 33 U.S.C. §§1221-1232 (Title I); 46 U.S.C. §§3701-3718 (Title II).

147. *Ray, et al. v. Atlantic Richfield Co., et al.*, 435 U.S. 151, 161 (1978)

148. 33 U.S.C. §1223.

149. 46 U.S.C. §3703(a).

150. *Ray*, 435 U.S. at 157; *Locke*, 529 U.S. at 99, 107-108.

R11: Operating Efficiencies or Improvements on In-Use Class 1 Rail Equipment

This control measure requires Class 1 railroads to implement efficiency improvements on in-use locomotives and railcars starting in 2005. Such efficiency improvements must result in a minimum of 1-2% per year emission reduction improvement, averaged over any three consecutive year period. NOx reductions achieved under this measure could not be used to meet the railroads' commitment under the South Coast MOU. Monitoring/reporting would be required.

A. Clean Air Act.

This section discusses whether this measure falls within the scope of preemption under the CAA. If any component of this measure is subject to the preemption provisions of the CAA, Section B addresses California's authority to obtain a waiver from EPA to implement the measure under the CAA, Section D addresses the impact of the adoption or attempt to enforce measure R11 on the South Coast MOU, Section C, E and F address preemption under the Commerce Clause, LBIA and ICCTA,, and Section G sets forth exceptions to federal preemption.

Section 209(e)(1) of the CAA preempts state and local governments from adopting or enforcing standards and other requirements relating to the control of emissions from new locomotives and new locomotive engines. In its Final National Locomotive Rule, EPA has crafted a very broad preemption in which EPA has defined "new" to include not only factory-new locomotives, but also remanufactured locomotives and locomotive engines. EPA also expanded the scope of preemption to cover a period equivalent in length to 133 percent of the useful life at which the locomotive or engine is manufactured or remanufactured. EPA has also asserted that regulations requiring the retrofit of nonroad sources are preempted. Rail notes that state controls that are not explicitly preempted would also be preempted if they violate federal anti-tampering rules. 63 FR 18994. However, EPA recognizes an exception to preemption for the use and operation of existing nonroad engines, including usage, daily mass emission limits, and sulfur limits in fuel burned in nonroad engines.

SCAMD and NRDC believe that R11 is not preempted because it could be implemented through operational improvements such as changes in lubrication, which are acceptable requirements governing the "use and operation" of nonroad vehicles and, to the extent they involve changes to the railcars, do not affect the locomotives. However, to the extent this measure would change the way locomotives or locomotive engines are manufactured, it would fall within the scope of EPA's preemption regulation. Rail believes that R11 would establish an equipment standard because the efficiency improvements would include application of emissions reductions technology. Rail notes that there are inherent connections between engine efficiency and engine design (which make diesel electric locomotives among the most efficient and lowest emitting transportation power trains) as well as inherent connections between engines and the fuels they are designed to consume. Thus, Rail believes that R11 would be preempted.

B. Waiver or Authorization.

To the extent this measure could be implemented without affecting locomotive design, SCAQMD and NRDC believe that a waiver would not be necessary. If any component of this measure is found to fall within the scope of preemption under Section 209(e), SCAQMD and NRDC believe that a waiver or authorization may be sought by the State from EPA to implement the measure. If waiver is required, it would not be available for new locomotives or new locomotive engines, which under EPA's regulation includes remanufactured locomotives and locomotive engines and locomotive and locomotive engines within 133% of their useful life. Rail believes that a waiver would not be available for measure R11.

C. Commerce Clause.

Unless the measure was viewed as a *per se* violation of the Commerce Clause that discriminates against interstate commerce and is not narrowly tailored to achieve a legitimate local purpose, the courts would determine whether this measure would create a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." SCAQMD and NRDC believe this measure should pass this test and PMSA and Rail believe it will not.

D. Impact on South Coast MOU.

Rail believes that because this measure establishes an emissions standard or other requirement, it could lead to the termination of the South Coast MOU and the loss of emissions reductions that would otherwise occur under the MOU. SCAQMD and NRDC believe that this measure is an "in use" requirement and would not require design modifications to the locomotive engines, and thus does not fall within the scope of preemption, and would not trigger the termination clause of the MOU. Rail believes this measure involves retrofit and design changes to locomotives and, even if it did not, any "in-use" emissions requirement would trigger the termination clause.

SCAQMD and NRDC also believe that requirements imposed by the Port acting as a market participant or under the municipal proprietor exception would not trigger the MOU's termination clause. Rail notes that the MOU does not contain any exception for governmental action, and they believe that therefore the market participant and municipal proprietor exceptions would not apply, and such action could lead to termination of the MOU.

E. Locomotive Boiler Inspection Act and Safety Appliance Act.

Rail notes that if the measure required a redesign of locomotives, it could implicate the Locomotive Boiler Inspection Act (recodified at 49 U.S.C. 20701-20703), see *Napier v. Atlantic Coast Line Railroad*, 272 U.S. 605, 613 (1926). Rail notes further that if the measure required a change to the design or use of rail car equipment, it could implicate the Safety Appliance Act (49 U.S.C. 20301 et seq.), see *Union Pacific Railroad Company v. California Public Utilities Commission,* 346 F.3d 851, 869-70 (9th Cir. 2003).

F. ICC Termination Act (ICCTA).

Rail states that any attempt by the Port to impose the emissions standards for locomotives in this measure as a condition on its permitting of future railroad projects at the Port would be subject to challenge under the ICCTA in the courts or before the Surface Transportation Board. Rail further states that insofar as compliance with those standards was regarded as a permitting or preclearance requirement, it would likely be held preempted as a matter of law. If a factual inquiry were called for, the question would be whether such standards for locomotives would interfere with the railroads' interstate operations.

G. Exceptions to Preemption and Commerce Clause.

SCAQMD and NRDC believe that if the Port implements this measure in its contract awards, lease and permit approvals, or as a port-wide rule, it may avoid federal preemption and restrictions under the Commerce Clause under the "market participant" or the "municipal proprietor" exceptions.

PMSA and Rail note that Courts have not determined whether or to what extent the "market participant" and "municipal proprietor" concepts apply under the ICCTA or the Locomotive Boiler Inspection Act. SCAQMD and NRDC believe that a court would find the exceptions applicable to these statutes, while PMSA and Rail believe that a court would not.

PMSA and Rail also believe that the market participant and municipal proprietor exception to preemption is not applicable to private fleets under the CAA. Moreover, PMSA and Rail note the courts have held that states and localities cannot escape federal preemption or restrictions under the Commerce Clause by using their proprietary or contractual control of property to attempt to impose regulatory conditions on interstate or foreign commerce.

HDV19: Idling Reduction Measures

This control measure calls for "unspecified control measures would reduce emissions from heavy-duty vehicles by reducing idling times. Development of a standard for terminal turn-time may be appropriate."

A. Clean Air Act

There is no preemption under the Clean Air Act for state and local regulation of the use and operation of motor vehicles. Clean Air Act §209(a), 42 U.S.C. §7543(d) provides: "Nothing in this part shall preclude or deny to any state or political subdivision thereof the right otherwise to control, regulate or restrict the use, operation or movement of registered or licensed motor vehicles." Therefore, the Clean Air Act does not preempt idling regulations.

B. Analysis of HDV19 under State Law

While ordinarily state law gives authority over motor vehicles to the Air Resources Board, the California Attorney General has recently ruled that a local government may enact an ordinance restricting vehicle engine idling. There is also an existing state law that requires marine terminals to operate in a manner that does not cause trucks to idle or queue for more than 30 minutes while waiting to enter the terminal. This law does not appear to occupy the field of vehicle idling, but the Port would need to draft any truck idling measure in a way that does not render it impossible to comply with both measures. There is also an ARB truck idling rule, but it specifically allows local governments to adopt more stringent local rules.

PMSA doesn't believe there is clear authority for the Port to adopt idling requirements for on-road vehicles within the Port.

C. Commerce Clause.

Given that this measure applies equally to in-state and out-of-state or foreign trucks, it is not facially discriminatory. The key inquiry, therefore, would be whether this measure creates a burden on interstate commerce that is "clearly excessive in relation to the putative local benefits." It does not appear that an idling regulation would have an overly burdensome effect on foreign or interstate commerce.

D. Exemptions to Preemption and Commerce Clause.

Exceptions to preemption such as the market participant and municipal proprietor doctrines should not be necessary since there does not appear to be any applicable preemption or violation of the Commerce Clause.

E. Equal Protection Clause.

Once fully implemented, this measure would apply equally to all terminals. However, if the measure is implemented in a manner that imposes more stringent requirements on some terminals as compared to others during the implementation period, the terminals could raise an argument that these more stringent requirements constitute unequal treatment or a competitive disadvantage. However, SCAQMD and NRDC believe that the court could find there is a rational basis for the differential application and PMSA and Rail disagree.

6. PLAN IMPLEMENTATION

This section presents an overview of various elements that should be considered prior to the implementation of the Plan. These elements include: schedule to achieve NNI, implementation methods, compliance with CEQA, contingency measures/activities, and the regular re-evaluation and update to the NNI measures, analysis, and progress.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

6. Plan Implementation - As stated in our cover letter, we insist that this document be duly noticed and submitted for public review and comment under the California Environmental Quality Act. We are opposed to any attempt to selectively review measures to avoid CEQA since that would be piecemealing of the defined project to reduce emissions to the 2001 level to meet the goal of no net increase. We also oppose any attempt to exempt this document as a plan or feasibility study since elements are intended to be enforceable through various mechanisms including lease agreements and tariffs.

Rail Industry

Chapter 6 – Plan Implementation - The Mayor requested "an innovative and realistic strategy" to achieve no net increase goals. As explained in our comments on Chapter 11, Summary and Key Recommendations, we recommend a fundamental reassessment of the assumptions which are the basis for the no net increase initiative, based upon the Task Force work to date. We request the Mayor consider, in light of the significant state and federal actions identified by the Task Force, whether local regulatory action is either advisable or necessary. We believe alternative strategies, other than a new layer of new regulations, will achieve the goal of reduced air emissions from the Port.

6.1. Schedule to Achieve NNI

The complete NNI analysis is based on the assumptions made about future growth in cargo activity and the relationship between that growth and emissions levels. The assumptions made of these two critical principles within the analysis have a direct effect on the schedule to achieve NNI. Under the current scenario proposed by the Task Force, NNI would theoretically be achieved for NOx between 2009 and 2010 and maintained until 2015, where assumed future cargo growth would erode the reductions until 2020 when the "Blue-Sky" engines (OGV-7) would start to come online (see Figure 3-3). For PM, NNI could theoretically be achieved briefly by 2008, and then again by 2010, where it could be maintained until approximately 2021 when assumed future cargo growth would erode reductions and NNI would no longer be maintained (see Figure 3-4).

Its important to note that cargo activity growth, the relationship between that growth and emissions, and emissions modeling beyond 2012 should be considered speculative, or at least as "trend" information. The limits of understanding the impacts of new technologies, changes in growth and efficiencies and inefficiencies within the transportation network become more critical the further one tries to project into the future.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 6.1 Schedule to Achieve NNI - We received this draft Section on close of business June 13, 2005. We will submit our comments by the deadline given June 16, 2005 (three working days.) We strongly object to this report going forward without the ability to comment on this critical section.

Dave Howekamp
6.1 Schedule to Achieve NNI - The first two sentences should be dropped. The ideas in these sentences should be replaced as a sentence at the end of the first paragraph as follows "It should be noted that assumptions made about future growth on cargo activity and the relationship between that growth and emissions levels are critical to the analysis.

6.1.1. Identify Phases for Measures Implementation

Implementation of NNI control measures can be divided into three phases: near-term, mid-term and long-term.

- Near-term measures are expected to be implemented in 2005-2007, mid-term measures in 2008-2010, and long-term measures in 2011 or later. Near-term measures include a broad spectrum of emissions reduction strategies. Many of the near-term measures have already been adopted. In addition, some proposed near-term measures are based on technologies that have been demonstrated in practice while others will require further evaluation and consideration by an adopting agency.

- Mid-term measures are the technologies that are either in the research and development stage now and will become available, or are currently under application testing and will become commercially available in the near future.

- Long-term measures will require further technology research and development and will not be available shortly, but will likely become available in the future.

Table 6-1 lists three implementation phases of NNI control measures.

Table 6-1. Implementation of NNI Control Measures

Near-Term: 2005-2007

Measure I.D.	Description	Note
Ocean-Going Vessels (OGV)		
OGV-1	New Engine Standards for Ships	Adopted
OGV-2	Vessel Speed Reduction (VSR) Memorandum of Understanding	Adopted
OGV-3	Alternative Maritime Power (AMP)	Adopted
OGV-4	Auxiliary Engine Fuel Improvement Program	Adopted
OGV-6	Reroute Cleaner Ship	
OGV-8	Cleaner Fuel for Ship Auxiliary Engines	
OGV-9	Main Engine Fuel Improvement Program	
OGV-11	Expanded Auxiliary Engine Fuel Improvement Program	
OGV-15	Expanded VSR Program	
OGV-16	Expanded AMP	
Harbor Craft (HC)		
HC-1	New Engine Standards for Harbor Craft	Adopted
HC-2	Clean Fuel for Harbor Craft	Adopted
HC-3	Early Implementation of ULSD	Adopted
HC-4	Dredging Activities	Adopted
HC-5	Technical Advisory Committee (TAC) Harbor Craft Measures	Adopted
HC-9	Repower Existing Harbor Craft	
HC-11	AMP-Ready Staging Area	
Cargo Handling Equipment (CHE)		
CHE-1	Emission Standards for Heavy-Duty Non-Road Diesel Engines	Adopted
CHE-2	Yard Tractor Modernization and ULSD Program	Adopted
CHE-3	Early Implementation of ULSD for CHE Other Than Yard Tractors	Adopted
CHE-4	Alternative Fuel Yard Tractor Resolution	Adopted
CHE-5	Emulsified Fuels	Adopted
CHE-6	Technical Advisory Committee (TAC) CHE Measures	Adopted
CHE-7	Expanded Yard Tractor Modernization	
CHE-8	Enhanced CHE Modernization	
CHE-9	CHE at Ports and Intermodal Rail Yards	
Rail (R)		
R-1	Tier 0, 1 and 2 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines	Adopted
R-2	ARB Diesel Fuel Used by Intrastate Locomotives	Adopted
R-3	Federal Standards for Non-Road Diesel Fuel	Adopted
R-5	PHL Switcher Locomotive Modernization and ULSD Programs	Adopted
R-6	Ultra-Low Emission Switcher Locomotives: PHL	
R-9	ARB Diesel Fuel for Class 1 Rail Locomotives	
R-10	Idling Controls for Switcher and Line Haul Locomotives	
R-11	Efficiency Improvements on In-Use Class 1 Rail Equipment	
Heavy-Duty Vehicles (HDV)		
HDV-1	2004 On-Road Standards for Heavy-Duty Diesel Vehicles	Adopted
HDV-2	2007 On-Road Standards for Heavy-Duty Diesel Vehicles	Adopted
HDV-3	Gateway Cities Truck Modernization Program	Adopted
HDV-4	Engine Software Upgrade (or Low NOx Software Upgrade)	Adopted

HDV-5	Ultra Low Sulfur Diesel Fuel (15 ppm)	Adopted
HDV-6	Heavy-Duty Vehicle Inspection Program	Adopted
HDV-7	Periodic Smog Inspection Program (PSIP)	Adopted
HDV-8	Augment Truck and Bus Highway Inspection with Community-Based Inspection	Adopted
HDV-9	Reduced Truck Idling	Adopted
HDV-10	Expanded Gateway Cities Truck Modernization Program	
HDV-11	California Heavy-Duty Diesel Vehicles Standards and Fleet Modernization for Mexican Trucks	
HDV-12	Early ULSD Implementation	
HDV-13	Retrofit Heavy-Duty Diesel Vehicles with Diesel Oxidation Catalysts (DOC)	
HDV-14	Retrofit Heavy-Duty Diesel Vehicles with Diesel Particulate Filters (DPF)	
HDV-15	PM In-Use Emission Control	
HDV-17	Transportation Refrigeration Units (TRU)	

Mid-Term: 2008-2010

Ocean-Going Vessels (OGV)		
Measure I.D.	**Description**	**Note**
OGV-5	New Engine Standards for Category 3 Engines	
OGV-12	Expanded Main Engine Fuel Improvement Program	
OGV-13	Additional Auxiliary Engine Reduction for Frequent Callers	
OGV-14	Retrofit/Repower Requirement for Infrequent Callers	
OGV-17	Additional In-Use Measures for Ships	
Harbor Craft (HC)		
HC-7	Emulsified Fuels	
HC-8	In-Use Harbor Craft Emission Reduction Measure/Airborne Toxic Control Measure (ATCM)	
HC-10	Retrofit Existing Harbor Craft	
Rail (R)		
R-4	MOU in the South Coast Air Basin	Adopted
R-7	Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1	
Heavy-Duty Vehicles (HDV)		
HDV-16	On-Board Diagnostics (OBD) for Heavy-Duty Trucks	
HDV-19	Idling Reduction Measures	

Long-Term: 2011+

Ocean-Going Vessels (OGV)		
Measure I.D.	**Description**	**Note**
OGV-7	Low Emission Main Propulsion Engines	
OGV-10	Creation of a Sulfur Emission Control Area (SECA)	
Harbor Crafts (HC)		
HC-6	New Engine Standards for Category 1 and 2 Marine Engines	
Rail (R)		
R-8	Tier 3 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines	

R-12	Electrification of Alameda Corridor and Alameda Corridor East	

To Be Determined

Heavy-Duty Vehicles (HDV)		
Measure I.D.	**Description**	**Note**
HDV-18	Truck Stop Electrification	
HDV-19	Idling Reduction Measures	

As shown in Table 6-1, the majority of control measures for all five emissions source categories either have been adopted or will be implemented in the near-term to achieve emissions reductions. It should be noted that the implementation of some control measures would require major infrastructure construction, such as electrification of truck stops and terminal efficiency improvements for improving in-terminal traffic and streamlining operations. These will also be considered, developed and incorporated into the NNI control measures when appropriate.

6.2. Implementation Methods

Control measures will be implemented in three ways - Voluntary, Incentive-Based and Enforceable.

6.2.1. Voluntary

Control measures categorized as voluntary measures are used or implemented by the participants without legal obligation. Participation with control measures classified as voluntary are non-compensated actions agreed to and undertaken by operators. There are already many examples of voluntary actions taken by operators that have resulted in a decrease in emissions, including procedural efficiency increases, purchase of new lower-emitting equipment, and use of low sulfur fuels in exempt equipment.

6.2.2. Incentive-Based

Control measures categorized as incentive-based include a business incentive for the participant. An incentive based approach makes the adoption of the various strategies cost-neutral for the participant, or provides just enough incentive for a participant to enter the program. Control measures implemented within the Port to date have been incentive-based and utilized Harbor Revenue funds, as well as Carl Moyer and other grant funding.

Procedures will be developed and set in place to monitor and review participation levels (on a semi-annual/annual time frame) to determine the effectiveness of the voluntary and incentive based measures. Should the participation levels not reach the stated goals for each measure, the Port will review the program design – including a review of the incentive provided, discuss with non-participants to determine why they are not participating, and evaluate applicable alternative methods to make measures compulsory. The review process for each of the measures would be open for comments, suggestions and coordination.

The Task Force acknowledges that voluntary and incentive-based programs may have limitations. But in addition to the benefit of having programs that can be easily implemented without any legal barriers, it is critical to have some programs that provide flexibility and encourage innovation. Setting a performance goal *with* the participants encourages buy-in and participation while acknowledging the creative thinking that will come from the operators. This flexibility should result in original ideas – creating additional measures not yet developed or even imagined. With entirely autocratic measures, there is much less room or incentive for operator innovation.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 6.2.2 Incentive Based - We strongly support incentive based programs and control measures. We will work in cooperation with the port and all stakeholders to ensure success with these programs as we have in the past. We do not understand the concept of making incentive based measures compulsory.

6.2.3. Enforceable

Control measures that are classified as enforceable ensure mandatory use of the control measure and forcible participation through either the policies of the Port, leases and other contractual obligations, or rulemaking by of the regulatory agencies: SCAQMD, ARB, EPA or a mechanism of the IMO. Compliance with these measures will be legally enforced through regulatory legislation and rules, by the Board of Harbor Commissioners, or by the IMO.

Next steps:

- Develop implementation strategies for voluntary and incentive based programs.
- Develop implementation strategies for enforceable programs.
- Develop verification, record keeping, reporting procedures, etc. for the measures such that the resulting emissions reductions can be quantified and validated.
- Develop program administration requirements and costs to ensure successful implementation of the measures/programs.

Programs that are currently voluntary or incentive based may be re-evaluated at a later date to determine the feasibility reclassifying them as enforceable, should adequate participation and emissions reductions not be realized through the voluntary and incentive based programs.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 6.2.3. Enforceable - By having enforceable measures you eliminate having the plan exempt from CEQA.

6.3. Compliance with CEQA

The California Environmental Quality Act (Public Resources Code [PRC] 2100 et seq.) and implementing Guidelines (14 California Code of Regulations [CCR] 1500 et seq.) applies to all discretionary activities proposed to be carried out or approved by California public agencies, including state, regional, county and local agencies, unless an exemption applies[i]. CEQA's primary objectives are to disclose to decision makers and the public, the significant environmental effects of proposed actions and to require agencies to reduce or avoid environmental effects by implementing feasible alternatives or mitigation measures to projects[ii]. In addition, CEQA provides for disclosure of why agencies approve projects where there are significant effects, provides for coordination among agencies, and enhances public participation in the planning process.

Implementation of the No Net Increase Plan would require approval by a decision-making body, and therefore, would be subject to considerations of CEQA either through approval of the Plan as a whole, or approval of individual measures contained in the document. However, CEQA review is a phased process (see insert) and the level of CEQA analysis and whether or not certain exemptions may apply would vary depending on whether the Plan is approved in its entirety as a formal "plan" document, or whether individual measures would be approved independently of the total Plan. The disposition of the Plan would be dependent on instructions provided by the City of Los Angeles Mayor's Office once the Plan is received.

Stakeholder Comments Received:

Pacific Merchant Shipping Association and Rail Industry

The NNI plan constitutes a very diverse and substantial collection of "discretionary activities proposed to be carried out or approved by" the Port and thus is subject to CEQA review. CEQA review will be a critical part of the NNI plan going forward. Only a full EIR, prepared through the Port's well-tested CEQA process, will adequately "Inform governmental decision-makers and the public about the potential, significant environmental effects of [the Port's] proposed activities." C/G 15002 (a)(1). Based on the very substantial and diverse impacts of the measures in the NNI plan, the initial draft of the CEQA section correctly concludes that "preparation of an Initial Study[for the NNI plan] would likely result in identification of some potentially significant impacts as a result of implementing one or more of the measures." We agree that "such potential [significant] impacts could occur from cross/multimedia effects of measure implementation," including the significant impacts that would result from a substantial modal shift from rail to on-highway trucking, which will occur if the NNI plan is adopted or implemented. The proposed measures will have "potentially significant impacts" upon several environmental factors, including Air Quality, Land Use/Planning, Transportation/Traffic, Utilities/Service Systems and Noise. See CEQA Guidelines, 14 C.C.R. § 15000, et seq., Appendix G.

In light of these circumstances, CEQA clearly requires preparation of an EIR prior to the plan adoption stage. As provided in the CEQA guidelines,

> *If the lead agency determines there is substantial evidence in the record that the project may have a significant effect on the environment, the lead agency shall prepare an EIR (Friends of B Street v. City of Hayward (1980) 106 Cal. App. 3d 988). Said another way, if a lead agency is presented with a fair argument that a project may have a significant effect on the environment, the lead agency shall prepare an EIR, even though it may also be presented with other substantial evidence that the project will be not have a significant effect (No Oil, Inc. v. City of Los Angeles (1974) 13 Cal. 3d 86).*

14 C.C.R. § 15064(f)(1). Additionally, separate EIRs may be required at the time of the application of proposed measures and adoption of future measures. 14 C.C.R. § 15168(c)("Subsequent activities in the program must be examined in the light of the program EIR to determine whether an additional environmental document must be prepared.")[1] Given the critical nature of the CEQA analysis, and its connections to the legal analysis, we recommend referring this section to the LWG for review and revision. The following statement in the preliminary CEQA analysis is not correct: "the level of CEQA analysis and whether or not certain exemptions apply would vary depending on whether the plan is [approved] in its entirety as a formal 'Plan' document, or whether individual measures would be approved independently of the total plan." This approach—where an agency segments a project into isolated parts in order to avoid or manipulate the CEQA review process—would constitute impermissible "piecemealing." The State CEQA Guidelines provide that, "The lead agency must consider the whole of an action, not simply its constituent parts, when determining whether it will have a significant environmental effect." 14 C.C.R. § 15003(h). The Guidelines further provide that, "Where individual projects are, or a phased project is, to be undertaken and where the total undertaking comprises a project with significant environmental effect, the lead agency shall prepare a single program EIR for the ultimate project. . . ." 14 C.C.R. § 15165. As stated in the seminal California Supreme Court case Bozung v. LAFCO, 13 Cal. 3d 263, 283-84 (1975), CEQA mandates that "environmental considerations do not become submerged by chopping a large project into many little ones . . . ." Applying the CEQA review process to each separate control measure that comprises the NNI plan, rather than to the NNI plan in total, would be an attempt to "[chop] a large project into little ones," and would be impermissible.

*The preliminary CEQA analysis also suggests that the NNI plan could elude CEQA review if "Approval of individual control measures could be included as mitigation measures in an Environmental Impact Report (EIR) prepared for a Port development project." On the contrary, the entire plan, including the proposed mitigation measures, must be thoroughly reviewed and analyzed by the agency at the onset. The CEQA guidelines provide that an initial study—which is required where the proposed project may have a significant effect on the environment—must contain "a discussion of ways to mitigate the significant effects identified." 14 C.C.R. § 15063(a) and (d)(4). In this case, alternatives to the proposed control measures would need to be evaluated. The guidelines further provide that "Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified [in the EIR]." 14 C.C.R. § 15126.4(a)(1)(B). These requirements reflect the principle that an agency is prohibited from assuming that a measure's impacts will be beneficial.
See 14 C.C.R. § 15064(c).*

We concur, therefore, with the following comments California Air Resources Board submitted on May 23, 2005:

- *We have serious concerns with portraying the list of measures as a 'tool box of vetted control measures.' That can be applied port wide for project mitigation under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). The application of the NNI measures as mitigation may or may not be appropriate depending on the specific project and the feasibility of the measures being proposed. Other than the consideration of the CEQA requirements as they apply to the project plan, it is outside the scope of the NNI Task Force to recommend application of proposed measures for CEQA and NEPA. We suggest removal of this paragraph. [Page 7 Paragraph 5]"*

Finally, we note that the statement in the preliminary draft suggesting that the NNI plan may be exempt from CEQA is incorrect. Courts have previously rejected claimed categorical exemptions from CEQA for environmental protection measures when the decision-making agency "cannot say with certainty 'there is no possibility that the activity in question may have a significant effect on the environment.'" Dunn-Edwards Corp. v. Bay Area Air Quality Management Dist., 9 Cal. App. 4th 644, 658 (1992), citing 14 C.C.R. § 15061(b)(3), disapproved on another ground in Western States Petroleum Assn. v. Superior Court, 9 Cal. 4th 559, 570 and fn. 2 (1995); see also Wildlife Alive v. Sherman Chickering, 18 Cal. 3d 190,

[1] For further discussion of program EIRs, see 14 C.C.R. § 15165 ("Where individual projects are, or a phased project is, to be undertaken and where the total undertaking comprises a project with significant environmental effect, the lead agency shall prepare a single program EIR for the ultimate project as described in Section 15168.")

206 (1976) ("where there is any reasonable possibility that a project or activity may have a significant effect on the environment, an exemption would be improper"). Furthermore, CEQA Guidelines preclude application of categorical exemptions to situations where "the cumulative impact of successive projects of the same type in the same place, over time is significant." 14 C.C.R. § 15300.2(b). We therefore urge the Task Force to begin to determine the most efficient and expeditious way in which to prepare a full EIR on the NNI plan.

6.3.1. Plan Approval

> **Phases in the Environmental Review Process under CEQA**
>
> 1. Preliminary review of an agency action to determine whether the action is subject to CEQA or the underlying project is exempt from CEQA.
> 2. Preparation of an Initial Study to determine whether the project may have a significant environmental effect.
> 3. Preparation of an EIR if the project may have a significant environmental effect or of a Negative Declaration or Mitigated Negative Declaration if no significant effects will occur.

Approval of the No Net Increase Plan in its entirety by a decision-making body such as the City of Los Angeles, through its Board of Harbor Commissioners, would constitute a project under CEQA and require preparation of either a Negative Declaration or an EIR. Preparation of an Initial Study would likely result in identification of some potentially significant impacts as a result of implementing one or more of the measures. Such potential impacts could occur from cross/multimedia effects of measure implementation (e.g., HC7), infrastructure construction (e.g., HC11), or safety considerations (e.g., OGV12). While controversy does not unto itself require preparation of an EIR, it is possible that approval of the Plan might also be challenged without preparation of an EIR. Preparation of an EIR or EIR equivalent[iii] is also consistent of the practice of ARB and SCAQMD in their preparation of the State Implementation Plans and the Air Quality Management Plans, respectively. It should be noted that approval of the Plan by a local agency that includes as yet unapproved measures under the authority of State, Federal and International agencies/law is discussed in Section 5.

6.3.2. Approval of Individual Mandated Measures

A number of control measures included in the draft Plan are engine standards or fuel requirements that would be adopted by EPA or ARB. In the case of ARB, their Certified Regulatory Program takes the place of CEQA[3]; that is, their rulemaking process includes certain provisions required under CEQA (see 14 CCR 15252). The ability of the Port or another local agency to adopt mandated measures that place requirements on mobile sources which fall under the purview of State, Federal, or International law is discussed in Section 5 of this document. If a local agency were to be found to have such authority, it would need to comply with CEQA as it relates to the specific measure under consideration. The level of CEQA analysis would need to be considered in a case-by-case basis (see Incentive/Voluntary Measures below).

6.3.3. Approval of Incentive/Voluntary Measures

A number of the control measures included in this document are based on incentive or voluntary programs, where incentives are provided by the Port or others. Such measures would need to be individually considered under the CEQA review process. It is possible that a number of these measures could be exempt from the CEQA review process[iv]. In particular, CEQA Guidelines (14 CCR 15301-15332) establishes 32 classes of categorical exemptions that can be applied where there is no reasonable possibility that such activities would result in a significant environmental impact (PRC 21084(b), (c), (e); 14 CCR 15300.2). As provided (14 CCR 15300) the City of Los Angeles has established its own list of specific activities falling within each class in its Los Angeles City CEQA Guidelines. One example of a categorical exemptions that might apply to one or more measures is Class 1 (6): *Addition of safety, security, health or environmental protection devices for use during construction of or in conjunction with existing structures, facilities or mechanical equipment, or topographical features (including navigational devices)* (Article III). State Guidelines and Los Angeles City CEQA Guidelines also includes a General Rule exemption, *"…where it can be seen with reasonable certainty that the type of activity in question could not possibly have a significant effect on the environment"* (14 CCR 15062(b)(3); Los Angeles CEQA Guidelines, Article I. 1.).

6.3.4. CEQA Mitigation Requirements

Approval of individual control measures could be included as mitigation measures in an EIR prepared for a Port development project. CEQA gives a public agency the authority to require feasible changes in any or all activities involved in a project to lessen or avoid significant effects on the environment (14 CCR 15041). However, the EIR must discuss the environmental effects of the measure, and a public agency does not have unlimited authority to impose mitigation measures. Specifically, a public agency may exercise only those express or implied powers provided by law, aside from those provided by CEQA (14 CCR 15040). If under other law an agency lacks the legal authority to impose those mitigation measures for a significant environmental impact, CEQA does not provide that authority. The ability of the Port or another local agency to apply as yet unapproved measures that place requirements on mobile sources, which fall under the purview of State, Federal, or International law is discussed in Section 5 of this document.

6.3.5. NNI Planning Study

The existing activities of the Task Force and related planning activities (e.g. consulting contract approval, receipt of the Plan) that might come before a decision-making body such as the Board of Harbor Commissioners do not constitute project approval, but are planning/feasibility studies. CEQA Guidelines (14 CCR 15262) provide that: *"A project involving only feasibility or planning studies for possible future actions which the agency, board, or commission has not approved, adopted, or funded does not require the preparation of an EIR or negative declaration but does require consideration of environmental factors. This section does not apply to the adoption of a plan that will have a legally binding effect on later activities."*

6.4. Contingency Measures/Activities

The Plan will remain a living document, with regular review and recalibration as necessary. As will be discussed in the following section, regular Plan review will assist both regulators and participants in ensuring that participation and emissions reduction goals are achieved. However, should the planned activities not result in the anticipated results, measures must be in place to assist in compliance. The key here is regulatory flexibility: NNI emission goals can be met in a variety of manners including approaches not yet considered, such as initiation of new cap and trade programs.

The TWG has identified three general contingency measures: furtherance of emerging technologies, use of operational capacity restraints where necessary and appropriate, and regular Plan review and update.

6.4.1. Emerging Technologies

There are a number of cutting edge or "Blue Sky" technologies under consideration. From alternative-fueled cargo handling equipment to expansion of AMP programs, programs are under development to lower emissions levels of equipment associated with Port activities. Some of these activities receive the additional benefit of the Port (or other regulatory) funding in order to speed development of such potential technologies, while other technologies are still under development and study.

Emerging technologies are driven by the current set of control measures, which employ a mix of regulatory mandates and incentives to encourage the adoption of viable emerging technologies at the earliest possible date. This should include the development of larger but cleaner engines, earlier than would otherwise be expected. New ship engine designs are critical for reductions in later years. See report Section 3.6 for a more detailed discussion of emerging technologies.

6.4.2. Operational Capacity Restraints

The least desired approach is for operational capacity constraints to be imposed. The goal of NNI is to achieve emissions stabilization without introducing undue operational capacity constraints. However, if such an approach is needed to ensure compliance with NNI, and participation rates are not sufficient to ensure compliance in any other manner, such growth curbs will be considered.

Again, it's important to note that this analysis of NNI does not take into account existing capacity restraints that currently exist within the transportation infrastructure. These constraints include terminal space and configuration, existing berth configurations, bridge and highway bottlenecks, rail system constraints, etc. These constraints will "naturally" affect cargo growth and movement and will provide a measure of operational constraint in the future as they are realized. At this time however, their potential effect cannot be quantified.

***Stakeholder Comments Received*:**

Pacific Energy Partners

Section 6.4.2, first paragraph. I don't think it is appropriate for this group to say that "growth curbs will be considered". This would be a policy decision of the Board of Harbor Commissioners. "Growth curb" is also a different concept than capacity restraints. A cap and trade program is a capacity constraint. A growth curb is a ban on new development.

Pacific Merchant Shipping Association
Section 6.4.2 Operational Capacity Restraints - In addition to the constraints noted in the draft report mandate measures that carry substantial costs to industry that are not required at other ports will result in a disincentive to cargo moving through the Port of Los Angeles. The economic barriers will effect cargo growth and movement.

6.5. Regular Re-Evaluation and Update

Section 7 of this report addresses NNI re-evaluation and update in detail. The Plan will be reviewed informally on an ongoing basis, reviewed formally on a yearly basis, and updated on an aggressive schedule of no less than once each three-year period. The Port anticipates developing a web-based reporting system for operators, so that the Port and TWG will have the ability to evaluate emissions reduction achievements on a real-time basis. This approach will also better enable the Port to determine which aspects of the program are achieving less than anticipated results. The Port will additionally generate quarterly reports during initial program implementation, to ensure that anticipated improvements are being met. Record keeping will include maintenance of emissions records for a minimum of three years on-site.

If the current control measures are found to be insufficient or inappropriate in achieving sufficient emissions reductions, the TWG will consider other measures or modes of implementation in order to achieve NNI.

Stakeholder Comments Received:

Pacific Energy Partners
This refers to the TWG as having an on-going role. I don't think the task force has any role after Mayor Hahn leaves office. It would seem that the TWG would also be defunct at that time.

Pacific Merchant Shipping Association
Section 6.5 Regular Re-Evaluation and Update - The port should commit to re-evaluation to the plan for each of the milestone years listed in the report - 2005, 2008, 2010, and 2012.

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[i] Taken in part from: Bass, R.E., A.I Herson and K. M. Bogdan, 1999. CEQA Deskbook. Solano Press Books. 2001 Supplement. 414 pp.

[ii] For the purposes of CEQA, a “project” is the whole of an action, which has the potential for resulting in wither a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment (14 CCR 15378(a); PRC 21065).

[iii] A number of State Agencies, including ARB and SCAQMD in part, which have Certified State Regulatory Programs, are exempt from preparing CEQA documents (see 14 CCR 15250-15253). However, these certified programs is generally subject to the provisions of CEQA and require preparation of a “Substitute Document”. Further, Responsible agencies are required to utilized such certified programs in their subsequent actions.

[iv] A discussion of the various types of exempt activities identified in CEQA or CEQA Guidelines can be found in Bass et al. (1999) pp. 22 – 32.

7. PLAN REVIEW AND ADOPTION

In order to meet Mayor Hahn's and Councilwoman Hahn's stated goal of NNI, specific and action-oriented goals, objectives and programs are established for each control measure. The Port will achieve cleaner air for all who live and work in the area through the implementation of Plan measures, including voluntary and mandatory compliance programs. The Port is committed to minimizing the emissions of criteria and hazardous air pollutants from existing and future operations, including the development of infrastructure or sea-based facilities/services. Air emissions inventories and emissions impact analyses have been developed, and will be maintained, to characterize air pollution emissions and impacts of Port sources.

The NNI Task Force evaluated the measures listed in the Compendium of Control Measures (Appendix B) and discussed in Section 3.2 of this document. These measures are expected to achieve significant reductions in current and future air emissions at the Port. Regulatory agencies or the Board of Harbor Commissioners have already adopted some measures, while others are recommended for further evaluation and implementation.

The Task Force considered the uncertainties and challenges that are expected in achieving NNI during the evaluation of these control measures. For example, information regarding duty cycles, emission factors, and the effectiveness of controls on marine engines is less definitive than for land-based mobile sources that have been subject to air quality regulations for many years. Furthermore, many of the proposed measures will require the cooperation and collaboration of multiple agencies on the local, state, national and international level; examples may include the formation of an international coalition of environmental agencies, shipping companies, and engine manufacturers.

Stakeholder Comments Received:

Pacific Merchant Shipping Association

7. Plan Review and Adoption - We received this draft Section on close of business June 13, 2005. We will submit our comments by the deadline given June 16, 2005 (three working days.) Since major portions of the document have not been completed or submitted for review, including significant sections of this chapter. We recommend the entire document must be completed and submitted for review by the taskforce. Following review by the taskforce, the entire document must be submitted to a full CEQA evaluation, including alternatives.

South Coast Air Quality Management District

Section 7 - Plan Review and Adoption - The last sentence of third paragraph should be revised as follows since only some (not many) measures may (not will) require the cooperation and collaboration of multiple agencies):

Furthermore, some of the proposed measures may require the cooperation and collaboration of multiple agencies on the local, state, national and international level; examples may include the formation of an international coalition of environmental agencies, shipping companies, or engine manufacturers.

Rail Industry
Chapter 7 – Plan Review and Adoption - The Mayor requested "an innovative and realistic strategy" to achieve no net increase goals. As explained in our comments on Section 10, Summary and Key Recommendations, we recommend a fundamental reassessment of the assumptions which are the basis for the no net increase initiative, based upon the Task Force work to date. We request the Mayor consider, in light of the significant state and federal actions identified by the Task Force, whether local regulatory action is either advisable or necessary. We believe alternative strategies, other than a new layer of new regulations, will achieve the goal of reduced air emissions from the Port.

State and federal agencies and international bodies, with formalized administrative processes, have adopted a significant body of regulations directed at the contaminants associated with goods movement and are in the ongoing process of developing and workshopping additional air quality regulations. In fact, at least 29 of the 68 proposed measures, which form a significant basis for the achievement of emission reductions even as the volume of TEU's passing through the Ports increases, fall into this category. Duplication or minimization of this effort should be avoided.

7.1. Plan Review and Subsequent Action

The Task Force has reviewed and approved this Plan. The Plan will be presented to Mayor James K. Hahn and his staff on June 24, 2005. As a report to the Mayor from a blue-ribbon Task Force, Plan review and subsequent action is largely at the discretion of the Mayor. It is not clear at this time what direction the Mayor will take with the Plan.

As discussed in previous sections, the Plan contains several kinds of measures: regulatory, non-regulatory industry-funded, and non-regulatory incentive-funded. The measures identified as regulatory will likely be implemented with or without further action on the Plan. Likewise those measures identified as non-regulatory industry funded (existing) are implemented through separate agreements and will likely continue with or without action on the Plan. However, in order for all or parts of the measures identified as *non-regulatory incentive-funded (proposed)* to be implemented, it will be necessary for the City of Los Angeles, probably through the Board of Harbor Commissioners, but perhaps also the City Council, to take action on the Plan.

Stakeholder Comments Received:

Professor Ed Avol
Section 7.1 (p72) – Based on the discussions at the previous few meetings, it seems unlikely that everybody will "approve" this report. I think the best that can be said is that all members of the Task Force had an opportunity to "review" and comment on this report…

Dave Howekamp
Section 7.1 second paragraph, add a third sentence
However, these measures will require support and lobbying by the Port, city and community members to insure adoption by the appropriate regulatory agencies.

7.2. Plan Adoption

In order to implement any or all of the *proposed non-regulatory incentive-funded* measures, the Board of Harbor Commissioners will likely have to take action to fund, condition project approval, or otherwise require implementation. Whether this comes as a complete Plan or through individual proposals is yet to be decided. The Board has previously taken action on those measures identified as *existing* non-regulatory incentive-funded measures and has funded at least the first year of implementation. Adoption of the Plan would be subject to the legal considerations discussed in Section 5.

Stakeholder Comments Received:

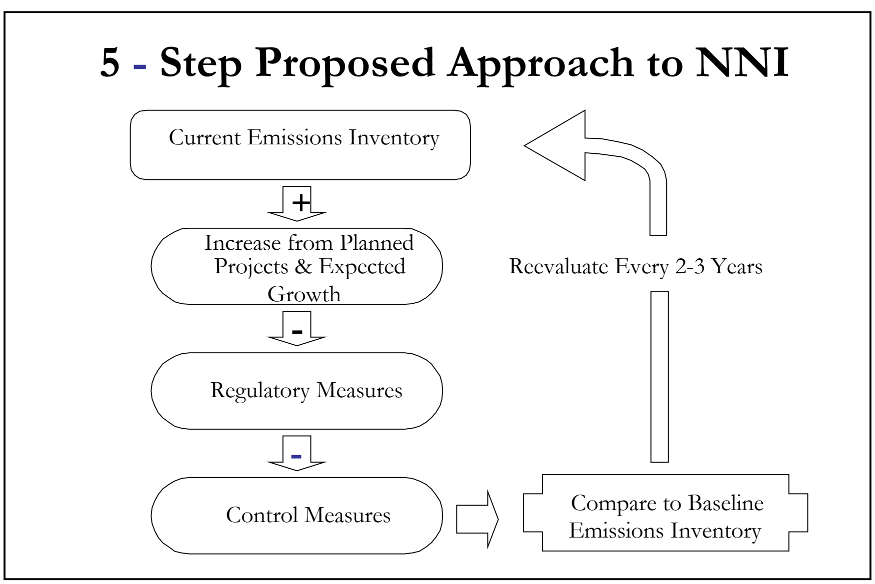
Dave Howekamp
Section 7.2 - The term "non-regulatory incentive funded" used in this section and elsewhere in the report is a little misleading in that it implies that all of the measures in this category will be incentive funded. Some will likely be accomplished by Port lease requirement or other mechanism which is still be sorted out by the LWG. A more descriptive term would be "non-regulatory port mandated or incentive funded" or something to that effect.

7.3. Plan Recalibration

The Plan will only succeed if it is regularly reviewed and updated as appropriate to reflect current circumstances. Regular monitoring and update cycles will need to be established to ensure that the goals of NNI are met and successful measures are recalibrated as appropriate.

This process would include an evaluation of measure implementation and Plan modification as necessary. This cycle is depicted in Figure 7-1. Additionally, an evaluation after the first full year of program implementation would be needed to ensure that initial program efforts succeed as anticipated. Lastly, it is seen as crucial that backstop measures be evaluated as well to provide interim feedback between the periodic Plan updates.

Figure 7-1. Recommended Cycle to Achieve and Maintain NNI



Stakeholder Comments Received:

Ed Avol
Figure 7.1 – This figure is inaccurate, in that it is not necessarily a given that planned projects or port growth will result in increased emissions (for example, what if a form of project-by-project NNI or new source review is instituted?)…Additionally, forces outside of regulatory or control measures, such as a downturn in the local business climate or a redirection or change in world trade, may exert a change on port emissions.

Dave Howekamp
Section 7.3 - "…backstop measures be evaluated as well to provide interim feedback between the periodic plan updates" is unclear. What is interim feedback in this context?

As recommended by PCAC, the Port has plans to conduct a Port-wide Health Risk Assessment (HRA). This assessment, coupled with results from the newly established Port-wide air monitoring network, can be used in the future to determine the effectiveness of the Plan. Future HRAs will also be performed to provide feedback regarding resulting improvements to air quality impacts on the health of the Port's workers and the neighboring communities.

The Port will present the findings of the evaluation of the Plan in the Annual Report to the Board of Commissioners, using a report card format indicating areas where the program is having more or less immediate impact and success. An annual stakeholder meeting will also be held to ensure that industry and public feedback remains one of the essential parts of this effort, not only through the PCAC, but also from the public at large.

7.4. Integration of Findings

The success of the Plan depends in large part on ensuring that the control measures both (1) are complied with, and (2) achieve or exceed the stated goals. To that end, the Port is working toward development of a formal mechanism to evaluate periodic success of each of the individual control measures. In April 2005 the Port entered into consulting services contracts to assist in the development of the administrative means of implementing the NNI and other air quality programs of the Port.

Stakeholder Comments Received:

Pacific Merchant Shipping Association
Section 7.6. Public Review - In order to fulfill the promise made in the early stages of the taskforce for public review, we recommend full public review in compliance with CEQA process. It is premature to recommend all the control measures until further legal, financial and implementation analyses are completed.

(June 17, 2005)
First, we have not had adequate time to review these new draft documents and reserve the right to submit additional comments at a later date. My initial comments on Section 7 Plan Review and Adoption:
Why was the entire section 7.6 Public Review deleted? This was a commitment made by the Commissioners that this report would go through a public review process. Please see my comments of June 14, 2005.

8. PUBLIC POLICY ISSUES

During the process of developing the draft Compendium of Control Measures, the Task Force identified several issues that were determined to be larger public policy issues. While the Task Force members recognized these as important issues intimately related to the No Net Increase goal, it was decided by the Co-Chairs that these issues ultimately lie beyond the purview of the Task Force. These are briefly described below.

8.1. Other Measures

The Technical Working Group drafted four potential control measures, which were not placed for vote by the Task Force. These measures, classified as “Other Measures” (O-x) included:

- **O-1 – Terminal Efficiency Improvements -** This measure briefly discusses opportunities for improving terminal efficiency and throughput through use of new technologies and improved logistics, generally related to enhanced coordination and optimization of all aspects of terminal operation – linking terminal gates, container yards and vessel operations through the terminal’s computerized operating system, and automatically tracing the container’s movement through the terminal.

- **O-2 – New Source Review -** This measure would establish conditions for approval by the Port of terminal expansions and other facility modifications that might cause increased emissions. The measure is based on “New Source Review” rules currently applicable to stationary sources such as factories and power plants. Such rules allow construction and modification of facilities that emit air contaminants, but require that such new and modified facilities not cause net emissions increases that could interfere with progress toward attainment of air quality standards.

- **O-3 – Growth or Emissions Cap -** Cargo throughput dictates the activity levels and associated emissions for all source categories operating in the Port . If the rate of reduction in emissions is not sufficient to achieve or maintain NNI attainment levels, this control measure would invoke a “cap” on cargo throughput or emissions at the Port-wide or terminal scale. The “cap” could be in the form of a reduced annual rate of throughput growth or an indexing of throughput or emissions to a specified year. Implementation of an emissions “cap” at the terminal scale would provide flexibility to operators to identify their own strategies for operating under their assigned “cap” levels. It is possible that highly efficient operators could generate excess emissions reductions that could then potentially be traded to other terminal operators that may not be able to achieve their apportioned reductions.

Alternatively, the “trigger” for the “cap” could be the inability to achieve or maintain OGV baseline emissions levels. This may make sense due to the dominance of the OGV source category in the aggregated Port-wide emissions growth.

- **O-4 – Port-Related Construction Emissions Limitations -** This measure suggests specific construction-related mitigation efforts to minimize the emissions impacts of construction projects within the boundaries of the Port. This measure includes the application of dust suppression measures provided in the SCAQMD CEQA guidelines, use of construction equipment employing the newest engines and verified emissions reduction technologies where possible, and a provision to limit project equipment to equipment that minimally meets EPA’s Tier 1 standards retrofitted with controls to achieve 85 percent or greater PM reductions, such as diesel particulate filters (DPFs). Additionally, equipment idling time will be limited to five minutes or less barring safety constraints, and no construction should occur on any days that violate or are expected to violate air quality standards.

In May 2005 a New Source Review subcommittee was formed to explore the potential application of the drafted New Source Review control measure. This committee met twice before deciding consensus could not be reached during the short timeframe available.

Stakeholder Comments Received:

Dave Howekamp

Public Policy Issues - The paragraph after O4 “In May 2005 a New Source Review …..short timeframe available should either be replaced or followed by sentences that reflect the outcome of discussions at the taskforce meeting on June 7 and June 21. There were initial discussions on June 7 to include a broad policy recommendation regarding application of application of controls and offsetting of emissions from new terminals. If the Task Force agrees to such a policy and it is stated in the recommendations section, then this section should at least refer to it so the reader does not become confused about the new source topic.

8.2. Trucking Industry

Trucks that service both the Port of Los Angeles and the Port of Long Beach are predominantly independent operators under contract with a brokering firm that in turn contracts directly with shipping companies. In this system, the independent operator receives a flat rate for freight movement, regardless of time expended performing this service. During the stakeholder meeting, participants expressed frustration over the large time fluctuations a driver may encounter while servicing the ports. Given these unpredictable circumstances, frequently those who service the ports are poorly compensated in comparison to drivers servicing different sectors of the trucking industry. Stakeholders also shared frustration with current Federal laws prohibiting shipping companies from contracting directly with the independent operators.

8.3. Potential Negative Impact of Cargo Diversion

Industry representatives requested that the Task Force explore possible negative economic consequences associated with the implementation of any Plan that results in cargo diversion away from the Port. While several Task Force members requested this issue be further explored, particularly in association with the Financial Analysis, this issue was not analyzed by this Task Force. In the event mandatory control measures and significant pollution controls are only required of tenants of the Port, the potential or likelihood of tenant withdrawal from the Port remains a significant concern.

Stakeholder Comments Received:

Rail Industry
Chapter 8 – Public Policy Issues - An additional section should be added:

Potential Negative Impact of Modal Shift
From the perspective of both air emissions and fuel consumption, the rail mode is the most efficient form of land transportation. U.S. EPA has observed that locomotives are "three times cleaner than trucks on an emissions per ton-mile basis." 62 Fed. Reg. 3268 (1997). A study for the U.S. Department of Transportation found that rail double-stack transportation of containers is approximately three times more fuel efficient than truck transportation, as measured on the basis of gallons consumed per ton-mile. Furthermore, to the extent goods are transported by rail instead of by motor vehicle, highway congestion and roadway wear and tear are reduced. A single train consisting of twenty-eight cars, each car consisting of five platforms which, in turn, can each hold two forty-foot containers, is capable of displacing 280 trucks which would move on the public highways.

The TWG's failure to treat trucks and rail the same in their analysis and its selection of regulatory control strategies for rail that will make rail less efficient and place rail at a competitive disadvantage is very harmful because it creates the potential for lessening the overall environmental efficiency of goods movement operations, increases the potential of "negative" modal shift from rail to truck, and increases freeway congestion. The potential for these unintended consequences of "negative" modal shift has not even been addressed in the NNI process.

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9. CAVEATS AND LIMITATIONS

When conducting evaluations of future conditions and emissions, there are unknown variables that need to be assumed in order to complete the analysis. When dealing with predicted future emissions impacts that affect public health, planners usually err on the conservative side (i.e., assume a greater rate of emissions to better ensure success of mitigation options) and this approach was adopted by the Technical Working Group. As stated previously, this first analysis of NNI should be considered a starting point for further analysis by the entities responsible for its implementation. There are significant technical and financial assumptions that were made in order to complete the analysis within the time constraints set by the Task Force and the Mayor. Future analysis of this initial NNI approach should focus on some of the significant technical and financial assumptions that were used.

Some of the significant technical assumptions include:

- Cargo growth projections,
- Relationship between cargo growth and emissions growth,
- Ship size distributions will remain at 2001 fleet mixes (i.e., assumed that ships do not get larger),
- Relationship between ship calls and cargo growth,
- Cargo and emissions growth rates for container ships used for extrapolating emissions for other ship types (cruise, tankers, bulk, auto carriers, general cargo, etc.),
- All emissions within study area are treated as having same level of impact regardless of proximity to communities,
- Future operational conditions for all sources, terminals, highways, rail lines, etc.,
- No existing or future infrastructure constraints considered in cargo growth or emissions projections,
- Timely development of new engine technologies and emissions reduction technologies,
- Reliance on future regulations that haven't been adopted at this time, and
- Implementation issues were not incorporated into the technical analysis.

Similarly, there were significant financial assumptions made in order to complete the analysis within the time constraints set by the Task Force. Some of these critical financial assumptions include:

- All cost projections are in unadjusted 2005 dollars,
- Consumption rates of fuels and fuel prices,
- Capital costs for technologies and engines that haven't been designed yet, and
- Cost effectiveness does not take into account control measure sequencing.

Stakeholder Comments Received:

Pacific Energy Partners

This is a very important part of the document and will be referred to frequently during future updates. Given that, I think the discussion of some of the assumptions is a little sketchy. For example, "cargo growth projections" doesn't say much while "all emissions within the study area are treated as having same level of impact regardless of proximity to communities" provides enough information to understand the impact of the assumption. I'd spend a little more time explaining the assumption and the impact it might have on predicting future emissions levels. Same comment with financial assumptions. I think this information will be very important when future changes are made to the plan in terms of explaining to industry and the regulated community why earlier projections may not have been accurate.

Pacific Merchant Shipping Association

10. Caveats and Limitations - This section should be moved up in the document and included in the Executive Summary. In addition, we have submitted many comments that should be included in this section.

10. SUMMARY AND KEY RECOMMENDATIONS

Despite considerable time and resource constrains, the Task Force has accomplished their mission to understand the scope of projected air emissions growth associated with Port activities, to evaluate appropriate control technologies that could be applied to Port emission sources, and, to assess potential financial and legal impacts associated with implementation of the NNI control measures. It is the Task Force's recommendation that the process should be moved forward and that appropriate near-term control measures as described in Section 6.1 be adopted and implemented as planned. In the meantime, financial, legal and technical concerns for selected control measures should be further studied and refined, and should be incorporated in the next iteration of the Plan in the near future.

Stakeholder Comments Received:

South Coast Air Quality Management District and Natural Resources Defense Council

The Task Force urges that the Mayor approve the No Net Increase Plan (Plan) and forward it to the Board of Harbor Commissioners, with a recommendation to take the following action following public review and comment and compliance with CEQA:

1. *The Board should commit to set aside the funding required under the Plan for the control measures that require incentive programs, infrastructure, and demonstration projects, and to take action to insure that these measures are implemented according to the timeline set forth in the Plan and that the required infrastructure is created;*
2. *The Board should adopt as port-wide requirements applicable to all port leases all control measures in the Plan for which an implementation option is through a port-wide policy, in order to insure the most equitable application of the measures;*
3. *The Board should require for all proposed new terminals and expansions of existing terminals that all applicable control measures in the Plan be implemented at the expanded and existing terminal unless it is demonstrated as part of the review under the California Environmental Quality Act that the measure is technically infeasible for implementation during the lease period for the project*
4. *To the extent feasible, approval of new terminals and expansions of existing terminals should not result in a net increase in emissions.*
5. *If an approval under paragraph 4 would result in a net increase in emissions, the increase should be fully offset by other emissions reductions from other port-related sources.*

In addition, the Task Force recommends that the Mayor, City of Los Angeles, and Board of Harbor Commissioners formally urge the Air Resources Board and Environmental Protection Agency to adopt and implement all measures assigned to those agencies in the Plan as "proposed" or "additional" measures at the highest level of emissions reductions that is feasible for those measures.

The Task Force also recommends that the Mayor, City of Los Angeles, and Board of Harbor Commissioners take a position in support of all legislation recommended as part of the Plan.

SCAQMD agrees with NRDC's recommendations. In addition, we recommend that if during implementation of the NNI Measures, it is found that any of them cannot be implemented in whole or in part due to preemption or other legal reasons, that the Port impose a mitigation fee upon the involved sources sufficient to attain equivalent emission reductions to that which the measure would attain.

South Coast Air Quality Management District
Recommendations - Suggest to add the following:

The NNI Task Force recommends that the Mayor forward the NNI Plan to the Board of Harbor Commissioners for implementation. NNI control measures should be implemented based on a hierarchy established according to the following categorizations (i.e., short-term implementation and medium/long-term implementation) . This hierarchy and implementation schedule excludes control measures that have already been adopted or proposed by the POLA and those measures that have been adopted by ARB or EPA, or are being proposed for adoption.

Short-Term Implementation
Priority should be given to control measures that the POLA could begin implementing without additional agency involvement or mandatory regulation such as through lease agreements, port tariffs or financial incentives or disincentives. The following list of measures should be considered for immediate implementation.

OGV6 – Reroute Cleaner Ships
OGV11 – Expanded Auxiliary Engine Fuel Improvement Program
OGV15 – Expanded VSR Program
OGV16 – Expanded AMP
HC9 – Repower Existing Harbor Craft
HC11 – AMP-Ready Staging Areas
CHE7 – Expanded Yard Tractor Modernization
CHE8 – Enhanced CHE Modernization
R6 – Ultra-Low Emission Switcher Locomotives
R9 – CARB Diesel Fuel for Class 1 Railroad Locomotives
R10 – Idling Control for Switcher and line-Haul Locomotives
HDV10 – Expanded Truck Modernization Program
HDV11 – California Heavy-Duty Diesel Vehicles Standards and Fleet Modernization for Mexican Trucks
HDV12 – Early ULSD Implementation
HDV13 – Retrofit Heavy-Duty Diesel Vehicles with Diesel Oxidation Catalysts (DOC)
HDV14 - Retrofit Heavy-Duty Diesel Vehicles with Diesel Particulate Traps (DPF)
HDV19 – Idling Reduction Measures

Demonstration Project Implementation
Several control measures in the NNI Plan require the POLA to initiate demonstration studies on emission reduction technologies, which if found feasible would be implemented following successful demonstration. These control measures' demonstration studies should be initiated as soon as possible and concurrent with the implementation of measures classified as priority. The following measures fall into this category.

OGV7 – Low-Emission Main Propulsion Engines
OGV9 – Main Engine Fuel Improvement Program
OGV12 – Early ULSD Implementation
OGV14 – Retrofit/Repower Requirement for Infrequent Callers
HC7 – Emulsified Fuels
R7 – Ultra-Low Emission Switcher and line-Haul Locomotives: Class 1

Medium and Long-Term Implementation
Several control measures require additional lead time for applicable technology to be developed in order for successful implementation of the control strategies. This category includes these measures as well as all the measures requiring demonstration studies in the previous category.

OGV7 – Low-Emission Main Propulsion Engines
OGV9 – Main Engine Fuel Improvement Program
OGV12 – Early ULSD Implementation
OGV14 – Retrofit/Repower Requirement for Infrequent Callers

HC7 – Emulsified Fuels
HC10 – Retrofit Existing Harbor Craft
R7 – Ultra-Low Emission Switcher and line-Haul Locomotives: Class 1

Pacific Merchant Shipping Association
Summary and Key Recommendations

1. *The Task Force recommends this report not be forwarded to the Mayor until it is completed and further reviewed by all members.*
2. *The NNI plan should be submitted for full CEQA review prior to any approval action.*
3. *The Port of Los Angeles (Port) should continue funding existing air quality programs approved by the Board of Harbor Commissioners (Board).*
4. *The Board should aggressively pursue the completion of all pending Environmental Impact Report's (EIR) to allow for further mitigation of emissions.*
5. *The Port should commit to updating the cargo forecast, and the emissions inventory at the earliest possible date and for each of the identified milestone years of 2005, 2008, 2010 and 2012.*
6. *The Port should commit to completing the monitoring program and health risk analysis at the earliest possible date.*
7. *The Port should work with regulatory agencies, scientific and academic organizations, engine manufacturers, emission control equipment manufactures and their customers and tenants to better define emissions from Port emission sources and the effectiveness and feasibility of emission control technologies.*
8. *The Port should work with marine fuel providers and their customer/tenants to identify sources and availability of clean marine fuels and support the use of those fuels in advance of regulations.*
9. *The Port should work closely and cooperatively with the regulatory agencies and their customer/tenants to develop appropriate regulations and incentive programs that will result in the most cost-effective emissions control at the earliest possible date.*

Dave Howekamp
(1) My suggestions for recommendations:

1. *The NNI task force recommends that the NNI Plan, including all the control measures, be endorsed by the Mayor and transmitted to the Board of Harbor Commissioners for their adoption to achieve the Board's adopted policy for "no net increase of emissions."*
2. *With regard to the individual control measures, the NNI task force recommends that the Mayor instruct the Board to propose for public comment adoption of the measures identified for POLA implementation. If modified during the public process, the measures should achieve equivalent emission reductions to the original measure or be referred back to the NNI task force for reevaluation if the measure appears to be infeasible. For measures identified for Federal, state and local agency implementation, the NNI task force recommends that the Mayor and the Board of Harbor Commissioners formally request that the appropriate agencies and legislative bodies adopt and implement the measures and to establish formal POLA programs to lobby these bodies for successful implementation.*
3. *With regard to timing, the NNI task force recommends that the identified near term measures be scheduled for adoption and implementation according to the schedule laid out in the NNI Plan and that necessary work begin on the medium and long-term measures.*
4. *With regard to follow-up, the NNI task force recommends that the Mayor and Board of Harbor Commissioners establish a policy and program to monitor progress and revise the Plan in the future.*
5. *With regard to funding and staffing, the NNI task force recommends that the Mayor and the Board of Harbor Commissioners provide adequate funding for incentive measures identified for POLA implementation. Adequate POLA staffing should be provided to develop, support and monitor the implementation of all incentive and mandatory POLA measures. Adequate POLA staffing should also be provided to monitor overall Plan progress and to revise the Plan in the future, if needed.*

Dave Howekamp
(2) Summary and Key Recommendations
Per the last Task Force meeting, I believe we agreed that recommendations would be added, hopefully by consensus, but if not, by majority with a minority objection or comment. In addition to the recommendations I submitted several weeks ago, I would request that the specific recommendations that were proposed by Gail at the Task Force meeting on June 7 be added:

> *-To the extent feasible, approval of new terminals and expansion of existing terminals should not result in a net increase of emissions.*
> *- If an approval under the above paragraph should result in a net increase in emissions, the increase should be fully offset by other emission reductions from other port related sources.*

Rail Industry
Summary and Key Recommendations
In light of our foregoing comments, we recommend an independent body review the process, assumptions, findings and recommendations to date, to make a recommendation as to what additional effort is appropriate on the local level. Comprehensive preemptive federal and state statutory frameworks are in place to continue the progress to reduce air-borne contaminants emitted by on-road vehicles, non-road vehicles and vessels and international, federal and state agencies entrusted with their implementation are actively engaged in achieving these goals. The Port and all citizens have input into the formal administrative processes in which air statutes and regulations are adopted. In light of the significant achievements occurring on the federal, state and international levels, Rail does not believe an additional layer of local regulation is either appropriate or necessary. Future efforts should be coordinated with the Governor's Goods Movement initiative, which has emerged during the no net increase analysis, to ensure uniform administration of state tidelands and harbors, held in trust for the benefit of the people of California. The economic impacts of future initiatives on a major industrial engine for not only Southern California but the entire State, needs to be fully and fairly evaluated. Finally, with respect to future no net increase efforts, in the event the additional layer of regulatory measures proposed in this report moves forward, we recommend immediate compliance with CEQA and the performance of an Initial Study to properly determine the scope of a full environmental impact report (EIR) and the prompt initiation of an open, transparent and scientific EIR.

APPENDIX A

PORT-WIDE BASELINE AIR EMISSIONS INVENTORY, EXECUTIVE SUMMARY

FINAL DRAFT

PORT-WIDE BASELINE AIR EMISSIONS INVENTORY EXECUTIVE SUMMARY

June 2005

Prepared for:

PORT OF LOS ANGELES

Prepared by:

Starcrest Consulting Group, LLC
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ACKNOWLEDGEMENTS

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The Port of Los Angeles Environmental Department and Starcrest Consulting Group, LLC (Starcrest) would like to recognize all that contributed their knowledge and understanding to the operations of container terminals, commercial marine vessels, locomotives, and onroad trucks at the Port:

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ACRONYMS AND ABBREVIATIONS

ARB	(California) Air Resources Board
ASTM	American Society for Testing and Materials
BAH	Booz Allen Hamilton, Inc.
BNSF	Burlington Northern Santa Fe Railroad
BSFC	brake specific fuel consumption
CHE	cargo handling equipment
CO	carbon monoxide
DF	deterioration factor
DMV	Department of Motor Vehicles
DPM	diesel particulate matter
DWT	deadweight tons
EEAI	Energy and Environmental Analysis, Inc.
EF	emission factor
EI	emissions inventory
EMD	(GE) Electromotive Division
EPA	U.S. Environmental Protection Agency
FCF	fuel correction factor
g/day	grams per day
g/hr	grams per hour
g/mi	grams per mile
GVWR	gross vehicle weight rating
HC	hydrocarbons
HDV	heavy-duty vehicle
hp	horsepower
hrs	hours
ICTF	Intermodal Container Transfer Facility
IFO	intermediate fuel oil
IMO	International Maritime Organization
ISO	International Organization for Standardization
ITB	integrated tug/barge
kW	kilowatts
lbs/day	pounds per day
LF	load factor
LPG	liquefied petroleum gas
MarEx	Marine Exchange of Southern California
MCR	maximum continuous rating
MDO	marine diesel oil
MMA	Meyer, Mohaddes Associates, Inc.
mph	miles per hour
MW	megawatts

ACRONYMS AND ABBREVIATIONS (Cont'd)

NO_x	oxides of nitrogen
OGV	ocean-going vessel
PCEEI	Pleasure Craft Exhaust Emissions Inventory
PHL	Pacific Harbor Line
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
POLB	Port of Long Beach
ppm	parts per million
RIA	Regulatory Impact Analysis
RO	residual oil
Ro-Ro	roll-on/roll-off
rpm	revolutions per minute
RSD	Regulatory Support Document
RTG	rubber tired gantry crane
RTL	rich text language
SCAQMD	South Coast Air Quality Management District
SO_2	sulfur dioxide
SoCAB	South Coast Air basin
SSA	Stevedoring Services of America
SUV	sport-utility vehicle
TEU	twenty-foot equivalent unit
TOG	total organic gases
tpd	tons per day
tpy	tons per year
U.S.	United States
UP	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
VMT	vehicle miles of travel
VSR	Vessel Speed Reduction
VTS	Vessel Traffic Service

EXECUTIVE SUMMARY

The Port of Los Angeles (Port) has prepared a 2001 Baseline Emissions Inventory (EI) in response to concerns from the public about the potential health impacts to surrounding communities from Port operations and to provide the Port with a planning document for development, prioritization and implementation of emission control strategies to reduce these impacts.

To address community concerns about air quality and other impacts, the Board of Harbor Commissioners on October 10, 2001, acting on the request of Mayor James Hahn, adopted a "goal that there will be no net increase in air emissions or traffic impacts from future Port operations." To initiate action on meeting the goal, the Board directed staff to conduct several environmental baseline studies. The Board approved the Concept Plan for the Port-wide Environmental Studies in December 2001 that combined several of the original air quality initiatives into a single Air Studies Program.

The 2001 Baseline EI is a major milestone for the Port and represents successful completion of the first component of the Air Studies Program. The inventory's comprehensive activity-based approach provides emission estimates, focusing on emissions of diesel particulate matter, for all significant sources operating in the Port. Development of this EI has been coordinated with the U.S. Environmental Protection Agency - Region 9 (EPA), California Air Resources Board (ARB), and South Coast Air Quality Management District (SCAQMD).

The 2001 EI includes tenant source category emissions that occur on Port-owned land within the Port boundary/district. Figure ES.1 shows the land area of active Port terminals in 2001, designated in yellow, including the area to the northeast. This figure illustrates the in-Port area of study. In addition to in-Port emissions, emissions from locomotives and on-road trucks transporting Port cargo have been estimated for activity that occurs outside the Port, but within the South Coast Air Basin (SoCAB) boundaries. Figure ES.2 shows the SoCAB boundary and the location of the Port. Since both the Port and Port of Long Beach are interconnected with intermodal transportation linkages, every effort was made to only account for freight movements originating from or having a destination at the Port. For marine vessels, the geographical extent of the EI is the same boundary that was used in previous marine vessel inventories for the South Coast Air Quality Management District. Figure ES.3 shows the geographical extent of the out-of-Port study area for marine vessels.

The scope of the study includes five source categories: ocean-going vessels (OGVs), harbor craft (e.g., tugboats, ferries, commercial fishing vessels, dredges, etc.), off-road cargo handling equipment (CHE), railroad locomotives and on-road heavy-duty vehicles (HDV). For each source category, baseline emission estimates were developed for oxides of nitrogen (NO_X), total organic gases (TOG), carbon monoxide (CO), particulate matter less than 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter, diesel particulate matter (DPM), and sulfur dioxide (SO_2). The inventory does not include stationary sources, as these are included in stationary source permitting programs administered by the SCAQMD.

Figure ES.1: Baseline Inventory In-Port Study Area

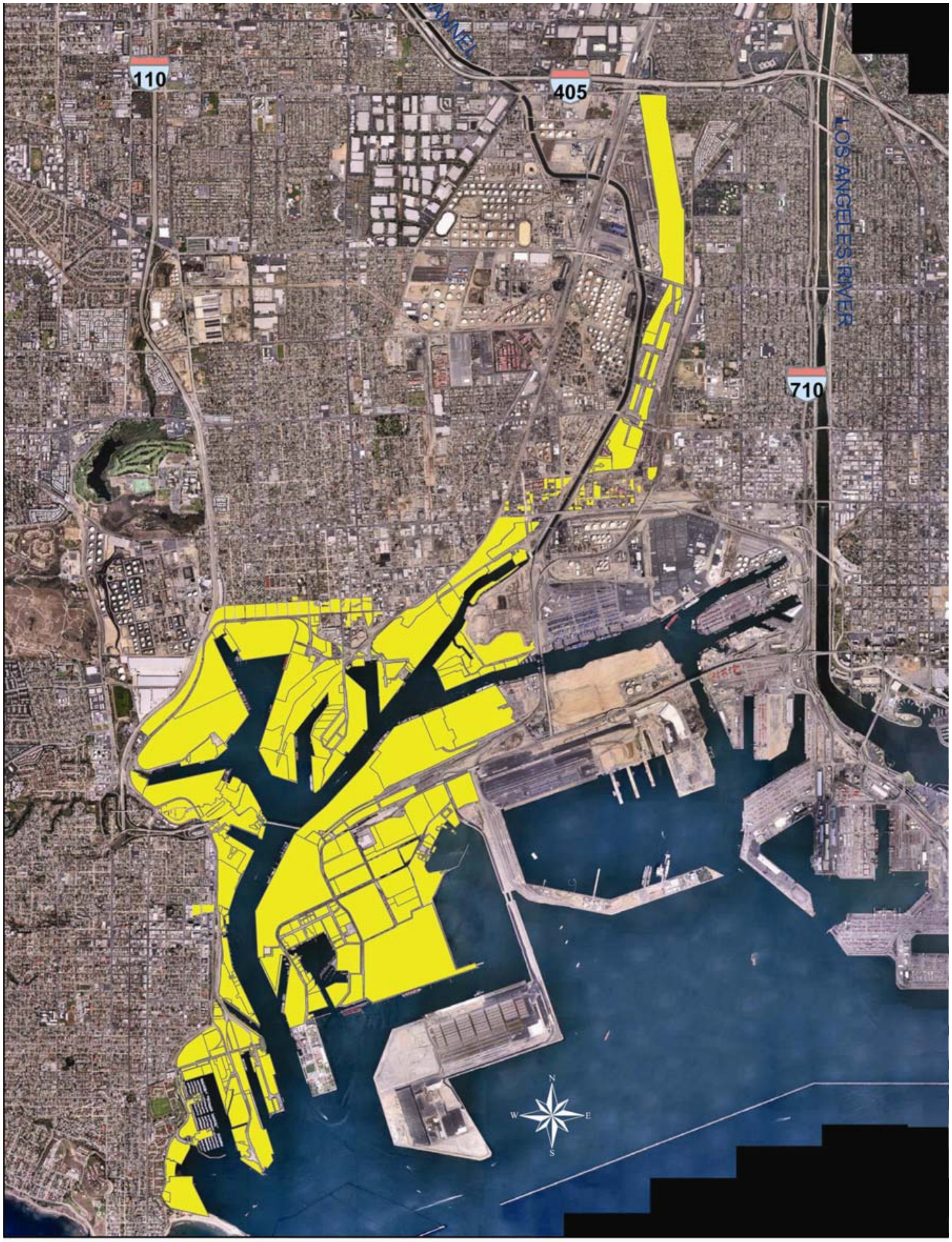


Figure ES.2: South Coast Air Basin Boundary

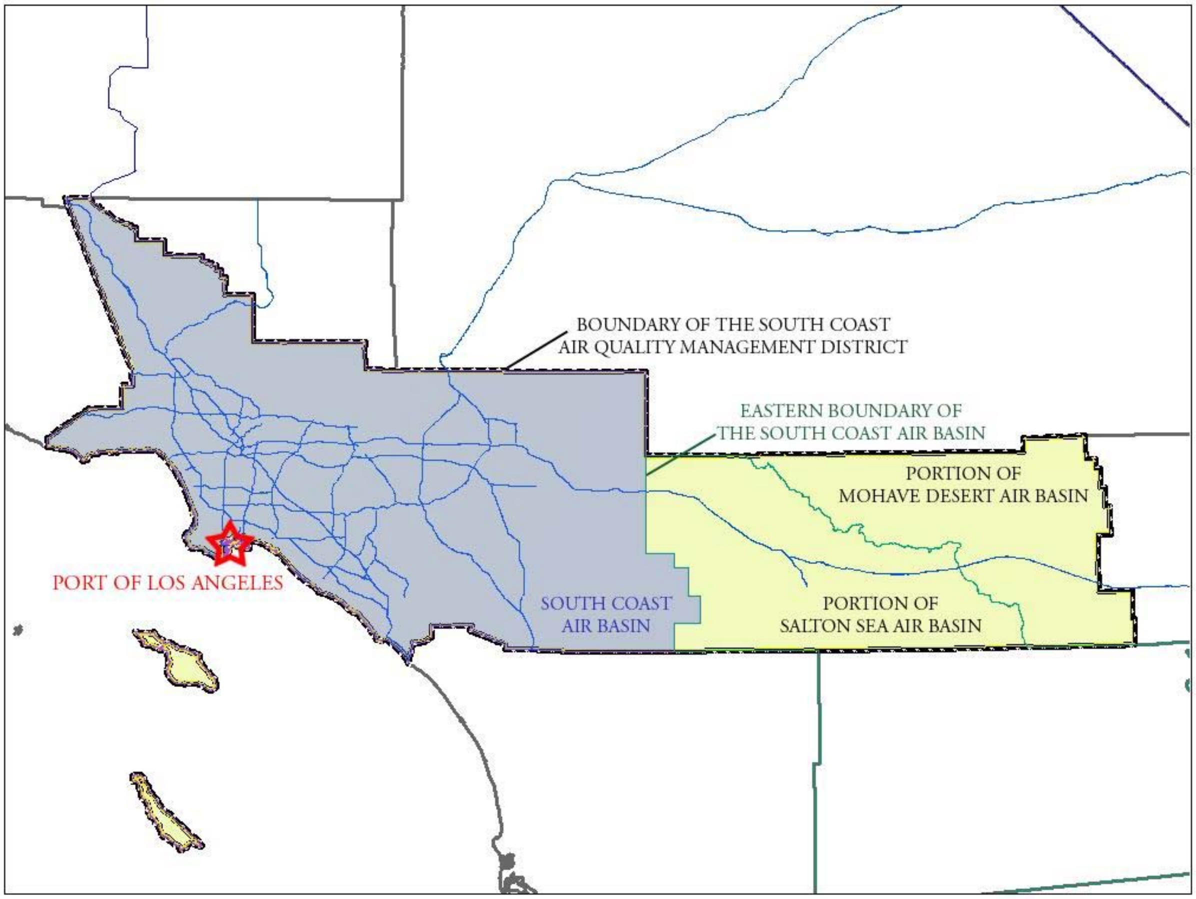
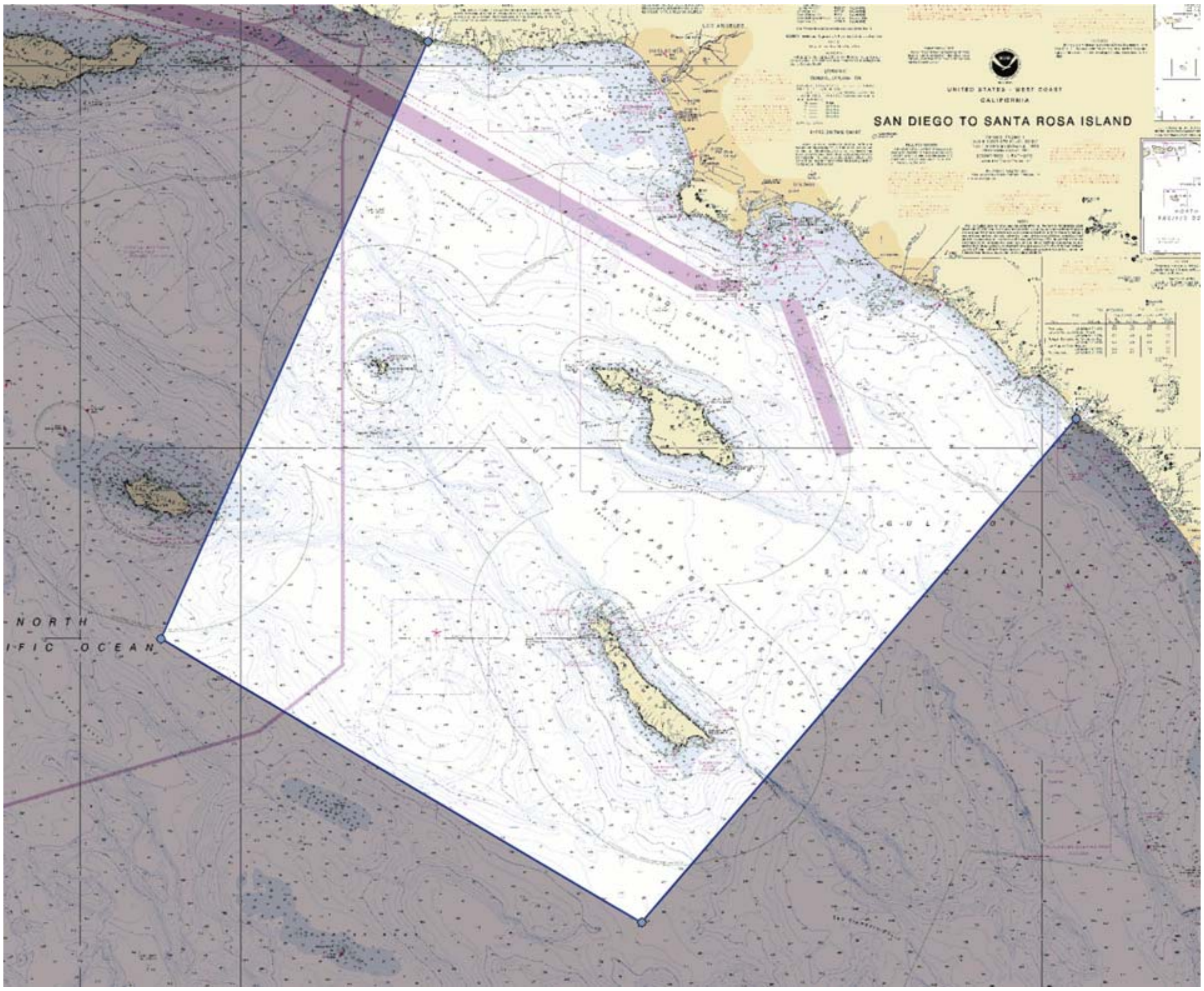


Figure ES.3: OGV and Harbor Vessel Out of Port Geographical Extent



Methodology Overview

The basic approach to developing an activity-based or "bottom-up" EI was based on interviews and conversations with tenants who own, operate and maintain equipment and own or charter vessels. Port tenants and shipping lines played an essential role in the success of this EI by providing the most accurate information available. The activity and operational data collected was then used to estimate emissions for each of the various source categories in a manner consistent with the latest estimating methods, as agreed on by the Port and participating regulatory agencies. The information that was gathered, analyzed and presented in this report improves the understanding of the nature and magnitude of Port-wide emission sources and is unprecedented in that it represents the first EI specifically covering Port sources of emissions disaggregated from all other sources contained in regional EIs. Specific data collection and analytical approaches unique to each of the five source categories are summarized below.

Ocean-Going Vessels

The basic methodology for estimating emissions from the various types of ocean-going vessels (auto carriers, bulk carriers, containerships, cruise ships, general cargo ships, ocean-going tugboats, refrigerated vessels, roll-on roll-off ships, bulk liquid tankers) that call on the Port utilized local activity-based data, previous marine emissions studies developed in California, elsewhere in the nation, and international studies. In addition to using available data on every OGV visit to the Port in 2001, the Port implemented an unprecedented Vessel Boarding Program that focused on gathering specific vessel characteristics and operational data and gaining an understanding of how the different types of OGVs arrive, depart, and transit the Port, as well as how they operate while at dock ("hotelling").

Harbor Craft

The Port harbor craft operators and marina managers were interviewed to develop a harbor craft list. ARB's 2002 Statewide Commercial Harbor Craft Survey and Pleasure Craft Exhaust Emissions Inventory supplemented this information. The harbor craft were separated into the following categories: assist tugboat, towboats and push boats, ferries, excursion vessels, crew boats, work boats, government vessels, dredges and dredging support, commercial fishing vessels, and recreational vessels. Valuable data was provided for assist tugs in the form of histograms on engine operations and loads. This is the first time that hard data of this caliber was used in a marine emissions inventory.

Cargo Handling Equipment

CHE consists of various types of equipment and vehicles that fall within the off-road designation and are used to move cargo within terminals and other off-road areas. The emission estimates for this group were prepared by the ARB using their OFFROAD[1] model, which has been developed to estimate emissions from off-road equipment fleets. Equipment operators and owners were interviewed and equipment lists with detailed specifications were developed that formed the inputs for the OFFROAD model. This ensured that specific information on the fleets that actually operate in the Port was used to estimate emissions.

[1] California Air Resources Board, OFFROAD, 2003. See http://www.arb.ca.gov/msei/off-road/off-road.htm.

Railroad Locomotives

Railroad operations are typically described in terms of two different types of operation, line haul and switching. Because of different types of information provided by the railroad companies, emissions were estimated using two basic methods. For most of the switching activities, emission estimates were based on the percentage of time spent in the different throttle notch settings. This information was obtained from on-board observations of switch engine operations during normal shift duties and from on-board dataloggers. For line haul activities (and a limited amount of switching activity), fuel usage was used as a surrogate measure of the level of activity of the locomotives. The EPA has published emissions information for switch and line haul locomotive operations in both throttle notch and fuel consumption modes and this information was used to cross-check between the estimating methods to demonstrate the degree of agreement.

Heavy-Duty Vehicles

There are two components to the estimation of HDV emissions presented in this report: on-road travel and on-terminal operations. For estimating on-road (off-terminal) HDV emissions, on-road activity information was developed by a traffic consultant, Meyer, Mohaddes Associates, Inc. (MMA), using trip generation and travel demand models that were used in previous Port traffic studies[2]. A Port-specific HDV model year distribution was developed by the ARB and the SCAQMD for this study by querying over 7,000 license plate numbers obtained from local terminals against the California Department of Motor Vehicles (DMV) registration database. For estimating on-terminal HDV emissions, terminal operators were interviewed with regards to on-terminal traffic patterns, including time spent waiting at the entry gate, time and distance on terminal while dropping off and/or picking up cargo, and time spent waiting at exit gates. Off-terminal and on-terminal emissions were estimated by multiplying the appropriate emission factor derived from EMFAC 2002[3] by the time and distance parameters established for the terminals.

Results

2001 emission estimates by source category in terms of tons per year (tpy) and tons per day (tpd) are summarized in Tables ES.1 and ES.2, respectively. These estimates include emissions related to 1) Port operations occurring within the Port boundary/district (In-Port) and 2) the transportation of Port-related cargo within the SoCAB (Regional).

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[2] Meyer, Mohaddes Associates, Inc., June 2001. Ports of Long Beach/Los Angeles Transportation Study, and Meyer, Mohaddes Associates, Inc., April 2004. Port of Los Angeles Baseline Transportation Study.

[3] California Air Resources Board, EMFAC2002. EMFAC2002 is the emission factor model approved by EPA for use in estimating emissions for on-road vehicles in California.

Table ES.1: 2001 Emissions by Source Category, tons per year

	NO_X		TOG		CO		PM_{10}		$PM_{2.5}$		SO_2	
	In-Port	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**
Ocean-Going Vessels	1,967.6	6,922.7	55.6	233.6	159.8	553.9	68.8	561.0	55.1	449.9	1,098.5	4,117.5
Harbor Craft	1,968.0	3,530.7	172.2	376.0	701.5	1,622.8	99.7	178.0	91.7	163.7	152.0	506.4
Cargo Handling Equipment	1,862.6	1,862.6	204.5	204.5	725.5	725.5	111.6	111.6	102.6	102.6	44.1	44.1
Railroad Locomotives	445.9	2,465.8	17.0	99.7	49.6	249.4	9.9	60.1	9.1	55.2	3.1	89.8
Heavy-Duty Vehicles	872.5	4,463.5	53.1	185.5	246.0	815.3	24.4	87.9	22.4	77.9	6.1	33.6
Total	**7,116.6**	**19,245.3**	**502.4**	**1,099.3**	**1,882.4**	**3,966.9**	**314.4**	**998.6**	**280.9**	**849.3**	**1,303.8**	**4,791.4**

Table ES.2: 2001 Emissions by Source Category, tons per day

	NO_X		TOG		CO		PM_{10}		$PM_{2.5}$		SO_2	
	In-Port	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**	**In-Port**	**Regional**
Ocean-Going Vessels	5.39	18.97	0.15	0.64	0.44	1.52	0.19	1.54	0.15	1.23	3.01	11.28
Harbor Craft	5.39	9.67	0.47	1.03	1.92	4.45	0.27	0.49	0.25	0.45	0.42	1.39
Cargo Handling Equipment	5.10	5.10	0.56	0.56	1.99	1.99	0.31	0.31	0.28	0.28	0.12	0.12
Railroad Locomotives	1.22	6.76	0.05	0.27	0.14	0.68	0.03	0.16	0.02	0.15	0.01	0.25
Heavy-Duty Vehicles	2.39	12.23	0.14	0.50	0.68	2.24	0.07	0.24	0.06	0.21	0.01	0.09
Total	**19.49**	**52.73**	**1.37**	**3.00**	**5.17**	**10.88**	**0.87**	**2.74**	**0.77**	**2.32**	**3.57**	**13.13**

Figure ES.4 illustrates the comparative contribution of each source category to total Port emissions, by key pollutant.

Figure ES.4: Port-Related Emissions by Source Category, tons per day

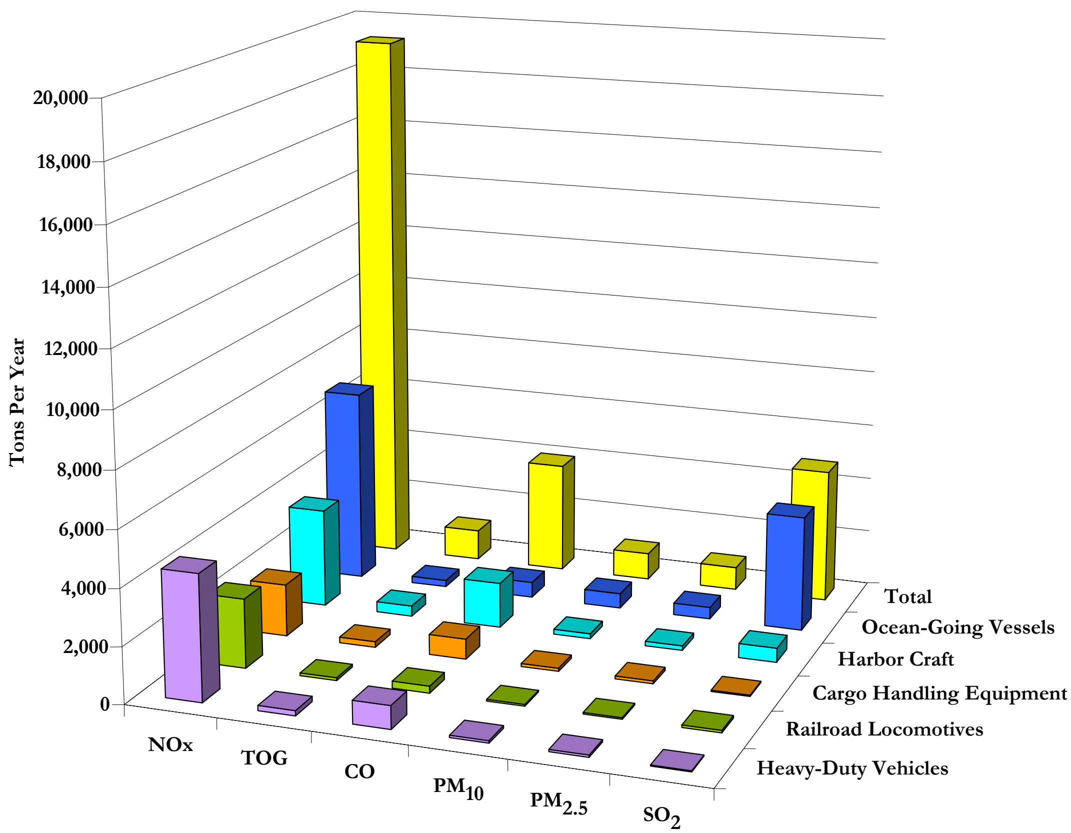


Table ES.3 illustrates the percentage breakdown of average annual emissions by source category for each pollutant and is an extension of the bar chart above.

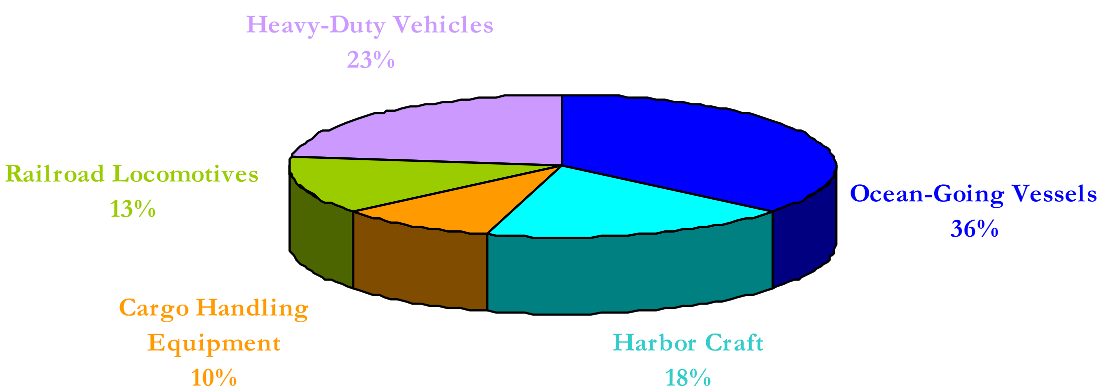
Table ES.3: Percentage Breakdown of Port Emissions in Air Basin

	NO_X	TOG	CO	PM_{10}	$PM_{2.5}$	SO_2
Ocean-Going Vessels	36%	21%	14%	56%	53%	86%
Harbor Craft	18%	34%	41%	18%	19%	11%
Cargo Handling Equipme	10%	19%	18%	11%	12%	1%
Railroad Locomotives	13%	9%	6%	6%	7%	2%
Heavy-Duty Vehicles	23%	17%	21%	9%	9%	1%

The following five figures illustrate the percentage breakdown of average annual emissions by source category for each pollutant and graphically display the data contained in Table ES.3. In summary, the ocean-going vessels account for the largest percentage of emission for every pollutant, except for CO emissions in which the recreational vessels, included in the harbor vessel category, have a large percentage of the estimated CO emissions.

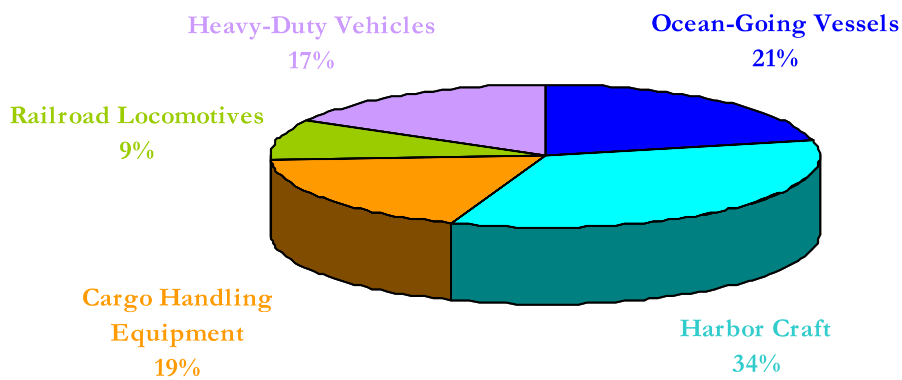
The NO_X emissions from ocean-going vessels represent 36% of Port-related emissions; heavy duty vehicles represent 23%; harbor craft represent 18%; locomotives represent 13%; and cargo handling equipment represent 10% of total Port NO_X emissions.

Figure ES.5: Percentage of Port NO_X Emissions by Source Category



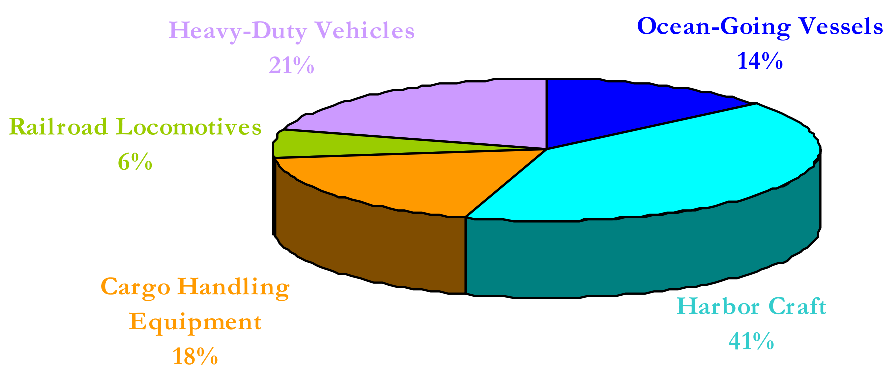
The TOG emissions from harbor craft represent 34% of Port-related emissions; ocean-going vessels represent 21%; cargo handling equipment represent 19%; heavy duty vehicles represent 17%; and locomotives represent 9% of total Port TOG emissions.

Figure ES.6: Percentage of Port TOG Emissions by Source Category



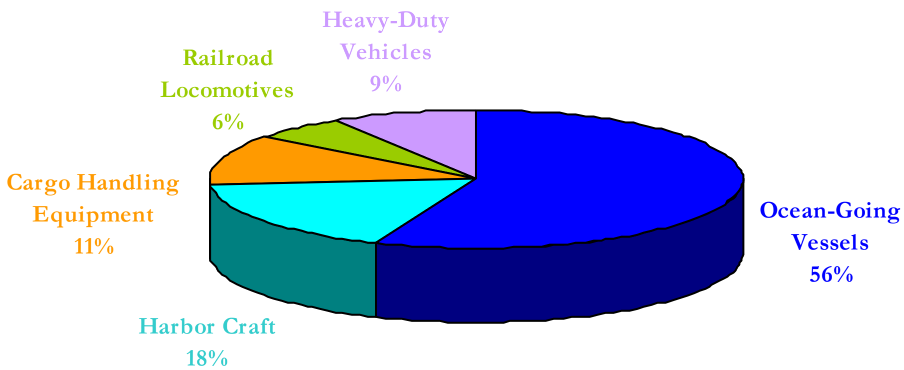
The CO emissions from harbor craft represent 41% of Port-related emissions; heavy duty vehicles represent 21%; cargo handling equipment represents 18%; ocean-going vessels represent 14%; and locomotives represent 6% of total Port CO emissions.

Figure ES.7: Percentage of Port CO Emissions by Source Category



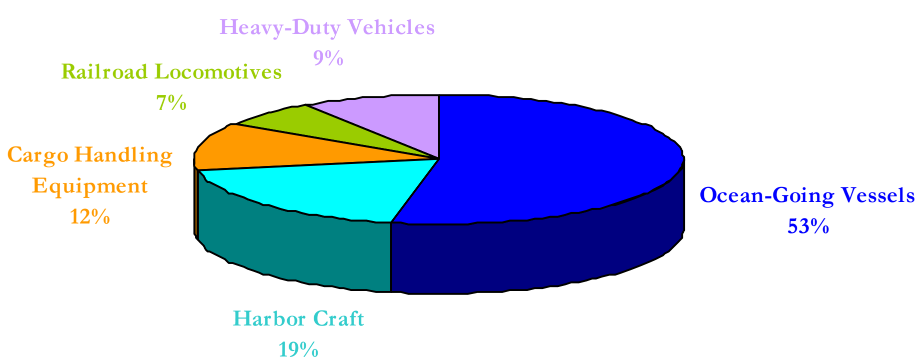
The PM10 emissions from ocean-going vessels represent 55% of Port-related emissions; harbor craft represent 18%; cargo handling equipment represents 12%; heavy duty vehicles represent 9%; and locomotives represent 6% of total Port PM10 emissions.

Figure ES.8: Percentage of Port PM_{10} Emissions by Source Category



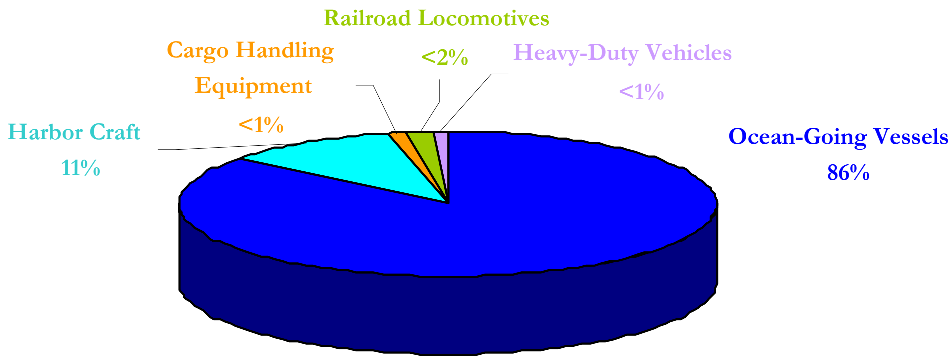
$PM_{2.5}$ emissions from ocean-going vessels represent 52% of Port-related emissions; harbor craft represent 20%; cargo handling equipment represents 12%; heavy duty vehicles represent 9%; and locomotives represent 7% of total Port $PM_{2.5}$ emissions.

Figure ES.9: Percentage of Port $PM_{2.5}$ Emissions by Source Category



The SO2 emissions from ocean-going vessels represent 86% of Port-related emissions; harbor craft represent 11%; locomotives represent less than 2%; and cargo handling equipment and heavy duty vehicles each represent less than 1% of the total Port SO2 emissions.

Figure ES.10: Percentage of Port SO_2 Emissions by Source Category



Next Steps

The successful completion of the Port-wide Baseline Emissions Inventory will enable the Port to initiate work on the remaining components of the Air Studies Program. Specifically, it provides the requisite data for preparation of a Port-wide health risk assessment and development of air emission control strategies necessary to achieve the Board's goal of "no net increase" in Port emissions. It also provides the foundation for future updates to the EI and preparation of project environmental analyses.

APPENDIX B

COMPENDIUM OF CONTROL MEASURE NARRATIVES

CONTROL MEASURES SUMMARY TABLE

INDIVIDUAL CONTROL MEASURES

STAKEHOLDER COMMENTS RECEIVED

Port of Los Angeles Draft Emissions Control Measure Descriptions

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
Source Category: Ocean-going Vessels						
	Adopted Ocean-Going Vessel Measures					
OGV1	New Engine Standards for Ships	IMO/EPA	Adopted	Engine Standards	G	1
OGV2	Vessel Speed Reduction (VSR) Memorandum of Understanding (MOU)	Port of Los Angeles	Adopted	Operational Efficiencies or Improvements	B	4
OGV3	Alternative Maritime Power (AMP)	Port of Los Angeles	Adopted	Operational Efficiencies or Improvements	B	6
OGV4	Auxiliary Engine Fuel Improvement Program	Port of Los Angeles	Adopted	Fuel Requirements	B	8
	Measure Focus: Engine Standards					
OGV5	New Engine Standards for Category 3 Marine Engines	EPA	Additional	Engine Standards	B	10
OGV6	Reroute Cleaner Ships	Port of Los Angeles	Additional	Engine Standards	B	12
OGV7	Low Emission Main Propulsion Engines	Port of Los Angeles	Additional	Engine Standards	B	14

[1] "Lead Agency" means the entity that is responsible for development, implementation and enforcement of the control measure shown.

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
			Measure Focus: Fuel Requirements			
OGV8	Cleaner Fuels for Ship Auxiliary Engines	ARB	Proposed	Fuel Requirements	B	16
OGV9	Main Engine Fuel Improvement Program	Port of Los Angeles	Proposed	Fuel Requirements	B	18
OGV10	Creation of a Sulfur Emission Control Area (SECA)	EPA and ARB	Additional	Fuel Requirements	B	20
OGV11	Expanded Auxiliary Engine Fuel Improvement Program	Port of Los Angeles	Additional	Fuel Requirements	B	21
OGV12	Expanded Main Engine Fuel Improvement Program	Port of Los Angeles	Additional	Fuel Requirements	B	23
			Measure Focus: Retrofit/Repower			
OGV13	Additional Auxiliary Engine Reductions for Frequent Callers	ARB	Proposed	Retrofit/Repower	B	25
OGV14	Retrofit/Repower Requirements for Infrequent Callers	Port of Los Angeles	Additional	Retrofit/Repower	B	26
			Measure Focus: Operational Efficiencies or Improvements			
OGV15	Expanded VSR Program	Port of Los Angeles	Additional	Operational Efficiencies or Improvements	B	28
OGV16	Expanded AMP	Port of Los Angeles	Additional	Operational Efficiencies or Improvements	B	30

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
OGV17	Additional In-Use Measures for Ships	EPA and ARB	Additional	Operational Efficiencies or Improvements	B	33
SOURCE CATEGORY: HARBOR CRAFT						
			Adopted Harbor Craft Measures			
HC1	New Engine Standards for Harbor Craft	EPA	Adopted	Engine Standards	B	35
HC2	Clean Fuels for Harbor Craft	ARB	Adopted	Fuel Requirements	B	36
HC3	Early Implementation of Ultra Low Sulfur Diesel (ULSD)	Port of Los Angeles	Adopted	Fuel Requirements	B	37
HC4	Dredging Activities	ARB/Local Districts	Adopted	Engine Standards	B	38
HC5	Technical Advisory Committee (TAC) Harbor Craft Measures	Port of Los Angeles	Adopted	Retrofit/Repower	B	39
			Measure Focus: Engine Standards			
HC6	New Engine Standards for Category 1 and 2 Marine Engines	EPA	Additional	Engine Standards	B	40
			Measure Focus: Fuel Requirements			
HC7	Emulsified Fuels	Port of Los Angeles	Additional	Fuel Requirements	B	41
			Measure Focus: Retrofit/Repower			
HC8	In-Use Harbor Craft Emission Reduction Measure/Airborne Toxic Control Measure (ATCM)	ARB	Proposed	Retrofit/Repower	B	42

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
HC9	Repower Existing Harbor Craft	Port of Los Angeles	Additional	Retrofit/Repower	B	43
HC10	Retrofit Existing Harbor Craft	Port of Los Angeles	Additional	Retrofit/Repower	B	44
Measure Focus: Operational Efficiencies or Improvements						
HC11	AMP-Ready Staging Areas	Port of Los Angeles	Proposed	Operational Efficiencies or Improvements	B	46
SOURCE CATEGORY: CARGO HANDLING EQUIPMENT						
Adopted Cargo Handling Equipment Measures						
CHE1	Emission Standards for Heavy-Duty Nonroad Diesel Engines	EPA/ARB	Adopted	Engine Standards	G	47
CHE2	Yard Tractor Modernization and ULSD Programs	Port of Los Angeles	Adopted	Engine Standards	B	48
CHE3	Early Implementation of ULSD for CHE (Other than Yard Tractors)	Port of Los Angeles	Adopted	Fuel Requirements	B	50
CHE4	Alternative Fuel Yard Tractor Resolution	Port of Los Angeles	Adopted	Engine Standards/Fuel Requirements/Retrofit/ Repower	B	51
CHE5	Emulsified Fuels	Port of Los Angeles	Adopted	Fuel Requirements	B	52
CHE6	Technical Advisory Committee (TAC) CHE Measures	Port of Los Angeles	Adopted	Fuel Requirements/ Retrofit/Repower	B	53

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
			Measure Focus: Engine Standards			
CHE7	Expanded Yard Tractor Modernization	Port of Los Angeles	Additional	Engine Standards	B	54
CHE8	Enhanced CHE Modernization	Port of Los Angeles/ ARB	Additional	Engine Standards/ Retrofit/Repower	B	56
			Measure Focus: Retrofit/Repower			
CHE9	Cargo Handling Equipment at Ports and Intermodal Rail Yards	ARB	Proposed	Retrofit/Repower	B	58
SOURCE CATEGORY: RAIL						
			Adopted Rail Measures			
R1	Tier 0, 1, and 2 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines	EPA	Adopted	Engine Standards	G	60
R2	ARB Diesel Fuel Used by Intrastate Locomotives	ARB	Adopted	Fuel Requirements	B	62
R3	Federal Standards for Nonroad Diesel Fuel	EPA	Adopted	Fuel Requirements	B	64
R4	Memorandum of Understanding (MOU) in the South Coast Air Basin	ARB	Adopted	Engine Standards	G	65
R5	PHL Switcher Locomotive Modernization and ULSD Programs	Port of Los Angeles	Adopted	Replace/Fuel Requirements	B	66

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
			Measure Focus: Engine Standards			
R6	Ultra-Low Emission Switcher Locomotives: PHL	Port of Los Angeles	Additional	Engine Standards	B	67
R7	Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1	Port of Los Angeles	Additional	Engine Standards	B	69
R8	Tier 3 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines	EPA	Additional	Engine Standards	N	72
			Measure Focus: Fuel Requirements			
R9	ARB Diesel Fuel for Class 1 Railroad Locomotives	Port of Los Angeles	Additional	Fuel Requirements	B	74
			Measure Focus: Retrofit/Repower			
R10	Idling Controls for Switcher and Line Haul Locomotives	Port of Los Angeles	Additional	Retrofit/Repower	B	75
			Measure Focus: Operational Efficiencies or Improvements			
R11	Efficiency Improvements on In-Use Class 1 Rail Equipment	Port of Los Angeles	Additional	Operational Efficiencies or Improvements	B	77
R12	Electrification of Alameda Corridor and Alameda Corridor East	Port of Los Angeles	Additional	Operational Efficiencies or Improvements	N	78

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
SOURCE CATEGORY: HEAVY-DUTY DIESEL VEHICLES						
Adopted Heavy-Duty Diesel Vehicle Measures						
HDV1	2004 On-Road Standards for Heavy Duty Diesel Vehicles	EPA	Adopted	Engine Standards	G	80
HDV2	2007 On-Road Standards for Heavy-Duty Diesel Vehicles	EPA	Adopted	Engine Standards	G	81
HDV3	Gateway Cities Truck Modernization Program	Port of Los Angeles	Adopted	Engine Standards	B	82
HDV4	Engine Software Upgrade (or Low NOx Software Upgrade)	ARB	Adopted	Engine Standards	G	83
HDV5	Ultra Low Sulfur Diesel Fuel (15 ppm)	ARB	Adopted	Fuel Requirements	G	85
HDV6	Heavy-Duty Vehicle Inspection	ARB	Adopted	Operational Efficiencies or Improvements	G	86
HDV7	Periodic Smoke Inspection Program (PSIP)	ARB	Adopted	Operational Efficiencies or Improvements	G	87
HDV8	Augment Truck and Bus Highway Inspections with Community-Based Inspections	ARB	Adopted	Operational Efficiencies or Improvements	G	88
HDV9	Reduced Truck Idling	ARB	Adopted	Operational Efficiencies or Improvements	G	89

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
Measure Focus: Engine Standards						
HDV10	Expanded Truck Modernization Program	Port of Los Angeles	Additional	Engine Standards	B	90
HDV11	California Heavy-Duty Diesel Vehicle Standards and Fleet Modernization for Mexican Trucks	ARB	Additional	Engine Standards	N	93
Measure Focus: Fuel Requirements						
HDV12	Early ULSD Implementation	Port of Los Angeles	Additional	Fuel Requirements	B	94
Measure Focus: Retrofit/Repower						
HDV13	Retrofit Heavy-Duty Diesel Vehicles with Diesel Oxidation Catalysts (DOC)	Port of Los Angeles	Additional	Retrofit/Repower	B	95
HDV14	Retrofit Heavy-Duty Diesel Vehicles with Diesel Particulate Filters (DPF)	Port of Los Angeles	Additional	Retrofit/Repower	B	96
HDV15	PM In-Use Emission Control	ARB	Additional	Retrofit/Repower	B	98
Measure Focus: Operational Efficiencies and Improvements						
HDV16	On-Board Diagnostics (OBD) for Heavy-Duty Trucks	ARB	Proposed	Operational Efficiencies or Improvements	N	99
HDV17	Transportation Refrigeration Units (TRU)	ARB	Additional	Operational Efficiencies or Improvements	N	100

Measure No.	Title	Lead Agency[1]	Measure Category	Measure Focus	Modeling Color Code (e.g., green, blue, none)	Page No.
HDV18	Electrified Truck Spaces	Port of Los Angeles	Additional	Operational Efficiencies or Improvements	N	101
HDV19	Idling Reduction Measures	Port of Los Angeles	Additional	Operational Efficiencies or Improvements	N	102

Note: The emission reductions shown in the tables contained in the following control measure narratives represent maximum potential reductions modeled on an individual measure-by-measure basis for the out-year shown. The percentage reduction (% Red) is the percentage of that pollutant reduced compared to the projected out-year emissions for the source category reduced by the control measure. These reduction values may change when multiple measures are applied through sequencing.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV1

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***New Engine Standards for Ships***

Lead Agency: International Maritime Organization/Environmental Protection Agency

Control Measure Narrative:

The International Maritime Organization (IMO) established limits for oxides of nitrogen (NOx) in Annex VI to the International Convention for the Prevention of Pollution from Ships in 1997. The limits apply to Category 3 diesel marine vessel engines over 130 kilowatts (kW) installed on vessels constructed on or after January 2000. The NOx limits are based on rated engine speed (revolutions per minute, rpm) and are presented in grams per kilowatt-hour (g/kW-hr) as follows:

Engine Speed (rpm)	NOx (g/kW-hr)
$n < 130$	17.0
$130 \leq n < 2000$	$45n^{(-0.2)}$
$n \geq 2000$	9.8

The NOx limits will enter into force in May 2005, since this treaty has recently been ratified by the required 15 countries representing at least 50% of the gross tonnage of the world's merchant shipping. However, engine manufacturers have generally complied with it since 2000 because the standards are retroactive to that date. In 2003, The US Environmental Protection Agency (EPA) adopted NOx limits consistent with the IMO limits for new engines built in 2004 or later on US flagged vessels. According to the EPA, engine manufacturers are meeting the IMO standards with a variety of emission control technologies such as increased compression ratios, modified fuel injection, valve timing and different fuel nozzles. These in-cylinder controls are relatively inexpensive compared to exhaust emission controls such as the use of selective catalytic reduction. The emission reductions below are based on the phase-in of the cleaner engines beginning in 2000, and the difference between baseline NOx emission factors and the standards. It was assumed that all engine manufacturers complied with the IMO standards in 2000, consistent with the requirement that once the treaty enters into force, the standards are retroactive to 2000.

This measure also includes the EPA marine engine Category 1 and 2 emission standards applicable to auxiliary engines adopted in a final 1999 rule. The EPA 1999 marine engine standards for US flagged vessels are as follows:

Category 1 Marine Engine Standards

Power 37 KW & cylinder displacement (D) ≤ 0.9 dm^3; starting 2005	7.5 g/kW-hr NOx + THC 0.40 g/kW-hr PM
0.9 dm^3 ≤ D < 1.2 dm^3 starting 2004	7.2 g/kW-hr NOx + THC 0.30 g/kW-hr PM
1.2 dm^3 ≤ D < 2.5 dm^3 starting 2004	7.2 g/kW-hr NOx + THC 0.20 g/kW-hr PM
2.5 dm^3 ≤ D < 5.0 dm^3 starting 2004	7.2 g/kW-hr NOx + THC 0.20 g/kW-hr PM

Category 2 Marine Engine Standards

5.0 dm^3 ≤ D < 15.0 dm^3 starting 2007	7.8 g/kW-hr NOx + THC 0.27 g/kW-hr PM
Power < 3,300 KW 15 dm^3 ≤ D < 20 dm^3 starting 2007	8.7 g/kW-hr NOx + THC 0.50 g/kW-hr PM
Power ≥ 3,300 KW 15 dm^3 ≤ D < 20 dm^3 starting 2007	9.8 g/kW-hr NOx + THC 0.50 g/kW-hr PM
20 dm^3 ≤ D < 25 dm^3 starting 2007	9.8 g/kW-hr NOx + THC 0.50 g/kW-hr PM
25 dm^3 ≤ D < 30 dm^3 starting 2007	11.0 g/kW-hr NOx + THC 0.50 g/kW-hr PM

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control measure has already been adopted and implemented, although the IMO standard will not be legally effective until May 2005. The measure applies only to diesel engines over 130 kilowatts (kW) installed on vessels constructed on or after January 2000. Penetration of engines subject to the IMO standards depends on the natural turnover of existing vessels, and increases in trade that would be expected to result in the introduction of more new vessels. For the calculation of estimated emission reductions, the fleet age distribution identified in the 2001 baseline inventory was used as the basis to turn over the fleet in the out years.

In addition, EPA's Category 1 and 2 marine engine standards were applied to the auxiliary engines of the US flagged fleet (making up 11% of calls in 2001). Emission reductions were modeled by ARB and again the age distribution from the 2001 baseline inventory was used as the basis to turn over the US flagged fleet in the out years.

Anticipated NOx and PM reductions in main engine emissions are included in the adjusted out-year emissions growth.

Expected NOx and PM reductions in auxiliary engine emissions are also included in the adjusted out-year emissions growth and those reductions in tons per year (tpy) and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,434.4	0.0	0.0%	28.7	0.4%	90.2	1.3%	106.0	1.4%	367.6	3.3%
PM	80.7	0.0	0.0%	0.4	0.2%	1.2	0.5%	1.6	0.5%	5.3	1.2%

Implementation Issues:

None.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV2

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Adopted

Measure Title: ***Vessel Speed Reduction (VSR) Memorandum of Understanding (MOU)***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Vessel speed is directly linked to the engine power required by the propulsion engines of ocean-going vessels (OGVs), and engine power is directly linked to engine exhaust emissions. The currently adopted, voluntary VSR program requests that ship captains slow their vessels to 12 knots at a distance of 20 miles from Point Fermin. An arriving or departing ship would slow to 12 knots for the 20-mile inbound or outbound transit and thus reduce the power requirements of the propulsion engine. This program is more effective for the faster ships (those that travel at speeds greater then 20 knots) such as containerships, auto carriers, and cruise ships. On the other hand, slower ships such as tankers, bulk, and general cargo do not transit much above 12 knots and their contribution toward emission reductions is somewhat less in magnitude.

Currently, the VSR program has an annual compliance rate of 48%. This is based on the 2004 annual average participation rate of ships arriving and departing the Port. The VSR program targets NOx, although other pollutants may be reduced as well. The OGV propulsion engines make up 65% of total OGV NOx emissions.

Pollutants Targeted: NOx.

Control Measure Schedule and Implementation:

The VSR is currently tracked through the Marine Exchange and operates under a Memorandum of Understanding (MOU) between the Port of Los Angeles, Port of Long Beach, EPA, California Air Resources Board (ARB), South Coast Air Quality Management District (SCAQMD), Pacific Merchant Shipping Association, and the Marine Exchange of Southern California. The MOU will either be renewed or the VSR program will be included as a voluntary measure under the State Implementation Plan (SIP). The program is very well monitored and participation is tracked by checking each vessel's speed by radar at designated points in the transit. Monthly reports are provided to the Port for program tracking and auditing. Based on a continuing compliance rate of 48%, anticipated reductions in main engine emissions in tons per year and percent reduced are as follows:

Pollutant	2001 (tpy)	2005 Reduction (tpy)	2005 Reduction % Red	2008 Reduction (tpy)	2008 Reduction % Red	2010 Reduction (tpy)	2010 Reduction % Red	2012 Reduction (tpy)	2012 Reduction % Red	2025 Reduction (tpy)	2025 Reduction % Red
NOx	4,463.6	1,225.4	13.8%	1,428.3	11.4%	1,585.7	13.8%	1,664.7	13.8%	2,453.5	13.8%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Note: The Port-wide Baseline Air Emissions Inventory (PWBAEI) calculated ocean-going vessel transit emissions in the fairway zone (outside of the precautionary zone) assuming all ships transited at cruise or service speed as reported in the Lloyd's Register of Ships. This was a high-end assumption because not all ships transit at cruise speed. However, the only actual speed data reflecting pre-VSR conditions was a dataset of vessel arrival and departure speeds for those vessels visiting the Ports of Los Angeles and Long Beach in the two months immediately preceding initiation of the VSR program in May 2001. These average pre-VSR speeds are generally lower than Lloyd's cruise or service speeds. During preparation of the PWBAEI, it was thought that the two-month dataset might not be totally reflective of pre-VSR conditions, so the faster cruise or service speeds from Lloyd's were used to model transiting emissions. Use of the PWBAEI methodology results in higher pre-VSR baseline transiting emissions in the fairway zone.

From May 2001 to present, the VSR program emission reductions have been calculated assuming and incorporating the two-month dataset of actual pre-VSR speeds (broken down by vessel class) to represent the pre-VSR transiting conditions. For calculation purposes, the methodology assigned the average pre-VSR speed for a vessel class to all vessels in that class. In order to calculate the emission reductions from the VSR program, the difference between the average pre-VSR baseline speed (by vessel class) and the actual speed recorded by radar was used. The actual speeds of transiting vessels have been tracked by radar from the commencement of the VSR program in May 2001 to present by the Marine Exchange of Southern California.

In evaluation of VSR control measures for NNI (OGV2 and OGV15), it became apparent that the PWBAEI and the VSR program emission estimating methodologies were inconsistent. Because some members of the TWG were still concerned that the two months of pre-VSR speed data may not be representative of pre-VSR conditions, the TWG decided that the methodology for calculating emission reductions for the VSR control measures under NNI should be harmonized to agree with the PWBAEI methodology. Therefore, to model the potential emission reduction benefit of the VSR control measures under NNI, the cruise or service speed from Lloyd's was used to represent pre-VSR program vessel speed and the speed for "compliant" vessels was set at 12 knots for the percentage of participation described in the control measure. The emission reduction is then calculated based on the difference in emissions at cruise or service speed versus 12 knots. The result is that the VSR emission reductions presented above are significantly higher than what has been reported in the past. However, it is important to note that these elevated reductions are most likely not indicative of the actual reductions under the NNI VSR control measures. The actual reductions are presumed to be somewhere between the NNI control measure estimates and the estimates reported to date under the VSR program. This issue will be further addressed and refined in the 2004 update to the PWBAEI.

Implementation Issues:

Further emission testing is required to determine if there is a net PM increase or decrease and also to verify NOx emission reductions.

The emission reductions shown above may be increased through development of a method to account for slowing that may occur by non-compliant vessels.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV3

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Adopted

Measure Title: *Alternative Maritime Power (AMP)*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Shore power electrification, also known as 'cold ironing' can be used to supply electrical power to marine vessels during hotelling and thus reduce or eliminate the use of on-board auxiliary diesel engines and their emissions. The use of cold ironing can reduce emissions of all pollutants to almost zero levels; some emissions remain for boiler use or engine start-up. At the present, cold ironing is being used at the Port of Los Angeles; Juneau, Alaska; and at Pittsburgh, California by the USS-POSCO ships. Such requirements would be more cost-effective for ships visiting ports on a frequent basis or those with high auxiliary engine energy demands and those spending longer periods in port.

Hotelling operations represent about 28% of the total NOx and about 12% of the total PM emissions inventory from ocean-going vessels at the Port of Los Angeles. Cold ironing for ocean-going vessels is a proven technology for certain applications and can achieve significant emission reductions from ships during hotelling operations. In order to provide cold ironing services at the dockside, both the ship and the dock/terminal infrastructures have to be modified to accept shore power, such as by installing transformers and switchgear.

Pollutants Targeted: NOx, PM, SOx, HC, and CO.

Control Measure Schedule and Implementation:

The AMP program received its first reconfigured ship in 2004. At this time, there is a limited number of participating container lines and the Port is working with other tenants whose facilities and operations are consistent with AMP requirements. Currently, there are no stated goals for the AMP program other than for the Port to bring more participants into the program over the short term.

Emission reductions shown below represent AMP commitments for China Shipping (Berth 100), P & O Nedlloyd (Berth 206-209) and one NYK vessel at YTI (Berth 212-225).

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	1,943.0	32.2	0.6%	33.5	0.4%	33.5	0.5%	33.5	0.5%	33.5	0.3%
PM	66.2	1.3	0.6%	1.3	0.5%	1.3	0.5%	1.3	0.5%	1.3	0.3%

Implementation Issues:

AMP requires costly infrastructure improvements for both participating ships and the terminals receiving the ships, as well as possible higher operating costs of electricity versus fuel. AMP is most effective for OGV operations that have the same vessels repeatedly call several times a year, year after year, thus minimizing the number of ships to be retrofitted. Ship retrofit costs can also be reduced by building new ships with AMP capabilities. One issue that has been identified is that there is no international standard for AMP equipment or supplied power.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV4

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: *Auxiliary Engine Fuel Improvement Program*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The Board of Harbor Commissioners recently adopted a suite of near-term measures to be added to the Port's existing Clean Air Program (CAP). One of these measures is to subsidize the use of lower sulfur fuels in OGV auxiliary engines, beginning at 40 nm from Point Fermin. There are ships that call on the Port that burn heavy bunker fuels (most commonly IFO380) that can range from 1 to 5% sulfur content (compared to 0.03% in automobiles) with the average being between 2.3 and 2.7% sulfur. The program focuses on shifting bunker-burning auxiliaries to 1.5% fuels (most commonly marine diesel oil (MDO)).

The program will target the sulfur content in the fuels that are used in auxiliary engines on OGVs, specifically containerships, cruise ships, and tankers. In the 2001 baseline inventory, containership auxiliary engines were estimated to emit 663 tpy of SO_X and 44 tpy of DPM, cruise ships were estimated to emit 200 tpy of SO_X and 14 tpy of DPM, and tankers were estimated to emit 207 tpy of SO_X and 14 tpy of DPM.

Pollutants Targeted: PM and SOx.

Control Measure Schedule and Implementation:

This control measure would be implemented in a phased approach starting in 2005 through a voluntary, incentive-based program. This program would fund the cost differential between fuels as well as infrastructure costs to modify onboard fuel storage facilities (as applicable). The focus on containerships, cruise ships, and tankers is because they represent over 90% of the OGV auxiliary engine PM emissions and are liner services, meaning that they have high numbers of frequent callers (making five or more calls per year). The program runs through 2008. This measure may be superseded by OGV8, if implemented, or the more aggressive OGV11.

Participation rates are set according to the following schedule:

Year	2006	2007	2008
Participation Rate	25%	75%	100%

Anticipated PM reductions in tons per year and percent reduced are estimated below:

Pollutant	2001 (tpy)	2005 Reduction (tpy)	% Red	2008 Reduction (tpy)	% Red	2010 Reduction (tpy)	% Red	2012 Reduction (tpy)	% Red	2025 Reduction (tpy)	% Red
NOx	2,434.4	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	80.7	1.0	0.5%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Changing the types of fuel a ship burns introduces several key technical and logistical issues that are specific to each ship and shipping line participating in the program. These issues have to be worked out with the vessel owner/operator in advance of entering the program.

For cruise ships using diesel/electric engine technology, requirement to shift to lower sulfur fuel in auxiliary engines would necessitate full fueling conversion for entire power plant.

To ensure achievement of the participation rates indicated for this measure, incentives and disincentives must be action forcing and stringent. Incentives should go beyond cost-neutrality and include decreased berth fees, priority berth assignment and/or priority gang assignment. Disincentives would include a potential fee assessment for non-participating vessels.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV5

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: ***New Engine Standards for Category 3 Marine Engines***

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

The EPA has committed to adopting technology-forcing Tier 2 standards for Category 3 engines by April 2007, but has not committed to controlling foreign-flagged vessels. (EPA Regulatory Announcement, *Emissions Standards Developed for New Marine Diesel Engines*, EPA420-F-03-001, 2003). Due to uncertainties in this measure, ARB is estimating a range in the potential emission reductions. At the low end, ARB is estimating a 30% NOx reduction (beyond IMO standards) in the emissions from new engines used on US flagged vessels only. EPA has identified a number of different control technologies that could be used to achieve this level of NOx control, including fuel injection modifications, internal exhaust gas recirculation, and electronic controls (US EPA Draft Regulatory Support Document, *Control of Emissions from Compression-Ignition Marine Diesel Engines at or Above 30 Liters per Cylinder*, April 2002, EPA 420-D-02-002). At the high end, ARB is estimating a 70% NOx and 90% PM reduction for new engines in all vessels (foreign and domestic), per SIP "Long-Term Advanced Technology Measure." This level of control would require significantly more substantial emission control equipment. To achieve a 70% control level for NOx, selective catalytic reduction (SCR) could be utilized, or combinations of controls could be implemented. The 90% control of PM would require the use of cleaner fuels in conjunction with exhaust emission controls adapted for use on large marine engines.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control measure is planned for adoption by April 2007. Standards are assumed to be effective and implementation is assumed to begin in 2010. The Technical Working Group (TWG) recommends that modeling should use conservative assumptions in estimating the range of possible emission reductions, pending EPA finalization of the standards.

ARB's current estimate of possible low-end emission reductions in tons per year and percent reduced is presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	241.3	2.0%	1,244.5	7.0%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

ARB's current estimate of possible high-end emissions reduction is presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

High-end estimates were not modeled or credited for purposes of NNI attainment; their display is included for information only.

Implementation Issues:

There may be challenges to the adoption and implementation of this measure. If the lower end control option is pursued (30% NOx reduction beyond IMO limits for US flagged ships only), it may generate opposition since it would only impact US–flagged vessels. In addition, a requirement that only impacts domestic vessels would have a minimal impact on California emissions since the vast majority of vessels calling on California ports are foreign-flagged. If the upper end control option is pursued, there may be challenges to applying EPA new engine standards to foreign-flagged vessels, or pursuing these standards through the IMO. In addition, the PM standards will most likely require a combination of cleaner fuels and technology that is new to large marine vessels that may generate significant opposition.

Any future federal standards will need to undergo formal rulemaking, with a proposal, public comment period, and final action responsive to the public comments. Until the EPA completes this process and issues the final rule, it is not possible to predict what standards may be set, when standards might go into effect, and what engine population might be affected.

Although various stakeholders have expressed little confidence that the EPA will take steps to regulate foreign-flagged vessels, it should be emphasized that the adoption of federal regulatory standards for foreign-flagged vessels has the ability to contribute significantly to the goal of NNI.

If OGV5 is not implemented, the Port of Los Angeles will commit to identify and implement control measure(s) representing emission reductions equivalent to the low-end estimates.

Additional References:

US EPA's Final Regulatory Support Document, dated January 2003. *Control of Emissions from New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder"* (EPA420-R-03-004). *http://www.epa.gov/otaq/marine.htm*. For more information about the future for C3 marine diesel engines see US EPA final rulemaking, 68 FR 9746 (28 February 2003).

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV6

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: ***Reroute Cleanest Ships***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Under the IMO MARPOL Annex VI, NOx emission limits apply to Category 3 engines installed on new vessels starting in 2000. These limits are expected to become effective in May 2005. However, most engine manufacturers and ship builders are already voluntarily complying with the emission limits (see OGV1). It is also likely that many ship engines already meet or fall below the IMO emission limits, and as a result may present an opportunity for shippers to route their cleanest ships to the Port of Los Angeles. This control strategy would take advantage of the shipper's flexibility by requiring shipping lines to reroute the cleanest ships (i.e., those meeting or exceeding IMO emission limits) to the Port of Los Angeles. Lease agreements or a Port-wide "rule" would be the mechanisms to require the specified fleet mix, outlined in the control measure schedule below.

Pollutants Targeted: NOx.

Control Measure Schedule and Implementation:

This measure is based on the percentage of visits to a terminal. The first standards are set for container and cruise ship terminals. Participation rates for container and cruise ship terminals are set according to the following schedule:

Year	2007	2010	2012
Participation Rate	50%	75%	100%

All others (non-container and non-cruise terminal) will be required to participate according to the following schedule:

Year	2010	2012	2015
Participation Rate	50%	75%	100%

Pending determination of the feasibility of use of 0.2% or lower fuel in main engines (see OGV9), vessels that are non-IMO compliant calling on terminals will be required as an alternative to use 0.2% or lower fuel in their main engines starting 40 nm out (see OGV12), as a mandatory measure. This alternative compliance option provides greater NOx benefit (~10%) than an IMO compliant engine and provides a PM reduction benefit.

Expected NOx reductions in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	103.5	0.8%	229.8	2.0%	120.6	1.0%	0.0	0.0%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Monitoring and reporting requirements for shippers would need to be established. Some vessel owners/operators may need to modify pre-2000 vessels to achieve compliance with the IMO NOx standards. According to Port data, the percentage of containerships calling on the Port of Los Angeles that are IMO compliant has gradually increased since 2001. In 2001, approximately 12% of containerships were IMO compliant. This percentage grew to 32% in 2004. It is expected that this number will continue to grow. However, further analysis may be necessary to determine if the participation rates could be accelerated.

It should be noted that vessel deployment plans are made well in advance and depend on many things other than environmental compliance. Stakeholder feedback indicated the cargo container vessels that come to the San Pedro Bay tend to be newer vessels. The container fleet is cleaner and loading/unloading tends to be shorter than with other vessels.

Shipping lines that operate chartered vessels under existing charter agreements may be constrained in their ability to comply with this measure. The Port would work with shipping lines to ensure that charter vessels subject to existing charter agreements comply with the requirements of this measure. However, in the event that the existing charter agreements cannot be modified to require compliance with this measure, the Port will commit to identify and implement control measure(s) representing equivalent emission reductions associated with these vessels. This issue would not be the case for future charter agreements that could be appropriately conditioned.

Any implementation approach must provide exceptions for non-repeat callers, emergency calls, bunkering only calls, etc.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV7

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: *Low Emission Main Propulsion Engines*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

IMO emissions standards will only result in small NOx emission benefits in the inventory from Category 3 main propulsion engines used in ocean-going vessels. Additional reductions from ships would be necessary if the NNI goal is to be met. In its national rulemaking for US flagged ships (40 CFR 94), EPA specified voluntary emission levels for “Blue Sky Series” Category 3 engines. However, these emission levels could provide the basis for States and regional agencies to adopt additional reduction strategies by establishing emission thresholds below existing IMO standards. For NOx, the optional “Blue Sky Series” emission levels are approximately 80% below IMO standards. These emission levels are potentially feasible based on the application of after treatment technologies on new or existing engines. This control measure proposes to require the application of “Blue Sky Series” Category 3 engines to ocean-going vessels visiting the Port of Los Angeles. Specifically, this measure applies to ocean-going vessels making frequent calls (5 or more per year) and infrequent calls (2 to 4 calls per year).

In addition, based on recent verbal information from an ocean-going vessel engine manufacturer (MAN B&W), advanced combustion modification technologies (e.g., optimized injection, sliding valve injection, increased compression ratio) capable of achieving up to 35% NOx reductions from main engines are currently being developed and incorporated into new vessel designs without significant cost impact. Such technologies are also applicable to existing vessels with modest cost impact. Therefore, this measure would also require vessels visiting the port which are capable of such modifications incorporate these technologies for reducing emissions from main engines.

Pollutants Targeted: NOx.

Control Measure Schedule and Implementation:

Due to the technological challenges to meeting the “Blue Sky Series” emission levels, participation rates are dependent on the demonstration of the technology (i.e., for existing vessels). Given the uncertainty of the technology for existing vessels, it is conservatively anticipated that this control strategy would be implemented by 2020 at a participation level of 50% of all calls at the Port of Los Angeles (from frequent calls) and 100% of calls (frequent and infrequent calls) by 2025.

It is also assumed that at least 50% of all vessels would be capable of incorporating advanced combustion modification technologies for their main engines. Therefore, this measure would also require that 50% of all vessel calls be equipped with these technologies by 2020.
In 2020, the application of these technologies would reduce the required penetration rate of the "Blue Sky Series" engines from 50% to 28% of all calls while achieving the same overall reductions. Since frequent calls represent about 62% of all calls, the 28% target in 2020 can

be achieved by only targeting frequent callers (and thus reducing the total number of vessels impacted). However, the 2025 target would apply to all frequent and infrequent callers.

Low-end emission reductions associated with both the Blue Sky Engine series (using after treatment technologies) and the combustion modification technologies in tons per year and percent reduced are shown below and are included in NNI attainment modeling.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	13,263.3	74.6%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

High-end participation rates would be 50% by 2015 and 100% by 2020. High-end estimates of reductions (applicable to frequent, infrequent, and single callers) in tons per year and percent reduced are shown below and may be included later in NNI attainment modeling if the technology yields an expedited and successful demonstration.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

The "Blue Sky Series" emission levels may require the use of technologies best designed and incorporated into new vessels. This may require early adoption with significant lead-time to allow for shipping lines to plan for purchases of cleaner new vessels. In addition, cleaner fuels may be required in conjunction with control technologies to achieve the target levels. For example, SCR can achieve an 80% or greater NOx reduction, but may be difficult to retrofit on existing ship main engines, and may require lower sulfur fuels to operate at higher efficiencies. The applicability of low–emissions technologies like SCR to large ocean-going vessels needs to be further evaluated and demonstrated in order for this control strategy to be implemented as an alternative to the development of Blue Sky engines. Three months of vessel down time is anticipated for the installation of SCR on main engines. SCR technology has been demonstrated on four new OGVs carrying scrap/steel between the Bay Area and Korea. Although these vessels are smaller than the majority of OGVs, the SCR technology could potentially be incorporated into larger new (or existing) vessels.

The Port of Los Angeles should commit to fund demonstration projects on retrofit and add-on technologies for existing OGVs. In addition, increasing the participation rate and schedule of this control measure would need further evaluation.

Because of the differing abilities of different vessel types to participate, it may be appropriate to develop a terminal specific implementation approach for this measure. Any implementation approach must provide exceptions for non-repeat callers, emergency calls, bunkering only calls, etc.

Shipping lines that operate chartered vessels under existing charter agreements may be constrained in their ability to comply with this measure. The Port would work with shipping lines to ensure that charter vessels subject to existing charter agreements comply with the requirements of this measure. However, in the event that the existing charter agreements cannot be modified to require compliance with this measure, the Port will commit to identify and implement control measure(s) representing equivalent emission reductions associated with these vessels. This issue would not be the case for future charter agreements that could be appropriately conditioned.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV8

Measure Focus: Fuel Requirements

Measure Category: Proposed

Measure Title: ***Cleaner Fuels for Ship Auxiliary Engines***

Lead Agency: Air Resources Board

Control Measure Narrative:

The ARB is currently developing a proposed regulation that would reduce emissions from ship auxiliary engines by requiring the use of distillate marine fuels. Specifically, low sulfur marine gas oil would be required in ship auxiliary engines while operating in California Coastal Waters and at dockside (0.2% in 2006 and 0.1% in 2008). The use of these distillate fuels result in an estimated 6-10% NOx reduction, and a 63% PM reduction relative to typical heavy fuel oils which are increasingly used in these engines.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control measure is scheduled for Board consideration in late 2005, with implementation of the fuel requirements in 2006. Anticipated reductions in tons per year are shown below.

These emission reduction estimates assume that half of existing ship auxiliary engines currently use heavy fuel oil, and that all hotelling emissions are from auxiliary engines. More refined estimates to be developed in the future will account for auxiliary engine emissions for ships at sea in California Coastal Waters, more accurate data on the use of heavy fuel oil in auxiliary engines, and delineate hotelling emissions from auxiliary engines as well as boilers.

Emission reductions in tons per year and percent reduced are estimated below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,434.4	0.0	0.0%	624.1	8.2%	694.4	10.0%	736.0	10.0%	1,097.5	10.0%
PM	80.7	0.0	0.0%	136.3	55.0%	151.7	55.0%	160.8	55.0%	239.7	55.0%

Implementation Issues:

Potential implementation issues may include: (1) the cost of installing additional fuel tanks or partitioning existing tanks on vessels, (2) the availability of lower sulfur fuels, (3) enforcement of requirements for vessels at sea, and (4) legal challenges of state authority over vessels. The cost of distillate marine fuel is currently more than twice the cost of heavy fuel oil. For example, *Bunkerworld* reported the cost of Singapore heavy fuel oil (IFO 380) at $172.50 per metric ton versus distillate (MGO) at $372.50 (*http://www.bunkerworld.com*; 11 January 2005).

Any low sulfur fuel will be required to meet the IMO International Convention for the Safety of Life at Sea (SOLAS) flashpoint requirements of 60°C. The compliance with this requirement is not yet determined. Also, this measure will require outreach to refineries to ensure the fuel product is available in sufficient quantities.

If OGV8 is not implemented, the Port of Los Angeles will commit to identify and implement control measure(s) representing equivalent estimated emission reductions, including making OGV 11 a mandatory measure.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV9

Measure Focus: Fuel Requirements

Measure Category: Proposed

Measure Title: ***Main Engine Fuel Improvement Program***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The Board of Harbor Commissioners recently adopted a voluntary, incentive-based program to subsidize the use of lower sulfur fuels in OGV auxiliary engines, beginning at 40 nm out. The current program focuses on shifting bunker-burning auxiliaries to 1.5% fuels (most commonly marine diesel oil (MDO)). In an effort to achieve additional emission reductions from this program, this control strategy provides incentives to participants who voluntarily use 1.5% fuels in their main propulsion engines while within 40 nm of Point Fermin, specifically focusing on containerships, cruise ships, and tankers.

In the 2001 baseline inventory, containership main engines were estimated to emit 1,824 tons of SO_X and 320 tons of DPM, cruise ships were estimated to emit 500 tons of SO_X and 86 tons of DPM, and tankers were estimated to emit 174 tons of SO_X and 26 tons of DPM.

In addition to this voluntary program, the Port of Los Angeles would initiate a multi-port study on the use of 0.2% or lower distillate in both the main and auxiliary engines, including global fuel availability and cost, operational and safety considerations. The Port would also commit to fund demonstration projects to further address the feasibility issues. Pending the results of the study, the Port may adopt additional programs for vessels to use 0.2% or lower distillate in their main propulsion and auxiliary engines (OGV11, OGV12).

Pollutants Targeted: PM and SOx.

Control Measure Schedule and Implementation:

This control measure would be implemented in a phased approach starting in 2005 through an incentive program. This program would fund the cost differential between fuels as well as infrastructure costs to modify onboard fuel storage facilities (as applicable). The focus on containerships, cruise ships, and tankers is because they represent over 90% of the OGV main engine PM emissions and are liner services, meaning that they have high numbers of frequent callers (making five or more calls per year). The program runs through 2010. In the event that the SECA (see OGV9) is not implemented or if participation rates are not met, this program could be made mandatory.

Participation rates are set according to the following schedule:

Year	2006	2007	2008	2010
Participation Rate	15%	25%	50%	100%

Anticipated PM reductions in tons per year and percent reduced are estimated below:

Pollutant	2001 (tpy)	2005 Reduction (tpy)	% Red	2008 Reduction (tpy)	% Red	2010 Reduction (tpy)	% Red	2012 Reduction (tpy)	% Red	2025 Reduction (tpy)	% Red
NOx	4,463.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	477.7	0.0	0.0%	99.7	9.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Changing the types of fuel a ship burns introduces several key technical and logistical issues that are specific to each ship and shipping line, particularly for main propulsion engines. These issues will be identified and explored within the study commissioned by the Port of Los Angeles.

The availability and cost of 1.5% sulfur heavy fuel oil may be a concern, since there is a high demand for this cleaner fuel from other sources. There is a limited supply of low sulfur crude available, and dilution with lower sulfur distillate fuels or desulfurization of higher sulfur heavy fuel oil is expensive. To ensure local supplies at the Port of Los Angeles, it may be necessary to guarantee to local refiners that a dedicated demand for 1.5% sulfur content fuel will exist and the product will be purchased.

Vessel owners may need to install additional tanks or modify existing tanks unless they decide to run on the lower sulfur fuel at all times.

To ensure achievement of the participation rates indicated for this measure, incentives and disincentives must be action forcing and stringent. Incentives should go beyond cost-neutrality and include decreased berth fees, priority berth assignment and/or priority gang assignment. Disincentives would include a potential fee assessment for non-participating vessels.

In the absence of a SECA by 2010, the Port of Los Angeles may elect to enforce a mandatory measure on a terminal-by-terminal lease based approach. A mandatory program may also induce shipping lines and engine manufacturers to identify and explore alternative technologies, beyond use of lower sulfur fuel, to reach stated emission reduction goals. However, a general principle is that it is always better and easier to remove sulfur before combustion than through after treatment.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV10

Measure Focus: Fuel Requirements

Measure Category: Additional

Measure Title: ***Creation of a Sulfur Emission Control Area (SECA)***

Lead Agencies: Environmental Protection Agency and Air Resources Board

Control Measure Narrative:

The International Maritime Organization allows for the creation of a SECA, such as that already established in the Baltic Sea. EPA is currently exploring the feasibility of pursuing a SECA covering all of North America. It is envisioned that a SECA will be established which limits the sulfur content of marine fuels at 1.5%. At this level, PM and SOx emissions would be reduced about 18% and 44% respectively, relative to typical 2.7% sulfur heavy fuel oil.

Pollutants Targeted: SOx and PM.

Control Measure Schedule and Implementation:

Provided a SECA is feasible and is approved by the IMO, the earliest this measure could be implemented is 2009. However, 2012 is probably more realistic, considering the approval process necessary. The estimated PM reductions in tons per year and percent reduced provided by ARB are shown below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	477.7	0.0	0.0%	0.0	0.0%	221.3	18.0%	232.4	18.0%	342.5	18.0%

Implementation Issues:

The availability and cost of 1.5% sulfur heavy fuel oil may be a concern, since there is a high demand for this cleaner fuel from other sources. There is a limited supply of low sulfur crude available, and dilution with lower sulfur distillate fuels or desulfurization of higher sulfur heavy fuel oil is expensive. Vessel owners may need to install additional tanks or modify existing tanks unless they decide to run on the lower sulfur fuel at all times. Finally, the United States must be a signatory to Annex VI to be able to request a SECA, and it has not yet signed the treaty. IMO approval would also need to be obtained.

If OGV10 is not implemented, the Port of Los Angeles will commit to identify and implement control measure(s) representing equivalent estimated emission reductions, including making OGV 9 a mandatory measure.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV11

Measure Focus: Fuel Requirements

Measure Category: Additional

Measure Title: *Expanded Auxiliary Engine Fuel Improvement Program*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Building on experience gained in OGV4 and based on findings of the study on feasibility of using 0.2% or lower distillate fuel, this measure focuses on shifting auxiliary engines to utilization of fuels of 0.2% or lower sulfur content in 2006 and 0.1% or lower sulfur content in 2008. This program begins as a voluntary, incentive-based program funding the incremental cost to use the cleaner fuel.

Pollutants Targeted: PM, NOx, and SOx.

Control Measure Schedule and Implementation:

Based on the results of the study implemented under OGV9, this program may supersede OGV4. Port staff would prepare a detailed program description for the Board's consideration.

If implemented, participation rates are set according to the following schedule:

Year	2006	2007	2008
Participation Rate	25%	75%	100%

This measure may be superseded by OGV8, if implemented. If OGV8 does not become regulation as proposed, or if participation rates are not being achieved under this voluntary program, this measure would be implemented as a mandatory program.

If implemented, expected NOx and PM reductions in tons per year and percent reduced from auxiliary engines are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,434.4	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	80.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Changing the types of fuel a ship burns introduces several key technical and logistical issues that are specific to each ship and shipping line participating in the program. These issues have to be worked through with the vessel owner/operator in advance of entering the program. In discussions with fleet managers, the lines are working out the technical issues associated with moving to these lower sulfur fuels in advance of proposed European Union (EU) regulations on auxiliary engines. This program hopes to benefit from the work being done to meet the new EU regulation.

To ensure achievement of the participation rates indicated for this measure, incentives and disincentives must be action forcing and stringent. Incentives should go beyond cost-neutrality and include decreased berth fees, priority berth assignment and/or priority gang assignment. Disincentives would include a potential fee assessment for non-participating vessels.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV12

Measure Focus: Fuel Requirements

Measure Category: Additional

Measure Title: ***Expanded Main Engine Fuel Improvement Program***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Building on experience gained in OGV9 and the feasibility study results, this measure focuses on shifting ship main engines to utilization of fuels of 0.2% or lower sulfur content. This program begins as a voluntary, incentive-based program.

Pollutants Targeted: PM and SOx.

Control Measure Schedule and Implementation:

This measure would remain voluntary as long as the participation rates shown below are achieved. In the event the voluntary program does not achieve acceptable participation rates, this program would become mandatory.

Contingent on resolution of technical/mechanical issues and fuel availability, participation rates are set according to the following schedule:

Year	2008	2010
Participation Rate	50%	90%

Contingent on resolution of technical/mechanical issues and fuel availability, expected PM reductions in tons per year and percent reduced from main engines are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	517.5	4.1%	1,034.1	9.0%	1,085.7	9.0%	1,600.1	9.0%
PM	477.7	0.0	0.0%	348.9	31.5%	498.0	40.5%	522.9	40.5%	770.7	40.5%

Implementation Issues:

Changing the types of fuel a ship burns introduces several key technical and logistical issues that are specific to each ship and shipping line. Specifically, with use of 0.2% or lower sulfur content fuels in main engines, there are potentially significant technical and mechanical issues that will need to be addressed between 2005 and 2007 so that the program can start seeing reductions in the beginning of 2008. These issues have to be worked through with the vessel owner/operator in advance of entering the program and include reduced lubricity of distillate fuel and potentially serious cylinder wear when used over extended hours of operation.

Stakeholder feedback indicates IFO380 fuel may be available at 0.2%. Staying with residual fuel in main engines may be a better solution than switching to distillate due to lubricity problems.

Since there are limited technologies available or demonstrated for PM control on OGV main engines, the Port of Los Angeles should commit to fund demonstration projects for after treatment of PM. Such technologies may potentially serve as alternative compliance strategies to the use of 0.2% or lower sulfur content fuel to achieve equivalent reductions.

To ensure achievement of the participation rates indicated for this measure, incentives and disincentives must be action forcing and stringent. Incentives should go beyond cost-neutrality and include decreased berth fees, priority berth assignment and/or priority gang assignment. Disincentives would include a potential fee assessment for non-participating vessels.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV13

Measure Focus: Retrofit/Repower

Measure Category: Proposed

Measure Title: ***Additional Auxiliary Engine Reductions for Frequent Callers***

Lead Agency: Air Resources Board

Control Measure Narrative:

The ARB is currently developing a proposed regulation that would apply to the auxiliary engines used on ships that frequently call at California ports (see OGV8). Under the proposal, "frequent callers" would be required to reduce their auxiliary engine emissions beyond the cleaner fuel requirements of OGV8. As currently proposed for discussion, ships that call at California ports five or more times in a calendar year would be required to submit and implement a plan to reduce the PM and NOx emissions from their auxiliary engines by an additional 50% beyond the requirements of OGV8.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This element of the control measure is scheduled for Board consideration in 2006, with implementation in 2010. Anticipated reductions of NOx and PM in tons per year and percent reduced are shown below. The reductions are estimated based on the emissions from vessels that call at the Port of Los Angeles five or more times annually.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,434.4	0.0	0.0%	0.0	0.0%	1,075.6	15.5%	0.0	0.0%	0.0	0.0%
PM	80.7	0.0	0.0%	0.0	0.0%	42.8	15.5%	0.0	0.0%	0.0	0.0%

Implementation Issues:

The requirements of this proposed measure are still under development and may change based on further information, including criteria for compliance (e.g., number of annual visits, percentage of calls at a terminal, number of hours in Port). Potential implementation issues may include: (1) technical issues with implementation of retrofit control technology, (2) enforcement of numerous unique control plans, and (3) legal challenges of state authority over vessels. In addition, as currently proposed, it is envisioned that cold ironing would be one means of compliance. Potential implementation issues associated with cold ironing include the high cost of both retrofitting ships, and infrastructure developments necessary for ships to plug in to shore power.

If OGV13 is not implemented, the Port of Los Angeles will commit to identify and implement control measure(s) representing equivalent estimated emission reductions.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV14

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: *Retrofit/Repower Requirements for Infrequent Callers*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Based on the 1999 Arcadis Marine Vessel Emissions Inventory Study, it is estimated that non-frequent callers (i.e., ocean-going vessels that call on the Port of Los Angeles two to four times per year) make up about 22% of the ship auxiliary emissions. From call data collected (2001 through 2004) and associated emission estimates made during the 2001 baseline emissions inventory, it was estimated that infrequent callers (making two to four visits per year) generated approximately 23% of all OGV NOx and PM emissions. Cold ironing may not be a feasible option for non-frequent callers at the Port of Los Angeles (due to cost). To address the hotelling emissions from non-frequent callers, this control strategy will require the on-board auxiliary engines that are operated during unloading and loading operations to be retrofitted or repowered in order to achieve at least a 50% reduction target from their baseline emissions.

Repowering of on-board auxiliary engines is a viable option. Category 1 and 2 marine engines meeting the EPA Tier 2 emission standards are currently available and result in estimated 30% reduction in NOx emissions. Retrofit options for on-board auxiliary engines may consist of retrofit and after treatment technologies used for Category 1 and 2 marine engines such as Selective Catalytic Reduction (SCR), Diesel Particulate Filters (DPF), Diesel Oxidation Catalysts (DOC), Exhaust Gas Recirculation (EGR), water injection, and emulsified fuels. Since these reduction technologies are not yet commercially available for on-board auxiliary engines, implementation of this control strategy will be in the 2010 and later timeframe, when commercialization of these technologies is anticipated. However, if additional emission reductions are necessary to achieve the NNI goal, implementation of this control measure may occur sooner using demonstrated, but not yet commercialized technologies. It is also anticipated that those calling at the Port of Los Angeles no more than one time per year would not have to comply with this control strategy.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy will be implemented at 50% participation rate beginning in 2010 and later at a 100% participation rate in the 2015 timeframe for all infrequent callers, excluding one-time callers.

Expected NOx and PM reductions in tons per year and percent reduced from auxiliary engines of infrequent callers are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,434.4	0.0	0.0%	0.0	0.0%	398.3	5.7%	422.2	5.7%	1,259.1	11.5%
PM	80.7	0.0	0.0%	0.0	0.0%	15.8	5.7%	16.7	5.7%	49.9	11.5%

Implementation Issues:

The monitoring and reporting requirements for the vessels subject to this measure would need to be established. Infrequent callers that opt to participate in the AMP Program shall be considered to have complied with the requirements of this control measure. Since there are limited technologies available or demonstrated for OGV auxiliary engines, the Port of Los Angeles should commit to fund demonstration projects on retrofitting auxiliary engines and applying after treatment technologies. Any implementation approach must provide exceptions for non-repeat callers (e.g., emergency calls, bunkering only calls, etc.).

Criteria for required compliance (i.e., number of annual visits versus percentage of calls at a terminal) will be evaluated and most appropriate approach identified. Some stakeholders noted that "percentage of calls" approach might provide greater flexibility than the "frequent callers" approach.

Shipping lines that operate chartered vessels under existing charter agreements may be constrained in their ability to comply with this measure. The Port would work with shipping lines to ensure that charter vessels subject to existing charter agreements comply with the requirements of this measure. However, in the event that the existing charter agreements cannot be modified to require compliance with this measure, the Port will commit to identify and implement control measure(s) representing equivalent emission reductions associated with these vessels. This issue would not be the case for future charter agreements that could be appropriately conditioned.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV15

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: *Expanded VSR Program*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The Port of Los Angeles currently implements a voluntary program for ships to reduce their speeds during their approach to and departure from the harbor (Measure OGV2). The current speed reduction program requests the ships to reduce their cruising speed to no more than 12 knots within 20 miles of Point Fermin. In an effort to achieve additional emission reductions from this program, this control strategy seeks to make the voluntary program a mandatory program if participation goals are not being achieved. This measure also extends the distance from which the ship speeds are reduced to 12 knots from 20 to 40 nm out from Point Fermin. This measure also includes increases in participation rates from the existing program.

Pollutants Targeted: NOx.

Control Measure Schedule and Implementation:

The implementation years and annual average participation rates for this control strategy are as follows: 80% by 2006 and 85% by 2007, continuing through 2025. Anticipated reductions in tons per year and percent reduced are as follows:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.6	0.0	0.0%	2,266.6	18.1%	2,516.4	21.9%	2,641.8	21.9%	3,893.7	21.9%
PM	477.7	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Note: The Port-wide Baseline Air Emissions Inventory (PWBAEI) calculated ocean-going vessel transit emissions in the fairway zone (outside of the precautionary zone) assuming all ships transited at cruise or service speed as reported in the Lloyd's Register of Ships. This was a high-end assumption because not all ships transit at cruise speed. However, the only actual speed data reflecting pre-VSR conditions was a dataset of vessel arrival and departure speeds for those vessels visiting the Ports of Los Angeles and Long Beach in the two months immediately preceding initiation of the VSR program in May 2001. These average pre-VSR speeds are generally lower than Lloyd's cruise or service speeds. During preparation of the PWBAEI, it was thought that the two-month dataset might not be totally reflective of pre-VSR conditions, so the faster cruise or service speeds from Lloyd's were used to model transiting emissions. Use of the PWBAEI methodology results in higher pre-VSR baseline transiting emissions in the fairway zone.

From May 2001 to present, the VSR program emission reductions have been calculated assuming and incorporating the two-month dataset of actual pre-VSR speeds (broken down by vessel class) to represent the pre-VSR transiting conditions. For calculation purposes, the methodology assigned the average pre-VSR speed for a vessel class to all vessels in that class. In order to calculate the emission reductions from the VSR program, the difference between the average pre-VSR baseline speed (by vessel class) and the actual speed recorded by radar was used. The actual speeds of transiting vessels have been tracked by radar from the commencement of the VSR program in May 2001 to present by the Marine Exchange of Southern California.

In evaluation of VSR control measures for NNI (OGV2 and OGV15), it became apparent that the PWBAEI and the VSR program emission estimating methodologies were inconsistent. Because some members of the TWG were still concerned that the two months of pre-VSR speed data may not be representative of pre-VSR conditions, the TWG decided that the methodology for calculating emission reductions for the VSR control measures under NNI should be harmonized to agree with the PWBAEI methodology. Therefore, to model the potential emission reduction benefit of the VSR control measures under NNI, the cruise or service speed from Lloyd's was used to represent pre-VSR program vessel speed and the speed for "compliant" vessels was set at 12 knots for the percentage of participation described in the control measure. The emission reduction is then calculated based on the difference in emissions at cruise or service speed versus 12 knots. The result is that the VSR emission reductions presented above are significantly higher than what has been reported in the past. However, it is important to note that these elevated reductions are most likely not indicative of the actual reductions under the NNI VSR control measures. The actual reductions are presumed to be somewhere between the NNI control measure estimates and the estimates reported to date under the VSR program. This issue will be further addressed and refined in the 2004 update to the PWBAEI.

Implementation Issues:

Voluntary compliance with the Vessel Speed Reduction Program is steadily increasing, partially due to assignment of gangs at the 20-mile boundary. To the extent that competition for gangs again occurs, compliance rates may decline.

In the event the participation rates are not being met, this measure includes a mandatory enforcement provision - possibly through lease agreements or a Port-wide "rule" enforcement mechanism. Legal authority to implement a mandatory program extending out to 40 nm, other than through lease agreements, may require further evaluation.

If the program is made mandatory, there could be a cost impact due to idled work gangs resulting from uncontrolled delays in the Air Quality Compliance Zone. A two hour delay can cost a shipping company $20,000 in labor costs. Therefore, there may be a need for additional time to reach berth after the assignment of gangs.

The Port could adopt a fee assessment program for non-compliant vessels that could then be used for other mitigation programs.

To ensure the success of this measure, participation by the Port of Long Beach, in addition to the Port of Los Angeles, is strongly recommended.

The capability to monitor the speed of ocean-going vessels is currently limited to approximately 20nm. However, this monitoring program has the capability of being expanded beyond the 20nm limit, but requires enhancement of the radar system in use by the Marine Exchange.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV16

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: *Expanded AMP*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Shore power or cold ironing can be used to supply electrical power to marine vessels during hotelling and thus reduce or eliminate the use of on-board auxiliary diesel engines. The use of cold ironing as an alternative to onboard auxiliary engines can reduce emissions of most pollutants by over 95 percent. In addition to the Port of Los Angeles, cold ironing is being used at a cruise ship terminal at Juneau, Alaska, at Pittsburg, California by the USS-POSCO ships, and is planned for a cruise ship terminal at Seattle. Such requirements would be more cost-effective for ships visiting ports on a frequent basis or those with high auxiliary engine energy demands.

Hotelling operations represent about 28% of the total NOx and about 12% of the total PM emissions inventory from ocean-going vessels at the Port of Los Angeles. Cold ironing for ocean-going vessels is a proven technology and can achieve significant emission reductions from ships during hotelling operations. This control strategy will require a specified percentage of ships calling at the Port to use shore-side power (i.e., cold iron) while at berth. Frequent callers, which call at the Port five or more times per year, would be subject to the shore-side power requirement (representing approximately 70% of the total calls, 45% of the total vessels and 62% of total OGV auxiliary engine NOx and PM emissions). All cruise liner ships, which have very high power demands (as well as high hotelling emissions) would be required to be cold ironed, regardless of the frequency of calls.

The costs for expanding the current AMP program would vary depending on several factors such as the number of berths utilized, whether ships are retrofitted or are new vessels with AMP capability, and existing shore-side infrastructure. As an example, based on an actual survey of shipping lines conducted by the Port of Los Angeles, the cost to retrofit an existing ocean-going vessel to accept shore-side power ranged from $350,000 to $1,800,000. The low-end cost estimate assumed: a barge- or shore-based transformer to convert from 6.6kV shore-side power to 440V, barge- or land-based spooled electrical cable, no power synchronization (i.e., blackout during conversion from ship to shore power) and no modifications to the on-board electrical management system. The high-end estimate assumed: either an on-board transformer or the ability to connect directly to 6.6kV, spooled electrical cable provisioning on-board the ship, power synchronization capability and upgrade to the on-board electrical management system. It should be noted that there is a larger initial, capital cost to outfit the ship with on-board equipment, but the on-going operation and maintenance cost is less. It should also be noted that as more and more ships are retrofitted to be AMP-ready, improved technology and economics of scale may reduce future costs.

Pollutants Targeted: NOx, PM, SOx, HC, and CO.

Control Measure Schedule and Implementation:

The following table specifies the percentage and number of total ship calls subject to the frequent caller provision in 2001, and the proposed participation rate and compliance date for ships calling on the Port of Los Angeles.

Category	Calls Subject to Cold Ironing (%)	Calls Subject to Cold Ironing (no.)	Calls (Frequent Callers) to be Cold Ironed (%)				
		2001	2007	2010	2015	2020	2025
Container and Reefer	70%	1110	25%	50%	100%	100%	100%
Tanker[1]	70%	193	25%	50%	100%	100%	100%
Cruise	100%	320	50%	100%	100%	100%	100%
Other	70%	325	25%	50%	100%	100%	100%

In addition, this control measure would require that all terminals with leases with the Port of Los Angeles require AMP use on 70% of their ship calls within two years of entering a new lease or renewing an existing lease. For an example, the recent lease agreement for Berths 206-209 in the Port of Los Angeles required an AMP commitment of 70% from the tenant, P & O Nedlloyd.

Anticipated reductions in tons per year and percent reduced for NOx and PM are estimated below.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	1,943.0	0.0	0.0%	940.7	12.3%	2,093.1	30.1%	3,523.8	47.9%	5,254.6	47.9%
PM	66.2	0.0	0.0%	37.3	15.1%	83.1	30.1%	139.9	47.9%	208.7	47.9%

Implementation Issues:

The installation of the infrastructure for on-shore power as well as the modifications of the vessels to use on-shore power would have to occur at rates necessary to meet the specified implementation schedule and participation rates. Compliance with this schedule and rates would have to be continually monitored and modified as needed. Further analysis may be necessary to determine if the participation rates could be accelerated. In lieu of the proposed participation rates, and in order to prevent circumvention of the requirements, the Port of Los Angeles could consider requiring a percentage of all calls to terminals to use AMP (rather then applying the requirements to frequent callers).

AMP requires costly infrastructure improvements for both participating ships and the terminals receiving the ships, as well as possible higher operating costs of electricity versus fuel. AMP is most effective for OGV operations that have the same vessels repeatedly call several times a year, year after year, thus minimizing the number of ships to be retrofitted.

[1] Currently verifying what percentage of tankers that call at the Port of Los Angeles operate pumps using diesel-electric engines vs. steam driven pumps.

Ship retrofit costs can also be reduced by building new ships with AMP capabilities. The issue is that there is no international standard for AMP equipment or supplied power.

It is also important to recognize that tankers may not be good candidates for AMP, since a potentially large portion of the current world fleet uses steam, not electricity, for pumping. Recent stakeholder feedback has indicated the world's fleet is not moving toward electric pumping, and changing from steam to electric pumping cannot be done easily. Furthermore, many tanker terminals may soon be required to comply with South Coast Air Quality Management District's Regulation XIII, triggering New Source Review with tenants required to acquire offsets for their pumping operations (i.e., pumping treated as a stationary source). This rule decreases the future opportunities for AMP reductions at tanker terminals. All commitments under this District rule would supersede the emission reductions achievable through this control measure.

Because of the differing abilities of different vessel types to participate, it may be appropriate to develop a terminal specific implementation approach for this measure.

Criteria for required compliance (i.e., number of annual visits versus percentage of calls at a terminal) will be evaluated and most appropriate approach identified. Some stakeholders noted that "percentage of calls" approach might provide greater enforceability and flexibility than the "frequent callers" approach.

Shipping lines that operate chartered vessels under existing charter agreements may be constrained in their ability to comply with this measure. The Port would work with shipping lines to ensure that charter vessels subject to existing charter agreements comply with the requirements of this measure. However, in the event that the existing charter agreements cannot be modified to require compliance with this measure, the Port will commit to identify and implement control measure(s) representing equivalent emission reductions associated with these vessels. This issue would not be the case for future charter agreements that could be appropriately conditioned.

Targeted Source Category: Ocean-going Vessels

Measure Number: OGV17

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: *<u>Additional In-Use Measures for Ships</u>* (beyond OGV8, OGV10, and OGV13)

Lead Agencies: Environmental Protection Agency and Air Resources Board

Control Measure Narrative:

In the "State and Federal Element" of the South Coast State Implementation Plan for Ozone, there is a "Long Term Advanced Technology Measure" that calls on the EPA (in cooperation with the ARB and the local air pollution control districts) to achieve a statewide 25-40% reduction from oceangoing ships by 2010. ARB and EPA Measures OGV8, OGV10, and OGV13 (in addition to others proposed in this document) may not completely fulfill this SIP measure. Measure OGV17 is designed to achieve the remaining reductions through additional measures that may utilize a variety of in-use emission reduction strategies as outline in the SIP. These strategies may include the use of operational controls (e.g., vessel speed reduction strategies or idling limits), cleaner fuels, economic incentive programs, cold ironing, and opacity (smoke) limits.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The schedule and implementation of this measure is dependent on the progress achieved by the other OGV measures. However, implementation is necessary no later than 2010.

Low-end (auxiliary engines only) expected NOx reductions in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,434.4	0.0	0.0%	0.0	0.0%	1,149.2	16.6%	1,580.2	21.5%	2,356.3	21.5%
PM	80.7	0.0	0.0%	0.0	0.0%	1.8	0.6%	4.8	1.7%	7.2	1.7%

Possible high-end (all engines) expected NOx and PM reductions are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	6,898.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	558.4	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Potential issues will depend on the control strategies ultimately pursued. It has been proposed that the stakeholders have further discussions in an effort to minimize any confusion associated with this measure.

The Port of Los Angeles will commit to identify and implement control measure(s) representing equivalent estimated emission reductions if ARB does not initiate rulemaking efforts by 2007 which would achieve the reductions claimed in this measure or if ARB's adopted rule does not fully achieve the reductions claimed in this measure.

Targeted Source Category: Harbor Craft

Measure Number: HC1

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***New Engine Standards for Harbor Craft***

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

The EPA promulgated final exhaust emission standards for new diesel engines over 37kW (50 hp) on 29 December 1999 (64 FR 73301). The standards apply primarily to commercial harbor craft with Category 1 and 2 engines.

Pollutants Targeted: NOx, Reactive Organic Gases (ROG), PM, and CO.

Control Measure Schedule and Implementation:

The implementation dates range from 2004 to 2007, depending on engine size. See the EPA Tier 2 Marine Diesel Emission Standards, as listed in the table below:

Engine Category	Displacement (liter/cyl)	Starting Date	NOx+THC (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)
1	D < 0.9	2005	7.5	0.40	5.0
	0.9 < D < 1.2	2004	7.2	0.30	5.0
	1.2 < D < 2.5	2004	7.2	0.20	5.0
	2.5 < D < 5.0	2007	7.2	0.20	5.0
2	5 < D < 15	2007	7.8	0.27	5.0
	15 < D < 20 (P < 3300 kW)	2007	8.7	0.50	5.0
	15 < D < 20 (P > 3300 kW)	2007	9.8	0.50	5.0
	20 < D < 25	2007	9.8	0.50	5.0
	25 < D < 30	2007	11.0	0.50	5.0

The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	3,530.6	106.6	3.0%	178.5	5.0%	465.8	13.0%	251.7	7.0%	406.4	11.0%
PM	177.9	1.8	1.0%	3.6	2.0%	17.1	9.5%	5.4	3.0%	9.2	5.0%

Implementation Issues:

None.

Targeted Source Category: Harbor Craft

Measure Number: HC2

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: ***Clean Fuels for Harbor Craft***

Lead Agency: Air Resources Board

Control Measure Narrative:

The control measure requires that diesel fuel sold, supplied, or offered for sale to harbor craft operators in California meet the specifications for vehicular diesel fuel, commonly referred to as CARB diesel fuel. Commercial Harbor Craft are defined as marine vessels that operate primarily along California's coastline, and inland waterways. They include a wide variety of vessels such as tug/tow boats, commercial fishing vessels, charter fishing vessels, pilot boats, work boats, crew/supply boats, ferry/excursion vessels and government vessels. Ocean-going ships are excluded from the definition of harbor craft.

Pollutants Targeted: NOx, SOx, and PM.

Control Measure Schedule and Implementation:

Diesel fuel sold, supplied, or offered for sale to harbor craft operators within the South Coast Air Basin is required to meet California motor vehicle diesel fuel standards beginning January 2006. This control measure would help satisfy commitments contained in the South Coast SIP. The regulation is effective statewide beginning January 2007.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	3,530.6	0.0	0.0%	107.1	3.0%	107.5	3.0%	107.9	3.0%	110.8	3.0%
PM	177.9	0.0	0.0%	14.4	8.0%	14.4	8.0%	14.4	8.0%	14.7	8.0%

Implementation Issues:

None.

Targeted Source Category: Harbor Craft

Measure Number: HC3

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: ***Early Implementation of Ultra Low Sulfur Diesel (ULSD)***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

One of the near-term measures recently adopted by the Board of Harbor Commissioners, the Marine Fuel Improvement Program would provide subsidies for the early implementation of ULSD fuels to harbor craft that operate in and service the Port of Los Angeles. The harbor craft source category was estimated to emit 506 tons of SOx and 178 tons of DPM in 2001.

Pollutants Targeted: NOx, PM and SOx.

Control Measure Schedule and Implementation:

The program would begin to provide cost subsidies to harbor craft operators in 2005. The program would end in 2006 when the State's fuel rule takes effect and the program would no longer be needed. The subsidies would focus on local (those that spend >50% of operating time in or near Port) harbor craft.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	3,530.6	24.9	0.7%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	177.9	3.1	1.7%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

A method for monitoring where the vessels consumed the fuel and in what quantities will have to be developed for subsidy program management and emission reduction reporting.

Targeted Source Category: Harbor Craft

Measure Number: HC4

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: *Dredging Activities*

Lead Agency: Air Resources Board/Local Districts/Port of Los Angeles

Control Measure Narrative:

Dredges participating in the Statewide Portable Equipment Registration Program (PERP) are required to have all portable engines certified to Tier 1 or 2 EPA/ARB nonroad engine standards, or equivalent, by January 2005. Dredges are also subject to the Airborne Toxic Control Measure for Diesel-Fueled Portable Engines, requiring dredges to be certified to Tier 1, 2, or 3 EPA/ARB nonroad engine standards by 2010. After 2010, the ATCM requires fleets of portable engines to meet diesel PM emission averages that become increasingly more stringent in 2013, 2017, and 2020. By 2020, portable engines on dredges must be certified to Tier 4 emission standards for EPA/ARB newly manufactured nonroad engines or be equipped with a Level-3 PM control technology or a combination of verified control technologies to achieve 85% reduction.

In addition to the permitting requirements at the state and local level, the Port of Los Angeles will commit to the use of electric dredges on a case-by-case basis, if physical space and geometry in the designated work area make it feasible to use electric dredges. When feasible, use of electric dredges will be included by the Port of Los Angeles in construction bid specifications.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

As stated above, portable diesel engines on dredges must be certified to EPA/ARB nonroad engine standards by 2010 (2005 if they are in PERP) and are subject to fleet emission standards in 2013, 2017, and 2020. The ATCM requires compliance reports to be submitted to the ARB by March of the year in which the fleet standard takes effect.

Emission estimates are not quantifiable at this time. Emission estimates from the use of electric dredges were not modeled or credited for purposes of NNI attainment.

Implementation Issues:

None.

Targeted Source Category: Harbor Craft

Measure Number: HC5

Measure Focus: Retrofit/Repower

Measure Category: Adopted

Measure Title: ***Technical Advisory Committee (TAC) Harbor Craft Measures***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

As part of the China Shipping settlement, the Port has committed to implementing various emission reduction strategies as determined and evaluated by the TAC. The harbor craft reductions focus on repowering or retrofitting primarily harbor craft main or auxiliary engines (two ocean-going vessels are included in the recent awards).

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

Emission reductions run from 2005 through 2014 (various measures run five, seven, or ten years). The TAC measures have been adopted by the Board of Harbor Commissioners.

The anticipated emission reductions for NOx in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	3,530.6	98.7	2.8%	98.7	2.8%	93.6	2.6%	93.8	2.6%	0.0	0.0%
PM	177.9	8.9	5.0%	8.9	5.0%	8.6	4.8%	8.6	4.8%	0.0	0.0%

Implementation Issues:

To be determined.

Targeted Source Category: Harbor Craft

Measure Number: HC6

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: *New Engine Standards for Category 1 and 2 Marine Engines*

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

Under an Advance Notice of Proposed Rulemaking (ANPRM), EPA is considering standards for new marine diesel engines with per cylinder displacement below 30 liters modeled after the 2007/2010 clean highway and non-road diesel engine program. The regulation would emphasize achieving large reductions in PM emissions as early as possible through the use of advanced emission control technology. The standards would apply to marine diesel engines used in all applications: commercial (excluding ocean vessels), recreational, and auxiliary. (EPA Regulatory Announcement, EPA420-F-04-041)

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The standards are planned for adoption and could apply as early as 2011. Standards are assumed to be effective and implementation is assumed to begin in 2014. The TWG recommends that modeling should use conservative assumptions in estimating the range of possible emission reductions, pending EPA finalization of standards. ARB's current conservative estimate of possible low-end emission reductions in tons per year and percent reduced are presented below. Low-end emission reductions were modeled and credited for purposes of NNI attainment.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	3,530.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	838.2	22.7%
PM	177.9	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	43.2	23.5%

Implementation Issues:

Any future federal standards will need to undergo formal rulemaking, with a proposal, public comment period, and final action responsive to the public comments. Until the EPA completes this process and issues the final rule, it is not possible to predict what standards may be set, when standards might go into effect, and what engine population might be affected. Nonetheless, the adoption of federal regulatory standards for Category 1, 2 marine engines has the ability to significantly contribute to the goal of NNI.

If HC6 is not implemented, the Port of Los Angeles will commit to identify and implement control measure(s) representing equivalent estimated emission reductions.

Targeted Source Category: Harbor Craft

Measure Number: HC7

Measure Focus: Fuel Requirements

Measure Category: Additional

Measure Title: *Emulsified Fuels*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The ARB has verified the use of emulsified fuel in heavy-duty diesel on-road engines as meeting a Level 2 control (i.e., 50% PM benefit) and a 15% reduction in NOx emissions. Though the use of emulsified fuel in Category 1 and 2 marine engines in harbor craft has not been fully verified, it is anticipated that for most applications it should perform as well as for on-road and nonroad engines. Some marine engines, especially older 2-stroke engines or those having certain Bosch fuel pumps, are known to have problems with diesel emulsions; for some applications, the power loss may present logistical barriers. This control strategy requires the use of emulsified fuel for harbor craft operating within the District water boundaries. The emulsified diesel fuel production capacity is approximately 25 million gallons per year and is currently underutilized. To fuel all harbor craft from the Port of Los Angeles with emulsified diesel fuel would require approximately 5 million gallons per year.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy could be implemented in 2006 starting with 80% of the harbor craft using emulsified fuels, except for assist tugs and line-haul tugs. This 80% participation rate could then apply to line-haul tugs beginning in 2008, with the condition that an on-board emulsifier would be used to provide the fuel.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	3,530.6	0.0	0.0%	396.3	11.1%	397.7	11.1%	399.2	11.1%	410.1	11.1%
PM	177.9	0.0	0.0%	68.0	37.9%	68.2	37.9%	68.4	37.9%	69.8	37.9%

Implementation Issues:

To ensure the effectiveness of emulsified fuel for harbor craft, a demonstration project on the applicability of emulsified fuel to assist tugs and to determine emissions at low load should be conducted by the Port of Los Angeles.

In a recent demonstration project conducted on a Golden Gate ferry vessel, use of emulsified fuel resulted in a 140% increase in PM and a 6% increase in NOx in idle ahead/in gear, a 76% increase in PM in idle/neutral and a 65% increase in PM in auxiliary engines (generators.)

Targeted Source Category: Harbor Craft

Measure Number: HC8

Measure Focus: Retrofit/Repower

Measure Category: Proposed

Measure Title: ***<u>In-Use Harbor Craft Emission Reduction Measure/Airborne Toxic Control Measure (ATCM)</u>***

Lead Agency: Air Resources Board

Control Measure Narrative:

Under this measure, ARB is proposing to reduce NOx, ROG, and PM emissions from existing "in-use" harbor craft engines. The proposed measure includes a number of options to reduce emissions, including: (1) the use of add-on control equipment; (2) repowering, replacing or retrofitting existing vessels and/or early introduction of new vessels. Due to the diversity within the harbor craft category, specific emission reduction proposals may vary with the type of vessels, industry, or other factors. Several strategies would be evaluated to determine the most effective means to reduce emission from in-use harbor craft engines.

Pollutants Targeted: NOx, ROG and PM.

Control Measure Schedule and Implementation:

It is envisioned that this measure will be approved by the ARB in November 2005 with implementation beginning in 2008 and phased in over a five to seven year period.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	3,530.6	0.0	0.0%	0.0	0.0%	788.3	22.0%	870.3	24.2%	1,847.2	50.0%
PM	177.9	0.0	0.0%	0.0	0.0%	30.6	17.0%	40.1	22.2%	156.6	85.0%

Implementation Issues:

There are several technical issues associated with this measure. (1) Lack of ARB verified control technologies; (2) high cost of engine replacement and retrofit technologies; (3) space limitations for in-use vessel control technologies such as SCR and DPF; and (4) safety concerns due to high temperature required for DPF regeneration.

If HC8 is not implemented, the Port of Los Angeles will commit to identify and implement control measure(s) representing emission reductions equivalent to this proposed regulatory measure.

Targeted Source Category: Harbor Craft

Measure Number: HC9

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: *Repower Existing Harbor Craft*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

It is currently estimated that of the roughly 400 harbor craft residing at the Port of Los Angeles, to date approximately 150 have been repowered with the help of SCAQMD or other funding mechanisms (e.g., the Carl Moyer program). This leaves about 250 vessels that could potentially be repowered with an average emission reduction potential of 60% NOx and 25% PM. This control measure would require the Port of Los Angeles to repower the remaining 250 vessels.

Pollutants Targeted: NOx.

Control Measure Schedule and Implementation:

Beginning in 2005, repower harbor vessel propulsion and auxiliary engines (e.g., line haul and fishing vessels) with new marine engines meeting the EPA 2004 Category 1, 2 Marine Engine standards based on the following schedule and participation rates.

- 50 vessels in 2005
- 50 vessels in 2006
- 50 vessels in 2007
- 50 vessels in 2008
- 50 vessels in 2009

The anticipated emission reductions for NOx in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx (tpy)	3,530.6	21.3	0.6%	78.6	2.2%	100.3	2.8%	100.7	2.8%	103.4	2.8%
PM (tpy)	177.9	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

In order to achieve the participation rates shown above, the Port will need to implement an aggressive outreach program and may need to consider a program with substantially more flexibility than existing grant programs, such as Carl Moyer (e.g., covering more than incremental cost, accepting higher cost effectiveness, allowing more time out of the South Coast Air Basin).

Due to their ability to relocate and travel up and down the California coast, the application of this control strategy to line-haul tugs would need to be further evaluated. The opportunities for repowering appear to be with main engines on line haul tugs.

The candidate fleet for this measure includes commercial fishing vessels, as well as any assist tugs that may not have already been repowered. Given current regulatory catch limitations on fish, the candidate commercial fishing fleet may relocate or be otherwise reduced.

ARB is currently developing a statewide regulation for In-Use Harbor Craft (HC8) that is similar to the proposal under this control measure. If HC9 achieves less than HC8, it will be superseded. If HC8 is not implemented, HC9 remains in place.

Targeted Source Category: Harbor Craft

Measure Number: HC10

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: *Retrofit Existing Harbor Craft*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The use of DPFs, Diesel Oxidation Catalysts (DOC), and SCR on heavy-duty diesel engines has been well documented and it may be possible to retrofit existing harbor craft engines using the same technologies since harbor craft engines are marketed as marine versions of land-based engines. The three technologies are known as "add-on exhaust retrofit devices." However, such retrofit systems for harbor craft engines do not currently exist as commercially available units.

DPF technology could reduce PM by 85%, while SCR has a NOx reduction potential of 95%. Adding a lean NOx catalyst to a DPF will result in a 25% reduction in NOx along with an 85% reduction in PM. This control strategy requires the retrofit of existing harbor vessel (e.g., tugboats and fishing vessels) propulsion and auxiliary engines with new add-on control systems such as DPFs, DPFs in combination with lean NOx catalysts, DOCs, or SCR.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

Sufficient time would be needed for technology manufacturers to achieve verification from ARB, so the implementation of this strategy should be delayed until 2007 at the earliest. The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	3,530.6	0.0	0.0%	42.8	1.2%	82.4	2.3%	97.1	2.7%	203.2	5.5%
PM	177.9	0.0	0.0%	5.6	3.10%	11.5	6.4%	11.6	6.4%	33.2	18.0%

Implementation Issues:

ARB is currently developing a statewide regulation for In-Use Harbor Craft (HC8) that is similar to the proposal under this control measure. If HC10 achieves less than HC8, it will be superseded. If HC8 is not implemented, this measure remains in place.

Implementation would depend on ARB verification of the retrofit technologies.

Targeted Source Category: Harbor Craft

Measure Number: HC11

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Proposed

Measure Title: *AMP-Ready Staging Areas*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The development of AMP-ready staging areas for vessel assist tugs will eliminate the emissions associated with unnecessary trips back to home berths after tugs complete each ocean-going vessel assist. Use of on-shore electrical power, instead of operating auxiliary generators, will further reduce emissions.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

It was assumed that up to 30% of assist tug transit and hotelling time could be reduced through this measure. This assumption will need further verification from the assist tug and unit tow companies. It is assumed that berths would be phased in from 2008 through 2025 and that they could be made available from unused wharfs/docks (though there are potential security concerns that were identified at the stakeholder meetings).

The anticipated emission reductions for NOx and PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	3,530.6	0.0	0.0%	25.0	0.7%	50.2	1.4%	75.5	2.1%	121.9	3.3%
PM	177.9	0.0	0.0%	0.9	0.5%	2.0	1.1%	2.9	1.6%	4.6	2.5%

Implementation Issues:

Need to coordinate with the U.S. Coast Guard, Port Homeland Security and assist tug and unit tow operators to identify potential staging areas.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE1

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***Emission Standards for Heavy-Duty Nonroad Diesel Engines***

Lead Agency: Environmental Protection Agency/Air Resources Board

Control Measure Narrative:

In September 1996, the ARB, in conjunction with EPA and the diesel engine manufacturers, signed a statement of principles (SOP) that called for harmonization of the ARB and EPA nonroad compression ignition (CI) engine regulations. The SOP called for new NOx, HC, and PM emission standards for nonroad CI engines that would reduce NOx and PM emissions by 60%.

In August 1998, EPA adopted new emission standards. In January 2000, the ARB adopted standards to existing California emission standards to harmonize as closely as possible with the federal program. These standards consist of a tiered structure of emission limits based on engine power. The Tier 1 standards were implemented in 1996. In 2001, the process of phasing in the Tier 2 standards began. The phasing in of the Tier 3 standards will begin in 2006.

California amended the existing regulations to harmonize with the recently modified federal requirements for Tier 4 engine emission standards. The Tier 4 standards are based on the use of advanced after-treatment technologies. These technologies will reduce PM and NOx emissions from new engines up to 95% when compared to previous emission requirements. The Tier 4 program also includes requirements for not-to-exceed limits, incentives to engine and equipment manufacturers for the early introduction of engines with advanced after treatment, new test procedures and test cycles, enhanced in-use compliance provisions, and transitional compliance assistance for engine and equipment manufacturers.

Pollutants Targeted: NOx, PM, CO, and SOx.

Control Measure Schedule and Implementation:

For Tier 4 standards, emission reductions for PM are anticipated in 2008 – 2013; for NOx in 2011 – 2014 and for engines >750 hp in 2011 – 2015. Anticipated reductions are included in the adjusted out-year emissions growth.

Implementation Issues:

None.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE2

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***Yard Tractor Modernization and ULSD Programs***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

This measure would accelerate the replacement of yard tractors with the cleanest engines available and accelerate use of ULSD fuels through a voluntary, incentive based program. Yard tractors made up 78% of the 2001 baseline CHE emissions. Equipment replacement options (i.e., on-road engines vs. nonroad engines) will be evaluated. Three scenarios will be developed: 1) replace existing yard tractors with tractors equipped with on-road engines, 2) replace existing yard tractors with tractors equipped with low-emission nonroad engines, and 3) replace existing yard tractors with a combination of on-road and nonroad tractors. The scenario representing overall best option for achieving largest reductions will be implemented.

It is important to note that this is a performance-based approach to incorporate cleaner engines; the program is fuel neutral. Engines procured must be certified to meet or be below the standards shown below:

- Phase 1 (2005) – Must meet or be below the 2004 on-road engine standards
- Phase 2 (2006) – Must meet or be below the 2007 on-road engine standards

Pollutants Targeted: NOx, PM, and SOx.

Control Measure Schedule and Implementation:

Implementation would be in two phases with use of cleaner fuels starting in 2005:

- Phase 1 (2005): replace 1995 and older (unregulated) yard tractors
- Phase 2 (2006): replace 50% of all Tier 1 (1996 – 2002 models) yard tractors

Expected NOx and PM reductions from this control measure are presented below in tons per year and percent reduced (as compared to total CHE emissions):

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	1,862.6	608.6	25.0%	297.8	12.0%	51.0	2.0%	24.1	1.0%	4.0	1.0%
PM	111.6	58.1	43.0%	20.4	18.0%	3.5	3.0%	2.2	2.0%	0.2	1.0%

Implementation Issues:

The NOx performance standard for this measure maybe achieved through use of an alternative fuel engine (e.g., 2004 Cummins on-road LNG engine) or certified onroad diesel engines.

Emissions testing were recently concluded by ARB and POLA on yard tractors to determine if there is any impact on the potential reductions due to the change to an off-road duty cycle for the on-road engine. At the time of the production of this document, the results were not available. The final emissions reductions associated with this measure will take into account the findings of the emissions testing study.

This measure requires scrappage of all replaced yard tractors.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE3

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: ***Early Implementation of ULSD for CHE (Other than Yard Tractors)***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

To reduce PM and SO_X emissions from all cargo handling equipment through the early implementation of ULSD fuels (yard tractors are covered in measures CHE2 and CHE8). The CHE fleet, excluding yard tractors, had 2001 baseline emissions of 20 PM tons and 9 tons SO_X. This program would subsidize the incremental cost of ULSD fuels in CHE instead of current diesel fuels being used.

Pollutants Targeted: PM and SOx.

Control Measure Schedule and Implementation:

This program would be implemented in two phases: the first in 2005 with conversion of 50% of the Port's CHE fleet over to ULSD, and the second phase in 2006 when the entire fleet would be converted to ULSD. The fuel improvement program is designed to be cost neutral. A terminal would most likely be entirely converted over at one time so as to minimize issues associated with multiple fuels; this means conversion would be on a terminal-by-terminal basis. The program would end in June 2006 when the ARB fuel regulations for nonroad vehicles becomes effective.

Expected PM reductions in tons per year and percent reduced from CHE engines, excluding yard tractors, are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	1,862.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	111.6	0.5	0.4%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

The Port should consider providing subsidy credit for terminals that have recently implemented ULSD in their CHE fleets.

The subsidy administration logistics (jobber vs. terminal), and verification of emission reductions will be resolved upon program implementation.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE4

Measure Focus: Engine Standards/Fuel Requirements/Retrofit/Repower

Measure Category: Adopted

Measure Title: *Alternative Fuel Yard Tractor Resolution*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

To improve the mitigation of environmental impacts from diesel yard tractors, the Board of Harbor Commissioners in February 2003 adopted Resolution 6164. The Resolution stipulates that in all approvals of new leases, the terminal operator shall be required to use alternative fuel yard tractors, unless it is operationally infeasible. In approvals of significant renegotiations of existing leases, for all future purchases or leases of yard tractors, the terminal operator shall be required to use alternative fuel yard tractors, unless it is operationally infeasible. Resolution 6164 further stipulates as a condition of new leases or significant renegotiations of existing leases that the terminal operator retrofit all of its existing diesel yard tractors and retrofit or purchase other CHE either with (1) an ARB-verified DPF using ULSD, or (2) an ARB-verified DOC using emulsified fuel. It is further stipulated that whenever a determination is made of operational infeasibility, only hybrid electric equipment, equipment operated with a DPF and ULSD, or equipment operated with a DOC and emulsified fuel may be used in lieu.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

As new leases and significant renegotiations of existing leases are approved.

Anticipated NOx and PM reductions in tons per year and percent reduced from CHE engines are presented below:

Pollutant	2001 (tpy)	2005 Reduction (tpy)	2005 Reduction % Red	2008 Reduction (tpy)	2008 Reduction % Red	2010 Reduction (tpy)	2010 Reduction % Red	2012 Reduction (tpy)	2012 Reduction % Red	2025 Reduction (tpy)	2025 Reduction % Red
NOx	1,862.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	111.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Procurement of local supplies of alternative fuel and installation of fueling infrastructure.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE5

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: *Emulsified Fuels*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

This is an existing CAP program that subsidizes the use of emulsified fuel.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The current program will continue as long as the demand for the product among Port terminals remains.

Expected NOx and PM reductions in tons per year and percent reduced from CHE engines are presented below:

Pollutant	2001 (tpy)	2005 Reduction (tpy)	2005 Reduction % Red	2008 Reduction (tpy)	2008 Reduction % Red	2010 Reduction (tpy)	2010 Reduction % Red	2012 Reduction (tpy)	2012 Reduction % Red	2025 Reduction (tpy)	2025 Reduction % Red
NOx	1,862.6	116.9	4.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	111.6	28.9	21.4%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

There are approximately 80 CHE units currently using emulsified fuel at terminals within the Port of Los Angeles.

ARB has confirmed that emulsified diesel provides 63% PM and 14% NOx reductions compared with CARB diesel fuel, and that these reductions are not dependent on the fuel sulfur content (150 ppm vs. 15 ppm).

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE6

Measure Focus: Fuel Requirements/Retrofit/Repower

Measure Category: Adopted

Measure Title: ***Technical Advisory Committee (TAC) CHE Measures***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

As part of the China Shipping settlement, the Port has committed to implementing various emission reduction strategies as determined and evaluated by the TAC. The CHE reductions focus on converting yard tractors to liquefied natural gas (LNG), using O_2 Diesel™ Fuel in selected nonroad equipment, in some cases with an oxidation catalyst retrofit, and repowering selected CHE.

TAC measures are expected to reduce NOx from CHE by 134 tons per year in the first five years and PM by six tons per year in the first five years, with additional reductions in years six through ten.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The emission reductions run from 2005 through 2011 (various measures run five or seven years). The TAC measures have been adopted by the Board of Harbor Commissioners.

Expected NOx and PM reductions in tons per year and percent reduced from CHE engines are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	1,862.6	134.0	5.5%	134.0	5.4%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	111.6	6.0	4.4%	6.0	5.3%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

None.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE7

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: ***Expanded Yard Tractor Modernization***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

To further reduce emissions from yard tractors, this is a voluntary, incentive-based program that expands the yard tractor modernization program (CHE2). The initial Port-wide yard tractor modernization program will be completed in years 2007 and 2008. The modernization cycle commences again upon availability of Tier 4 nonroad engines (currently scheduled for 2011).

It is important to note that this is a performance-based approach to incorporate cleaner engines; the program is fuel neutral. Engines procured must be certified to meet or be below the standards shown below:

- All phases of implementation of this measure must meet or be below the 2007 on-road engine standards. In 2011 and beyond, all engines must meet the cleaner of the 2007 on-road engine standards and the Tier IV off-road standard.

Pollutants Targeted: NOx, PM, and SOx.

Control Measure Schedule and Implementation:

Implementation would be in six phases starting in 2007:

- Phase 1 (2007): replace remaining 50% of Tier 1 (1996-2002 models) yard tractors (the first 50% were procured in 2006 in accordance with CHE2)
- Phase 2 (2008): replace all Tier 2 (2003-2004 models) yard tractors
- Phase 3 (2011): replace all yard tractors originally procured in 2005 (CHE2, Phase 1)
- Phase 4 (2012): replace all yard tractors originally procured in 2006 (CHE2, Phase 2)
- Phase 5 (2013): replace all yard tractors procured in 2007, under Phase 1
- Phase 6 (2014): replace all yard tractors procured in 2008, under Phase 2

Expected NOx and PM reductions from this control measure are presented below in tons per year and percent reduced (as compared to total CHE emissions):

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	1,862.6	0.0	0.0%	1,116.9	45.0%	1,146.5	45.0%	1,034.3	43.0%	16.1	4.0%
PM	111.6	0.0	0.0%	50.9	45.0%	46.7	40.0%	39.4	36.0%	0.9	5.0%

Implementation Issues:

The performance standard for this measure maybe achieved through use of an alternative fuel engine, as certified to meet 2007 on-road engine standards (with the 2010 NOx level) or certified onroad diesel engines.

This measure requires scrappage of all replaced yard tractors, with the possible exception of Tier 2 units replaced in 2008. Possible resale of the newest Tier 2 units will be further evaluated.

ARB is currently developing a statewide regulation (CHE9) that is similar to the proposal under this control measure. If CHE7 achieves less than CHE9, it will be superseded. If CHE9 is not fully implemented or does not achieve at least the emission reductions shown for CHE7, this measure remains in place.

Emissions testing were recently concluded by ARB and POLA on yard tractors to determine if there is any impact on the potential reductions due to the change to an off-road duty cycle for the on-road engine. At the time of the production of this document, the results were not available. The final emissions reductions associated with this measure will take into account the findings of the emissions testing study.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE8

Measure Focus: Engine Standards/Retrofit/Repower

Measure Category: Additional

Measure Title: *Enhanced CHE Modernization*

Lead Agency: Port of Los Angeles/Air Resources Board

Control Measure Narrative:

Opportunities exist for reducing emissions from CHE other than yard tractors - such as top picks, side picks, and rubber tired gantry (RTG) cranes - through use of alternative fuel, on-road, and Tier 3 and 4 nonroad engines. This control measure takes advantage of these opportunities and places requirements on both new purchases and replacement or retrofit of existing equipment. The following provides the implementation dates and participation rates for new purchases, replacements and retrofits of CHE other than yard tractors:

- New Purchases
  - Require all new CHE purchases in 2005-2006 to meet the 2004 on-road engine standard and be equipped with the highest level ARB-verified ECS available, or, if that option is not feasible, meet the Tier 3 nonroad engine standards (or Tier 2 if engine size is greater than 750 hp) and be equipped with the highest level ARB-verified ECS available.
  - Require all new CHE purchases in 2007-2011 to meet the 2007 on-road engine standard, or, if that option is not feasible, meet the Tier 3 nonroad engine standards (or Tier 2 if engine size is greater than 750 hp) and be equipped with the highest level ARB-verified ECS available.
  - Require all new purchases beginning in 2012 to be alternative fuel or, if not feasible, meet the Tier 4 nonroad engine standards.

- Replacement and Retrofit of Existing CHE
  - Pre-1996 (unregulated) CHE
    - ✓ By 2007, 50% must meet the 2007 on-road engine standard or if that option is not feasible, meet Tier 3 nonroad standard (or Tier 2 if engine size is greater than 750 hp) and be equipped with the highest level ARB-verified ECS available. By 2010, 100% of pre-1996 CHE must comply with these requirements.
  - Model Year 1996-2002 CHE
    - ✓ By 2007, 25% must meet the 2007 on-road engine standard or if that option is not feasible, meet Tier 3 nonroad standards (or Tier 2 if engine size is greater than 750 hp) and be equipped with the highest-level ARB-verified ECS available. By 2010, 50% of model year 1996-2002 CHE must comply with these requirements.
    - ✓ By 2014, 100% of model year 1996-2002 CHE must meet the 2007 on-road engine standard or if that option is not feasible, meet Tier 4 nonroad standards.
  - Model Year 2003 -2005 CHE

- ✓ By 2007, 100% of model year 2003-2005 CHE must be equipped with highest level of ARB-verified ECS, or at the earliest date an ECS becomes available.
- ✓ By 2014, 100% of model year 2003-2005 CHE must meet the 2007 on-road engine standard or if that option is not feasible, meet Tier 4 nonroad standards.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The implementation dates of this control strategy are described in the above narrative along with the participation rates.

The expected NOx and PM reductions in tons per year and percent reduced from CHE (excluding yard tractors) are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	1,862.6	0.0	0.0%	124.1	5.0%	101.9	4.0%	72.2	3.0%	28.1	7.0%
PM	111.6	0.0	0.0%	6.8	6.0%	5.8	5.0%	4.4	4.0%	1.5	8.0%

Implementation Issues:

ARB is currently developing a statewide regulation (CHE9) that is similar to the proposal under this control measure. If CHE8 achieves less than CHE9, it will be superseded. If CHE9 is not fully implemented or does not achieve at least the emission reductions shown for CHE8, this measure remains in place.

In addition to the specifications for new purchases, replacements and retrofits identified above, the applicability of SCR technology on gantry cranes will be further investigated to determine feasibility.

Targeted Source Category: Cargo Handling Equipment

Measure Number: CHE9

Measure Focus: Retrofit/Repower

Measure Category: Proposed

Measure Title: ***Cargo Handling Equipment at Ports and Intermodal Rail Yards***

Lead Agency: Air Resources Board

Control Measure Narrative:

The proposed regulation for Diesel-Fueled Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards is a statewide ARB planned measure to reduce emissions from diesel-fueled, nonroad mobile equipment used for cargo handling at California's ports and intermodal rail yards. Emission reductions are expected to be achieved through the mandated required use of Best Available Control Technology (BACT).

Pollutants Targeted: NOx, PM, CO and HC.

Control Measure Schedule and Implementation:

The proposed measure is expected to be considered for adoption by the Board in November 2005 with implementation of the proposed regulation beginning in the 2007 timeframe. The current proposal addresses in-use yard trucks and all other cargo handling equipment. The proposed requirements are listed below:

Model Year or Effective Model Year	Compliance Date
In-Use Yard Trucks:	
Pre-1996	July 2007
1996-2002 (with verified ECS installed by adoption date)	July 2008
1996-2002 (without verified ECS installed)	July 2007
2003-2005 (verified ECS is available)	July 2007
2003-2005 (verified ECS is NOT available)	July 2011
2006-2007	July 2013
2008-2010	July 2016
In-Use Cargo Handling Equipment (Excluding Yard Trucks):	
pre-1988	January 2007
1988-1995	January 2008
1996-2005	January 2010

Expected NOx and PM reductions in tons per year and percent reduced from CHE engines are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	1,862.6	0.0	0.0%	0.0	0.0%	611.4	24.0%	685.5	28.5%	329.2	82.0%
PM	111.6	0.0	0.0%	0.0	0.0%	28.0	24.0%	31.2	28.5%	15.0	82.0%

Implementation Issues:

The appropriate duty cycle of yard trucks needs to be established. BACT for different categories of equipment may differ, pending availability of verified control devices; and on-road engine availability and retrofit issues for yard trucks need to be resolved.

Targeted Source Category: Rail

Measure Number: R1

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***Tier 0, 1, and 2 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines***

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

In 1998, EPA adopted locomotive emission standards for NOx, HC, CO, PM and smoke, applicable to newly manufactured and remanufactured railroad locomotives and locomotive engines. The rule took effect in the year 2000 and applies to locomotives originally manufactured during or after 1973, any time they are manufactured or remanufactured. Electric locomotives, historic steam-powered locomotives, and locomotives originally manufactured before 1973 are not regulated.

Three sets of emission standards were adopted, with applicability of the standards depending on the date a locomotive is first manufactured. The first set of standards, Tier 0, apply to locomotives and locomotive engines originally manufactured from 1973 through 2001, any time they are manufactured or remanufactured. The second set of standards, Tier 1, apply to locomotives and locomotive engines originally manufactured from 2002 through 2004. These locomotives and locomotive engines will be required to meet the Tier 1 standards at the time of original manufacture and at the time of each remanufacture. The final set of standards, Tier 2, will apply to locomotives and locomotive engines originally manufactured in 2005 and later. Tier 2 locomotives and locomotive engines will be required to meet the applicable standards at the time of original manufacture and each subsequent remanufacture.

The emission standards apply separately to two different duty cycles, line haul and switching. Line haul refers to the overland transportation of trains, typically over long distances whereas switching refers to the local movement of railcars to set them up for line haul transportation or to prepare them for local delivery. Locomotives used for line haul operations are typically equipped with large, powerful engines of 3,000 hp or more, while switching locomotives use smaller engines, typically having 1,200 to 3,000 hp. Older line haul locomotives have often been converted to switch duty as newer line haul locomotives with more horsepower have become available. Each locomotive must comply with both sets of standards regardless of whether they are intended for duty in one or the other service.

The Tier 0, Tier 1, and Tier 2 locomotive emission standards, and the years they become effective, are listed below.

- **Tier 0 Locomotive Standards (1973 – 2001)**

Line-haul:	1 g/bhp-hr HC*	**Switching:**	2.1 g/bhp-hr HC*
Line-haul:	5 g/bhp-hr CO	**Switching:**	8 g/bhp-hr CO
Line-haul:	9.5 g/bhp-hr NOx	**Switching:**	14 g/bhp-hr NOx
Line-haul:	0.6 g/bhp-hr PM	**Switching:**	0.72 g/bhp-hr PM

- **Tier 1 Locomotive Standards (2002 – 2004)**

Line-haul:	0.55 g/bhp-hr HC*	**Switching:**	1.2 g/bhp-hr HC*
Line-haul:	2.2 g/bhp-hr CO	**Switching:**	2.5 g/bhp-hr CO
Line-haul:	7.4 g/bhp-hr NOx	**Switching:**	11 g/bhp-hr NOx
Line-haul:	0.45 g/bhp-hr PM	**Switching:**	0.54 g/bhp-hr PM

- **Tier 2 Locomotive Standards (2005 and later)**

Line-haul:	0.3 g/bhp-hr HC*	**Switching:**	0.6 g/bhp-hr HC*
Line-haul:	1.5 g/bhp-hr CO	**Switching:**	2.4 g/bhp-hr CO
Line-haul:	5.5 g/bhp-hr NOx	**Switching:**	8.1 g/bhp-hr NOx
Line-haul:	0.2 g/bhp-hr PM	**Switching:**	0.24 g/bhp-hr PM

* - HC standard is in the form of THC for diesel engines

In addition to these emission standards, smoke standards limit 30-second and 3-second peak smoke opacity to 40% and 50%, respectively (for Tier 0, 1, and 2) and limit the opacity of steady-state emissions to 30% (Tier 0), 20% (Tier 1), and 20% (Tier 2).

Pollutants Targeted: NOx, PM, CO, HC and smoke.

Control Measure Schedule and Implementation:

Tier 0 standards are effective in year 2000, Tier 1 standards are effective in year 2002, and Tier 2 standards will take effect in year 2005. Anticipated reductions are included in the adjusted out-year emissions growth.

Note: The 2001 values for PM were adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm. This will be reflected in the final 2001 baseline emission inventory document.

Implementation Issues:

None.

Targeted Source Category: Rail

Measure Number: R2

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: ***ARB Diesel Fuel Used by Intrastate Locomotives***

Lead Agency: Air Resources Board

Control Measure Narrative:

The control measure requires that diesel fuel sold, supplied, or offered for sale to intrastate locomotive operators in California meet the specifications for vehicular diesel fuel, commonly referred to as ARB diesel fuel. Intrastate locomotives are defined as those locomotives that operate at least 90 percent of the time within the borders of the state, based on hours of operation, miles traveled, or fuel consumption. Line-haul locomotives meeting the EPA's Tier 2 locomotive emission standards (for both NOx and PM) which primarily move freight into and out of the SCAQMD are not included in the definition of intrastate locomotive.

Also, to provide additional flexibility to affected intrastate locomotive operators, operators of intrastate locomotives have the option of participating in an alternative emission control plan (AECP). The AECP provisions allow the owner or operator of an intrastate locomotive to submit for approval a substitute fuel and/or emission control strategy. The substitute fuel and/or emission control strategy must achieve equivalent or greater reductions than those achieved solely through compliance with ARB diesel fuel standards, and adequate enforcement provisions are required. Further, there must be a detailed analysis to ensure adequate environmental protections have been provided for environmentally sensitive and impacted areas (e.g., Port of Los Angeles area).

Pollutants Targeted: NOx, PM, and SOx.

Control Measure Schedule and Implementation:

The regulation is effective statewide beginning January 2007.

Expected NOx and PM reductions in tons per year and percent reduced from locomotives are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	0.0	0.0%	42.3	1.2%	29.3	1.1%	33.4	1.1%	60.1	1.1%
PM	57.4	0.0	0.0%	2.4	5.0%	2.7	2.3%	3.0	2.3%	3.7	2.3%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R3

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: ***Federal Standards for Nonroad Diesel Fuel***

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

The federal nonroad diesel fuel standards require that sulfur levels for nonroad diesel fuel be reduced from current uncontrolled levels ultimately to 15 parts per million, (ppm), though an interim cap of 500 ppm is contained in the rule. The rule is applicable to all locomotives and marine vessels. The federal nonroad diesel fuel rule does not apply to stationary sources.

Pollutants Targeted: NOx, PM and SOx.

Control Measure Schedule and Implementation:

Beginning June 2007, refiners are required to produce nonroad, locomotive, and marine diesel fuel that meets a maximum sulfur level of 500 ppm. Beginning June 2010, the maximum sulfur level is 15 ppm for diesel fuel used by nonroad sources, excluding locomotives and marine vessels. In 2012, nonroad diesel fuel used in locomotives and marine applications must meet the low sulfur (15 ppm) standard.

Measure R2 partially supersedes this control measure. The residual benefit of the federal nonroad diesel fuel standard in tons per year and percent reduced is as follows:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	0.0	0.0%	0.0	0.0%	2.6	0.1%	3.0	0.1%	5.4	0.1%
PM	57.4	0.0	0.0%	1.5	3.1%	5.4	4.5%	11.6	8.7%	13.3	8.4%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R4

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***Memorandum of Understanding (MOU) in the South Coast Air Basin***

Lead Agency: Air Resources Board

Control Measure Narrative:

ARB developed and implemented a voluntary program to reduce emissions from locomotives in the South Coast Air Basin. ARB and the two Class 1 freight railroads operating in California (Burlington Northern and Santa Fe (BNSF) and Union Pacific (UP)) signed a MOU in July 1998, establishing a locomotive fleet average emissions program with an emission target for 2010. The intent is to accelerate introduction of newer, lower-emitting locomotives in the South Coast Air Basin. The locomotive fleet average emissions program is tied to the promulgation of the EPA National Locomotive Rule and requires that fleet average emissions are equivalent to EPA's 2005 locomotive NOx standard (5.5 g/bhp-hr) by 2010. The MOU addresses locomotive NOx emissions only, not PM. The program is voluntary because Federal law prohibits any state or local government from adopting or enforcing any standard or other requirement relating to the control of emissions from new locomotives and new engines used in locomotives.

Pollutant Targeted: NOx.

Control Measure Schedule and Implementation:

The California railroads have until 2010 to comply with the NOx emission reduction requirement of the MOU. Anticipated NOx and PM reductions are included in the adjusted out-year emissions growth.

Implementation Issues:

See stipulation under other NNI Rail measures regarding avoidance of double counting of emission reductions under NNI Plan and MOU.

Targeted Source Category: Rail

Measure Number: R5

Measure Focus: Replace/Fuel Requirements

Measure Category: Adopted

Measure Title: ***PHL Switcher Locomotive Modernization and ULSD Programs***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

This program will replace sixteen of PHL's switch engine fleet with newer and significantly cleaner Tier 2 railroad locomotives engines, equipped with idling controls. Switch engine emissions are important to reduce as they are generally emitted within the Port boundary. The in-Port switching operations were estimated to emit 171.9 tons of NOx and 3.7 tons of PM in the 2001 baseline inventory.

The second component of the program is to subsidize the use of ULSD until it is mandated by state law in 2007.

Pollutants Targeted: NOx, PM, and SOx.

Control Measure Schedule and Implementation:

This program calls for eight rail locomotives to be replaced in 2005 and the remaining eight to be replaced in 2006. The fuel subsidy would run from 2005 through 2006.

Expected NOx and PM reductions from this control measure are presented below in tons per year and percent reduced (as compared to total rail emissions):

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	61.3	2.0%	139.0	4.0%	184.9	7.0%	211.1	7.0%	379.6	7.0%
PM	57.4	1.8	2.0%	2.5	5.0%	2.4	2.0%	2.7	2.0%	6.3	4.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

The agreement is imminent between PHL, the Port of Los Angeles, and the Port of Long Beach.

The Port of Los Angeles Board of Harbor Commissioners has approved the funding for this modernization program. Carl Moyer grant funds have also been awarded to PHL for a portion of the fleet modernization cost. As part of the agreement with the Ports of Los Angeles and Long Beach, PHL will conduct demonstration testing of a "green goat" and a LNG locomotive. As the technology for ultra-low emission switcher locomotives becomes proven in PHL's duty cycle, the Port will assist PHL to obtain ultra-low emission switchers in lieu of Tier 2 locomotives.

Targeted Source Category: Rail

Measure Number: R6

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: ***Ultra-Low Emission Switcher Locomotives: PHL***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Sixteen of the approximately twenty PHL switcher locomotives operated at the ports have already been scheduled for replacement in the near future (see R5). This control strategy requires the remaining on-Port PHL switcher locomotives to be replaced with ultra-low emission locomotives meeting the standards shown below:

- NOx: 3.0 g/bhp-hr
- PM: 0.0225 g/bhp-hr

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy will be implemented according to the following schedule and participation rates.

- 25% by 2007
- 50% by 2008
- 75% by 2009
- 100% by 2010

Expected NOx and PM reductions from this control measure are presented below in tons per year and percent reduced (as compared to total rail emissions):

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	0.0	0.0%	34.7	1.0%	79.2	3.0%	90.5	3.0%	162.7	3.0%
PM	57.4	0.0	0.0%	0.5	1.0%	1.2	1.0%	1.3	1.0%	3.2	2.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

Performance standards for this measure are based on a demonstration switcher locomotive using multiple, modular Tier 3 nonroad engines. PM standard based on assumed use of a DPF on the Tier 3 engines. This switcher locomotive uses two or three palletized generator sets with truck-type engines (600 horsepower or less). The number of engines used at any one time depends upon the throttle setting. When the locomotive is not working, the engines are automatically shut off. Because these Tier 3 nonroad-certified engines have relatively low emission levels, the net emissions and fuel consumption are much lower than conventional locomotives with large engines. This type of technology is not limited by the size of the battery pack nor does it require any unusual maintenance; on the contrary, such engines require less specialized maintenance than regular locomotives. This type of switcher locomotive is currently being demonstrated by National Railway Equipment Company and Brookville Equipment Corporation. Under the EPA switch test cycle, this type of locomotive reduces NOx emissions, PM emissions and fuel consumption up to 75%.

Performance standards may also be achieved with a battery hybrid or LNG switcher locomotive.

Battery Hybrid. This type of locomotive uses a large bank of batteries to power the electric drive motors and is able to provide maximum power only for short periods which is compatible with switcher operations. A small diesel engine (300 horsepower or less) is used to recharge the battery pack at a lower rate than peak switcher requirements. Once the battery pack is charged, the diesel engine is automatically shut off. It is anticipated that the battery pack must be replaced every few years. This type of switcher locomotive is now manufactured by RailPower with the "Green Goat" and the "Green Kid" locomotive models. NOx and PM emissions are reduced from 80-90% while fuel consumption is reduced 40-70%.

LNG. LNG switcher locomotives have been commercialized by MotivePower Inc. (originally M-K Boise Locomotive). Two LNG switchers have been operating for almost 10 years in the Commerce area by LA Junction Railway (BNSF). Two more of these LNG switchers will be placed in service in 2005. These LNG engines use spark-ignited natural gas and have NOx levels of approximately 2.0 g/bhp-hr in notch 8. They are also 6-12 dB quieter than equivalent diesel engines. NOx emissions are reduced 89%.

The Port of Los Angeles should commit to fund demonstration projects to advance technology development of super "green goats", LNG and other technology options for reliable operation in PHL's duty cycle.

Any future transaction involving the Port of Los Angeles and PHL for locomotive fleet modernization will include a buy-back provision, wherein the Port will assist PHL to obtain newer, lower emission locomotives as technology advances.

Targeted Source Category: Rail

Measure Number: R7

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: ***Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

This control strategy requires deployment of ultra-low emission locomotives by Class 1 freight railroads for out-of-Port switching and in-Port and out-of-Port line haul operations. The first phase would apply to Port-related switcher locomotives and the second phase would apply to Port-related line haul locomotives.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy uses performance-based standards. The standards in the first phase, applicable to Port-related switchers, are 3.0 g/bhp-hr NOx and 0.0225 g/bhp-hr PM and are equivalent to those described in R6 for future PHL switcher locomotives. Phase 1 would be implemented according to the following participation rates and schedule:

Year	2008	2009	2010	2011	2012
Participation Rate	20%	40%	60%	80%	100%

The standards in the second phase, applicable to Port-related line haul locomotives, are 3.0 g/bhp-hr NOx and 0.035 g/bhp-hr PM and are roughly equivalent to estimated high-end Tier 3 locomotive engine standards and Tier 4 nonroad engine standards for engines > 750 hp. Phase 2 would be implemented according to the following participation rates and schedule:

Year	2010	2012
Participation Rate	50%	100%

Expected NOx and PM reductions from this control measure are presented below in tons per year and percent reduced (as compared to total rail emissions):

Class 1	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	0.0	0.0%	34.7	1.0%	66.1	2.5%	775.4	25.7%	1,393.9	25.7%
PM	57.4	0.0	0.0%	1.0	2.0%	50.0	42.0%	110.3	83.0%	128.5	81.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

Performance standards for Port-related switchers are based on a demonstration switcher locomotive using multiple, modular Tier 3 nonroad engines (see R6). PM standard based on assumed use of a DPF on the Tier 3 engines.

Performance standards for the line haul locomotives may be achieved with LNG or after treatment technology. Achievement of standards using after treatment controls may require further technology development and in-use demonstration.

LNG. LNG line-haul locomotives are ready for commercialization. Such technology was developed by Energy Conversions Incorporated of Tacoma, Washington, for Burlington Northern Railway (BN). It was demonstrated by two BN locomotives for six years in the 1990's pulling coal trains across the Midwest. These pilot-injection diesel engines ("homogeneous combustion") utilizing EMD prime movers achieved 4.0 to 4.5 g/bhp-hr NOx. With further optimization, these ECI engines can be calibrated well below Tier 2 standards (5.5 g/bhp-hr) to approximately 3.5 g/bhp-hr NOx. Under the GasRail program during the 1990's, 3.0 g/bhp-hr NOx was achieved using the "LaCHIP" technology ("direct injection"). Current on-the-shelf designs use the EMD 645 engine, but this technology is adaptable to other engines. Compared to the Tier 2 line haul standards, these locomotives will reduce NOx emissions by 36-45%.

SCR. SCR is a control technology that has been developed for stationary diesel engines similar in size to locomotive propulsion engines. Besides being equipped with a special catalytic converter, SCR systems require the use of a liquid reductant (usually ammonia or urea) that is sprayed into the exhaust stream. With proper engineering, new, modern locomotives can be designed to be equipped with SCR systems while still retaining the external space limitations for bridges and tunnels. In a 1995 ARB report by Engine, Fuels and Emissions Engineering, such a design was proposed and the emission benefit estimated at 72% NOx. PM emissions could also be reduced through recalibration of the fueling strategy. Through the use of such after-treatment technology, line-haul emissions of less than 2 g/bhp-hr NOx and less than 0.10 g/bhp-hr PM are feasible. Further PM reductions are possible if a DPF is added to the system (see below). No demonstration of this feasible technology is planned at this time, but the EPA will consider such technology in its rulemaking process for Tier 3 standards for new locomotives.

DPFs. ARB, under a cooperative agreement with BNSF and UPRR, is investigating the use of DPFs on switch locomotives. This technical project is being conducted by Southwest Research Institute (SwRI). To date, SwRI has identified technology to reduce the lubrication oil combustion with conventional locomotive engines. SwRI is now working with HUG Engineering of Switzerland to design compatible DPFs. HUG has equipped over 200 switch locomotives with DPFs in Europe. DPFs are able to achieve about 90% reduction in PM emissions, well below 0.05 g/bhp-hr PM. The EPA will also consider this technology in its rulemaking process for the Tier 3 standards for new locomotives.

For line haul locomotives, regardless of the technology used to achieve the performance standards, a dedicated locomotive fleet operating in the South Coast Air Basin would likely be required.

The Port of Los Angeles should commit to fund demonstration projects to advance technology development for locomotive engines to meet the performance-based standards for this strategy.

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R8

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: *Tier 3 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines*

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

Under an Advance Notice of Proposed Rulemaking (ANPRM), EPA is considering standards for new locomotive diesel engines and is considering additional requirements for all 1973 and later locomotives covered under current Tier 0, 1 and 2 engine standards. (*EPA Regulatory Announcement,* Federal Register. June 29, 2004. Page 39276.) EPA has identified a number of different advanced emission control and after treatment technologies, currently being developed to meet 2007 highway engine standards and Tier 4 nonroad engine standards. Although for the most part these highway and nonroad engines are smaller than locomotive engines, much of the fundamental diesel engine and emission control technology involved is the same. Technologies for control of PM include catalyzed diesel particulate filters (CDPF) and for NOx include NOx adsorbers and SCR. To operate reliably and at high efficiencies, these technologies will require use of 15 ppm diesel fuel. Use of exhaust gas recirculation (EGR) and optimized fuel injection could also be applied.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

Tentatively, these standards could apply as early as 2011. Possible Tier 3 low-end and high-end standards are shown below. Due to uncertainties in development of standards a range has been presented. The range is based on percentage change in nonroad engine standards, with the low-end representing change from Tier 2 to Tier 3 and the high-end representing change from Tier 2 to Tier 4.

Estimated Tier 3 Locomotive Standards:

Pollutant	Tier 3 Low-End	Tier 3 High-End
NOx	5.0 g/bhp-hr	2.7 g/bhp-hr
PM	0.085 g/bhp-hr	0.034 g/bhp-hr

The TWG recommends that modeling should use conservative assumptions in estimating the range of possible emission reductions, pending EPA finalization of the standards. ARB's current estimate of possible low-end and high-end emission reductions is presented below. Emission reductions were not modeled or credited for purposes of NNI attainment; their display is included for information only.

Pollutant	2001 (tpy)	2005 Reduction (tpy)	2005 Reduction % Red	2008 Reduction (tpy)	2008 Reduction % Red	2010 Reduction (tpy)	2010 Reduction % Red	2012 Reduction (tpy)	2012 Reduction % Red	2025 Reduction (tpy)	2025 Reduction % Red
NOx	2,465.8	0.0	0.0%	0.0	0.0%	0.0	0.0%	1,508.0	50.0%	2,711.1	50.0%
PM	57.4	0.0	0.0%	0.0	0.0%	0.0	0.0%	99.7	75.0%	119.0	75.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

If the federal rule only impacts Tier 3 locomotives (i.e., does not increase the stringency of the Tier 0-Tier 2 standards), the emissions impact at the ports of the upcoming federal rule is likely to be small in the near term (due to slow turnover rate) without incentives for Tier 3 locomotives to be deployed at the ports earlier.

Any future federal standards will need to undergo formal rulemaking, with a proposal, public comment period, and final action responsive to the public comments. Until EPA completes this process and issues the final rule, it is not possible to predict what standards may be set, when the standards might go into effect, and what engine population might be effected. Nonetheless, the adoption of federal regulatory standards for Tier 3 locomotive engines has the ability to contribute significantly to the goal of NNI.

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R9

Measure Focus: Fuel Requirements

Measure Category: Additional

Measure Title: ***ARB Diesel Fuel for Class 1 Railroad Locomotives***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

ARB's recently adopted low sulfur fuel requirements for intrastate locomotives and harbor craft do not apply to locomotives operated by Class 1 freight railroads (i.e., BNSF, UP) operated in the South Coast Air Basin. This control measure would require locomotives operated by Class 1 railroads which service the Port of Los Angeles while in the South Coast Air Basin to only use fuel for their operations that meets the same fuel-based standards as intrastate locomotives (i.e., ARB Diesel).

Pollutants Targeted: NOx, PM and SOx.

Control Measure Schedule and Implementation:

This control strategy is proposed to be implemented for all locomotives in 2007.

Expected NOx and PM reductions in tons per year and percent reduced from locomotives are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	0.0	0.0%	173.7	5.0%	132.1	5.0%	150.8	5.0%	271.1	5.0%
PM	57.4	0.0	0.0%	7.4	15.0%	17.9	15.0%	19.9	15.0%	23.8	15.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

Trains using high sulfur fuel and carrying freight in and out of the Basin would have to switch to low-sulfur fuel upon entering the Basin. This will result in potentially significant operational, logistical and equipment changes, including but not limited to, draining of tanks, or the installation of separate tanks, baffling of tanks, or adding a dedicated fuel car containing ULSD to the train all with the ability to switch over fueling.

Benefit of using ULSD in locomotive engines may be more limited than in highway and nonroad engines, due to low speed, steady state operation and engines not transmission-connected to wheel axles.

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R10

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: ***Idling Controls for Switcher and Line Haul Locomotives***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Locomotives almost never shut off their propulsion engines. Depending upon the application, they spend from 40-80% of their operational time idling. They are kept running for operational and technical reasons including to reduce the delays in starting the engine; to maintain water jacket temperature, battery voltage and brake system air pressure; and to reduce wear on the starting system and battery pack. However, each locomotive uses 8,000-25,000 gallons of fuel per year during idling with the associated emissions, noise, engine wear and neighbor complaints.

There are a number of retrofit idle control systems available, ranging in cost from $14,000-$18,000 per locomotive. These systems shut off the propulsion engines after certain time and/or use parameters are exceeded, and then restart the engine whenever engine or operational parameters drop below their minimums. New locomotives come with such automatic start/stop idle controls. Because of the fuel saved, these idle controls can pay for themselves in one to three years. The cost effectiveness for this control is about $2,000 per ton NOx and PM.

This control strategy requires the installation of tamper proof idling control devices on all switcher and line haul locomotives serving the Port of Los Angeles.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy should be implemented for all locomotives by the end of 2006. Expected NOx and PM reductions in tons per year and percent reduced from locomotives are presented below (cut off time is 20 minutes):

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	18.4	0.6%	42.3	1.2%	33.8	1.3%	38.6	1.3%	69.5	1.3%
PM	57.4	1.43	1.6%	1.36	2.8%	3.7	3.1%	4.1	3.1%	4.8	3.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

Current BNSF goal is to equip switchers and intrastate locomotives with idling controls in 3-4 years: potential acceleration to 2 years might be achievable.

Tamper-proof idle control technology installation in abbreviated timeframe would not be a problem on GE locomotives, but could be a problem on EMD locomotives.

Port of Los Angeles should commit to fund demonstration projects to determine operational viability of using "pony packs" to meet on-board electrical requirements, instead of running main engines.

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R11

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: *Efficiency Improvements on In-Use Class 1 Rail Equipment*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Class 1 freight railroads have successfully implemented efficiency improvements in their locomotives and railcars (e.g., low torque bearings) over the last decade or more. These improvements increase fuel efficiency, but also produce measurable emission reduction benefits. The average annual benefit of these improvements is estimated by the railroads to be 2-3%. This control strategy commits the railroads to continue to develop and implement these improvements.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

Starting in 2005, the Class 1 railroads will identify and provide reporting on their program of annual improvements (including description of measures, number of units involved, schedule of implementation and estimated fuel efficiency or emission reduction benefit) that will result in a minimum of 1-2% per year emission reduction improvement, averaged over any three consecutive year period.

Expected NOx and PM reductions in tons per year and percent reduced from locomotives are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	2,465.8	20.7	0.7%	37.2	1.1%	33.5	1.3%	0.0	0.0%	0.0	0.0%
PM	57.4	0.6	0.7%	0.5	1.0%	2.4	2.0%	0.0	0.0%	0.0	0.0%

Note: The 2001 values for PM shown above have been adjusted from the baseline emission inventory to reflect data from the ARB indicating that the average sulfur content of fuel used by line haul locomotives operating in the South Coast Air Basin from 1998-2001 was 1,927 ppm. The baseline emission inventory assumed an average sulfur content of 3,300 ppm.

Implementation Issues:

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Rail

Measure Number: R12

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: ***Electrification of the Alameda Corridor and Alameda Corridor East***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

The electrification of Alameda Corridor and Alameda Corridor East should be considered to achieve reductions from line-haul locomotives to meet the NNI goal.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control measure creates possible emission reductions from electrification of the Alameda Corridor and Alameda Corridor East in 2020. Emission reductions were not modeled or credited for purpose of NNI attainment. This control strategy could potentially be implemented in the future as a contingency measure to the extent necessary to meet the NNI goal.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	2,465.8	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	57.4	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Alameda Corridor is built to use catenary. Original cost estimates to electrify the Corridor were several billion dollars, but could be less now due to planning for catenary.

Alameda Corridor officials stated that it is essential to design, construct and operate as a regional project (i.e., Alameda Corridor and Alameda Corridor East), rather than as a segmented project.

In addition to Corridor infrastructure cost, there may be required costs to construct additional power generation capacity and upgrade the distribution system. This is in addition to the costs to purchase an unspecified number of electric locomotives to service the Corridor.

Probable operational model would be to haul idle diesel locomotives in front of an assembled train behind electric locomotives through the Corridor. The logistics of integrating electric locomotives to maintain efficient train throughput would need to be addressed, including locomotive and crew change points. This would be imperative to prevent mode shift back to trucks to haul cargo around the Corridor.

Rail industry noted that, unlike other measures, such as fuel efficiency measures, electrification produces an emissions reduction benefit with little or no business benefit.

In order to avoid double counting of emission reductions, NOx reductions achieved under this measure and credited for purposes of attaining the NNI goal may not also be used as credits or offsets to meet the ARB/Railroad MOU commitment. Monitoring/reporting will be required to ensure compliance.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV1

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: *2004 On-Road Standards for Heavy-Duty Diesel Vehicles*

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

Phase I of the EPA Rule targets highway diesel vehicles greater than 8,500 pounds GVWR built for model year 2004 and beyond. Heavy-duty diesel engines and vehicles affected by the final regulation will have to comply with a combined NMHC + NOx emissions standard of 2.4 g/bhp-hr. The emissions standard that applied to this class of diesel engines and vehicles prior to the 2004 model year was 4.0 g/bhp-hr NOx and 1.3 g/bhp-hr HC. The new combined emissions standard represents a reduction in the emissions limit of approximately 40% from the former standard. The emissions limit for PM is not expected to change (0.1 g/bhp-hr) until model year 2007 standards are proposed.

Pollutants Targeted: NOx, NMHC and PM

Control Measure Schedule and Implementation:

Phase I of the final rule affects model year 2004 and later heavy-duty diesel engines and vehicles (highway trucks and urban buses). Anticipated reductions are included in the adjusted out-year emissions growth. For the calculation of estimated emission reductions, the HDV fleet age distribution identified in the 2001 baseline inventory was used as the basis to turn the fleet over in the out-years.

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV2

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***2007 On-Road Standards for Heavy-Duty Diesel Vehicles***

Lead Agency: Environmental Protection Agency

Control Measure Narrative:

Building on Phase I (HDV1), this EPA rule covers Phase II in a comprehensive nationwide program for controlling emissions from heavy-duty engines. This phase is based on the use of high-efficiency exhaust emission control devices and the consideration of the vehicle and its fuel as a single system. The rule will result in PM and NOx emission levels that are 90 and 95 percent below the 2004 standard, respectively. The standards will be effective in the 2007 model year and the low sulfur diesel fuel needed to facilitate the standards will be available in mid-2006. As a result, diesel vehicles will achieve gasoline-like exhaust emission levels, in addition to their inherent advantages over gasoline vehicles with respect to fuel economy, lower greenhouse gas emissions, and lower evaporative emissions. The PM standard will be 0.01 g/bhp-hr in 2007 and the standards for NOx and NMHC will be 0.2 g/bhp-hr and 0.14 g/bhp-hr, respectively, to be phased in together between 2007 and 2010. The phase-in will be on a percent-of-sales basis, with 50 percent from 2007 to 2009 and 100 percent in 2010. New evaporative emission standards are also contained in the rule.

Pollutants Targeted: NOx, NMHC and PM.

Control Measure Schedule and Implementation:

The PM standard will be effective in 2007. The NOx and NMHC standards for diesel engines will be phased in together between 2007 and 2010. Anticipated reductions are included in the adjusted out-year emissions growth. For the calculation of estimated emission reductions, the HDV fleet age distribution identified in the 2001 baseline inventory was used as the basis to turn the fleet over in the out-years.

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV3

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: *Gateway Cities Truck Modernization Program*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Under the Gateway Cities Truck Modernization Program, commercial truck owners that trade in their diesel trucks with older engines for models with newer, cleaner-burning engines are subsidized for the cost of the purchase. At the inception of the program, owners of 1983 or older trucks were compensated when they purchased a 1994 or newer used diesel truck that is more reliable, cleaner and fuel-efficient. The existing program parameters have been recently modified to compensate owners of 1986 or older trucks when they purchase a 1999 or newer truck. Funding from the Port of Los Angeles for the Gateway Cities program will replace approximately 400 trucks by mid-2006.

The heavy-duty diesel vehicle source category was estimated to emit 4,464 tons of NOx and 88 tons of PM in the 2001 baseline inventory.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The program is currently funded through approximately mid-2006, based on current program subscription rates. Anticipated reductions are included in adjusted out-year emissions growth.

Implementation Issues:

Verification of time spent in Port area and South Coast Air Basin and emission reductions.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV4

Measure Focus: Engine Standards

Measure Category: Adopted

Measure Title: ***Engine Software Upgrade (or Low NOx Software Upgrade)***

Lead Agency: Air Resources Board

Control Measure Narrative:

This measure requires the installation of low NOx software in heavy-duty diesel vehicles with 1993 - 1998 model year engines for which low NOx software was developed under the federal Consent Decrees. Low NOx software is simply software installed in the electronic control module (ECM) of the vehicle engine. Most 1993-1999 model year heavy-duty diesel trucks, school buses, and motor homes with engines manufactured by Caterpillar, Cummins, Detroit Diesel Corporation, Mack/Renault, Volvo and International are eligible for low NOx software. When installed, the low NOx software reduces NOx.

Pollutants Targeted: NOx.

Control Measure Schedule and Implementation:

The following implementation schedule applies to owners of engines manufactured by Caterpillar, Cummins, Mack/Renault, Volvo and International:

- 1993 and 1994 model year Low NOx Rebuild Engines must have a Low NOx Rebuild Kit installed by April 30, 2005.
- 1995 and 1996 model year Low NOx Rebuild Engines must have a Low NOx Rebuild Kit installed by August 31, 2005.
- 1997 and 1998 model year Low NOx Rebuild Engines other than MHDDE must have a Low NOx Rebuild Kit installed by December 31, 2005.
- 1997 and 1998 model year MHDDE Low NOx Rebuild Engines must have a Low NOx Rebuild Kit installed by December 31, 2006.

Owners of engines manufactured by Detroit Diesel Corporation may continue to have low NOx software installed under a voluntary program. Statewide emission benefits of installing low NOx software in vehicles in California are estimated to be 18 tons per day NOx in 2005, 40 tons per day NOx in 2006, and 21 tons per day NOx in 2010 if there is no delay in the implementation of the regulation. Anticipated reductions are included in adjusted out-year emissions growth.

The implementation dates of this control strategy are described in the above along with the participation rates. Anticipated reductions are included in the adjusted out-year emissions growth.

Implementation Issues:

Potential implementation issues associated with the measure include: legal authority, unresolved technical issues/challenges associated with control measure, measure funding, etc.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV5

Measure Focus: Fuel Requirements

Measure Category: Adopted

Measure Title: ***Ultra Low Sulfur Diesel Fuel (15 ppm)***

Lead Agency: Air Resources Board

Control Measure Narrative:

Requires diesel fuel produced or offered for sale in California for use in any on-road or nonroad vehicular or stationary diesel engines contain no more than 15 ppm sulfur by weight, beginning June 2006. (On 18 November 2004, the ARB approved an extension of the requirement to harbor-craft marine and intrastate locomotive diesel engines, beginning January 2006 in the SCAQMD and January 2007 statewide.)

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

Full implementation of the fuel requirement will commence in mid-2006 to accommodate new vehicular engine standards in model-years 2007-2010. A large amount of low-sulfur California diesel fuel is already available. The amount is enough to support after-treatment retrofit programs implemented before 2006, though will typically only be available for fleet fueling operations. Anticipated reductions are included in the adjusted out-year emissions growth.

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV6

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Adopted

Measure Title: *Heavy-Duty Vehicle Inspection*

Lead Agency: Air Resources Board

Control Measure Narrative:

Heavy-duty diesel trucks and buses are tested for excessive smoke emissions with a hand-held electronic smoke meter to meet smoke opacity < 55% for pre-1991 model year engines and < 40% for 1991 or newer model year engines. Any heavy-duty vehicle traveling in California, including vehicles registered in other states and foreign countries may be tested. Trucks and buses with excessive smoke are subject to fines starting at $300. Under the Periodic Smoke Inspection Program (HDV7), trucking fleet operators are required to self-inspect their trucks and repair those with excessive smoke.

Pollutant Targeted: PM.

Control Measure Schedule and Implementation:

Since June 1988, the ARB has implemented the Heavy Duty Vehicle Inspection Program where teams of ARB staff inspect trucks and buses for excessive smoke. The inspections take place at border crossings, CHP scales and other locations that do not hinder traffic flow. Anticipated reductions are included in the adjusted out-year emissions growth.

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV7

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Adopted

Measure Title: ***Periodic Smoke Inspection Program (PSIP)***

Lead Agency: Air Resources Board

Control Measure Narrative:

In July 1998, the ARB implemented its fleet Periodic Smoke Inspection Program (PSIP). Under this program, owners of California-based fleets with two or more vehicles are required to perform annual smoke opacity tests on their heavy-duty diesel-powered vehicles with a GVWR greater than 6,000 lbs. A fleet facility may use either their own technicians or contract with an outside facility to perform the smoke opacity tests. All smoke opacity tests must comply with the SAE J1667 test procedures.

Pollutants Targeted: PM and Opacity.

Control Measure Schedule and Implementation:

Effective October 1999, owners of the California-based fleets must meet certain compliance requirements. Anticipated reductions are included in adjusted out-year emissions growth

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV8

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Adopted

Measure Title: ***Augment Truck and Bus Highway Inspections with Community-Based Inspections***

Lead Agency: Air Resources Board

Control Measure Narrative:

This measure complements the heavy-duty vehicle inspection program by participating in a new program focused on environmental inspections in existing mixed-use communities (residential/commercial/industrial areas). Under this program and in concert with fuel and hazardous waste inspections, heavy-duty vehicles are inspected to detect malmaintenance and tampering, and measure smoke emissions.

Pollutants Targeted: PM and Opacity.

Control Measure Schedule and Implementation:

This measure was adopted and implemented in 2003. Anticipated reductions are included in the adjusted out-year emissions.

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV9

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Adopted

Measure Title: *Reduced Truck Idling*

Lead Agency: Air Resources Board

Control Measure Narrative:

This measure limits nonessential (or unnecessary) vehicle idling to specific time limits. It is applicable to all diesel-fueled commercial motor vehicles with a GVWR of greater than 10,000 pounds. This mobile source category encompasses vehicles operating in California, including those entering from other states or countries.

Pollutants Targeted: NOx, HC and PM.

Control Measure Schedule and Implementation:

Effective February 1, 2005, the driver of any vehicle subject to this section shall not idle the vehicle's primary diesel engine for greater than five minutes at any location and shall not operate a diesel-fueled auxiliary power system (APS) to power a heater, air conditioner, or any ancillary equipment on that vehicle during sleeping or resting in a sleeper berth for greater than five minutes at any location when within 100 feet of a restricted area. Anticipated reductions are included in the adjusted out-year emissions growth.

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV10

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: *Expanded Truck Modernization Program*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Under the Gateway Cities Truck Modernization Program, commercial truck owners that trade in their diesel trucks with older engines for models with newer, cleaner-burning engines are subsidized for the cost of that purchase. The existing Gateway Cities program compensates owners of 1986 or older trucks when they purchase a 1999 or newer used diesel truck that is more reliable, cleaner, and fuel efficient. Emission benefits are realized by the replacement of pre-1987 trucks with 1998 or newer trucks having lower tailpipe emissions. This control measure seeks to expand the existing Truck Modernization Program, using Gateway Cities or a similar program, according to the implementation schedule and participation rates shown below. All replacement trucks funded by the program from NNI plan adoption to June 2006 will have a DOC installed as standard equipment (see HDV13). All replacement trucks funded by the program starting in June 2006 will have a DPF installed as standard equipment. In addition, if a lean NOx catalyst is available for the model year trucks being replaced, installation should be considered as standard equipment.

- Existing Trucks Model Years 1986 and Older
  - Replace with 1998 and newer and install DPF
  - 50% by 2006
  - 100% by 2007

- Existing Trucks Model Years 1987 – 1993
  - Replace with 1998 and newer and install DPF
  - 50% by 2008
  - 100% by 2009

- Existing Trucks Model Years 1994 - 2003
  - Replace with 2004 and newer and install DPF
  - 50% by 2009
  - 100% by 2012

- Existing Trucks Model Years 2004 - 2006
  - Replace with 2007 and newer
  - 50% by 2020
  - 100% by 2025

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

The implementation dates of this control measure are described in the above narrative along with the participation rates.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced from the modernization of trucks with 1998 and newer model year trucks (in accordance with the above schedule) using after treatment technology for PM are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.5	0.0	0.0%	229.5	6.0%	549.0	16.0%	645.6	22.0%	164.6	11.0%
PM	87.9	0.0	0.0%	12.9	23.0%	21.8	43.0%	22.8	50.0%	3.0	10.0%

In order to show the range of emission reductions using alternative implementation approaches, the following options will also be modeled.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced from the modernization of trucks with 1998 and newer model year trucks (in accordance with the above schedule) using after treatment technology for PM and a lean NOx catalyst will be modeled.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced from the modernization of trucks with 2004 and newer model year trucks using after treatment technology for PM will be modeled.

The anticipated emission reductions for NOx and PM in tons per year and percent reduced from the modernization of trucks with 2004 and newer model year trucks using after treatment technology for PM and a lean NOx catalyst will be modeled.

The emission reductions associated with the three alternative implementation approaches were not credited for purposes of NNI attainment.

Implementation Issues:

Implementation of this measure will require an aggressive outreach program to achieve the targeted participation rates.

Stakeholders have stated that many truck owner/operators servicing the Port do not make sufficient income to provide their equity share of a replacement truck under the Gateway Cities program. In order to achieve the targeted participation rates, it may also be necessary for the Port of Los Angeles to consider a low-income subsidy program to cover the truck owner/operator's share of the replacement truck, in conjunction with the standard program subsidy.

The owner/operator of any replacement truck fitted with a DPF must commit to periodic maintenance of the DPF in order to ensure proper operation and prevent damage to the engine from backpressure.

All replacement trucks funded by the Truck Modernization Program starting from NNI plan adoption will have an automated vehicle tracking system installed with download capability to ensure time in Port area and South Coast Air Basin is monitored and adhered to. A call-back program will need to be implemented by Gateway Cities for all trucks replaced prior to NNI plan adoption and funded by the Port of Los Angeles, to also ensure that automated vehicle tracking systems are installed.

To support the emission reduction goal of the Truck Modernization Program, the Port of Los Angeles should consider implementation of a truck certification sticker program, whereby only trucks model year 1998 and newer are eligible to service Port terminals.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV11

Measure Focus: Engine Standards

Measure Category: Additional

Measure Title: ***California Heavy-Duty Diesel Vehicle Standards and Fleet Modernization for Mexican Trucks***

Lead Agency: Air Resources Board

Control Measure Narrative:

Mexican heavy-duty diesel trucks will soon be permitted to travel beyond the restricted mileage range of the Mexican/U.S. border under the new North American Free Trade Agreement (NAFTA) policy. It is anticipated that a portion of the heavy-duty diesel trucks serving the Port of Los Angeles will be made up of these Mexican vehicles. To avoid the resulting impact of the increased emissions from Mexican trucks, this control strategy requires that all Mexican trucks servicing the Port (if any) comply with the California On-Road Heavy-Duty Diesel Emission Standards applicable to the engine's model year at the time the engine was manufactured.

AB1009 was chaptered into law in September 2004. This bill effectively fulfills the requirements of these proposed control measures. The bill states that by 2006 the ARB, in cooperation with the California Highway Patrol, to develop protocols to ensure that vehicles entering the state (particularly Mexican vehicles) must provide evidence that their truck's engine met the Federal standards for the applicable model year at the time it was manufactured.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy shall be implemented by the beginning of 2006. Emissions reductions are not quantified at this time and no credit has been taken for purposes of NNI attainment.

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.5	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	87.9	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Enforcement could be a problem, since verification of an engine's certification is difficult, requiring engine manufacture research and possible engine disassembly. In addition, this control measure needs to be implemented in such as way as to avoid conflicts with existing international treaties.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV12

Measure Focus: Fuel Requirements

Measure Category: Additional

Measure Title: *Early ULSD Implementation*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Accelerate availability of ULSD for on-road trucks servicing the Port in order to facilitate early installation of DPFs.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

The plan will be implemented through June 2006. The anticipated emission reductions for PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.5	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	87.9	0.1	0.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Ensuring that truck operator with DPF installed prior to September 2006 only fuels with ULSD.

Infrastructure for dispensing and sale of fuel does not currently exist under Port authority. Arrangements would need to be made with existing facilities.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV13

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: ***Retrofit Heavy-Duty Diesel Vehicles with Diesel Oxidation Catalysts (DOC)***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Through this measure, diesel PM from on-road trucks is reduced by approximately 20% through the installation of DOCs. DOCs would be installed on all Gateway Cities funded on-road trucks (model year 1993 and older) from plan adoption to June 2006 and on all trucks funded prior to plan adoption.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

The program is estimated to run through June 2006 (at which time DPFs would be installed) and would be administered by Gateway Cities as part of the truck modernization program.

The anticipated emission reductions for PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.5	0.00	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	87.9	1.40	2.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%

Implementation Issues:

Implementation of this measure will require an aggressive outreach and callback program, appointment scheduling and possible compensation for downtime.

Implementation of this measure will also require verification of emission reductions.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV14

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: ***Retrofit Heavy-Duty Diesel Vehicles with Diesel Particulate Filters (DPF)***

Lead Agency: Port of Los Angeles

Control Measure Narrative:

DPF technology is widely available for heavy-duty diesel trucks starting with model year 1994 and newer. The use of DPFs is an effective method of reducing PM by at least 85%. This control strategy requires the installation of DPFs on model years 1994 to 2006 heavy-duty diesel trucks serving the Port of Los Angeles. This measure focuses on (1) the portion of the truck fleet that will not participate in the Expanded Truck Modernization Program (HDV10) until 2009, and (2) those trucks replaced under the Expanded Truck Modernization Program prior to June 2006. As of June 2006, DPFs will be installed as standard equipment.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

The implementation years and participation rates for this control strategy are:

Model years 1994 – 2003 (starting with the oldest model year):

Year	2006	2007	2008
Participation Rate	30%	60%	90%

Model years 2004 – 2006 (starting with the oldest model year):

Year	2007	2008	2009
Participation Rate	30%	60%	90%

The anticipated emission reductions for PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	(tpy)	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red	(tpy)	% Red
NOx	4,463.5	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	87.9	0.0	0.0%	20.2	36.0%	6.1	12.0%	5.9	13.0%	0.0	0.0%

Implementation Issues:

Implementation of this measure will require an aggressive outreach program, appointment scheduling, possible compensation for downtime, and commitment of truck owner to periodic maintenance.

ARB is currently developing a statewide regulation for PM In-Use Emission Controls (HDV15). If HDV14 achieves less than HDV15, it will be superseded. If HDV15 is not fully implemented or does not achieve at least the emission reductions shown for HDV14, this measure remains in place.

If a lean NOx catalyst is available for the model year trucks identified above for DPF retrofit, installation should be considered as an augmentation to this measure.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV15

Measure Focus: Retrofit/Repower

Measure Category: Additional

Measure Title: *PM In-Use Emission Control*

Lead Agency: Air Resources Board

Control Measure Narrative:

This measure will require public and private on-road truck operators to aggressively reduce emissions from their truck/bus fleets. Like other ARB regulations, the truck/bus fleet rules will not prescribe the emission control strategies that fleet operators must use. The strategies that operators select, however must have ARB-verified emission reductions or involve the use of ARB-certified engines and must meet the emission reduction targets specified by the truck/bus fleet rules.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

Implementation begins in 2007 or 2008. The anticipated emission reductions for PM in tons per year and percent reduced are presented below:

	2001	2005 Reduction		2008 Reduction		2010 Reduction		2012 Reduction		2025 Reduction	
Pollutant	**(tpy)**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**	**(tpy)**	**% Red**
NOx	4,463.5	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
PM	87.9	0.0	0.0%	6.7	12.0%	12.7	25.0%	10.0	22.0%	1.5	5.0%

Implementation Issues:

None.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV16

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Proposed

Measure Title: ***On-Board Diagnostics (OBD) for Heavy-Duty Trucks***

Lead Agency: Air Resources Board

Control Measure Narrative:

Heavy-duty engines used in trucks would be required to be equipped with on-board diagnostic (OBD) systems that monitor the emission controls on the engine and detect a fault when one or more of the emission-related components is malfunctioning. Upon detecting a fault, the system illuminates a warning lamp on the dash and stores fault information that can be used by repair technicians to identify the cause of the fault. Emission-inspection programs such as ARB's heavy-duty vehicle inspection program or fleet self-inspection rules can also use the information to identify trucks in need of emission repair.

Pollutants Targeted: NOx, PM, HC and CO.

Control Measure Schedule and Implementation

Regulatory workshop and Board Hearing scheduled for 2005 with implementation required on all 2010 and subsequent model year engines. OBD helps ensure that emission benefits projected from 2010 emission standards are achieved as well as helps identify in-use malfunctioning vehicles in need of repair.

No estimates are available on emission reductions and no credit has been taken for purposes of NNI attainment.

Implementation Issues:

OBD is generally a technology-forcing measure that requires engine manufacturers to stringently monitor the emission controls. Given that many of the emission controls will be newly introduced starting in the 2010 model year such as NOx adsorbers, DPFs and SCR systems, manufacturers will have limited previous experience with those controls and the added burden of developing diagnostics for this control measure may be challenging. Engine manufacturers are expected to strongly oppose OBD requirements.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV17

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: ***Transportation Refrigeration Units (TRU)***

Lead Agency: Air Resources Board

Control Measure Narrative:

Under ARB's Airborne Toxic Control Measure (ATCM) for TRUs, TRUs operating within the state are required to meet in-use performance standards that vary by horsepower range. These standards can be met by using an engine that meets a required engine certified emission level, equipping the TRU with a verified diesel emission control system (VDECS), or using an alternative technology (e.g., electrification). This control strategy accelerates the implementation dates of ARB's ATCM for TRUs serving the Port of Los Angeles.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

Level 2 VDECS should be applicable to TRU generation sets starting in 2007. Level 3 VDECS should be applicable to TRU generation sets in 2009.

No estimates are available on emission reductions and no credit has been taken for purposes of NNI attainment.

Implementation Issues:

This control strategy will be further evaluated to determine if the current practice of not operating TRUs within short distances from the Port of Los Angeles (due to the refrigerated trailers having sufficient residual cooling capacity) causes the requirement to be unnecessary. In addition, if the program is accelerated as planned, there is a chance that feasible control technologies will not be available yet.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV18

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: *Electrified Truck Spaces*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Electrification of truck spaces is the action of using off-truck electric power to operate on-truck or trailer Transportation Refrigeration Units (TRUs), in-cab appliances, or directly supplied heating and air conditioning while heavy-duty diesel trucks are parked in truck spaces. Truck space electrification allows the truck operator to run the on-truck or trailer systems without operating the truck's main drive or auxiliary engine. This control strategy requires heavy-duty diesel trucks serving the Port of Los Angeles to use off-truck electrical systems while parked at truck spaces in lieu of idling their main drive or auxiliary engines.

Pollutants Targeted: NOx and PM.

Control Measure Schedule and Implementation:

This control strategy is anticipated to be a future additional measure that has no specific implementation schedule or participation rate at this time. No credit has been taken for purposes of NNI attainment.

Implementation Issues:

This measure needs to be further evaluated to determine applicability to truck transport of Port-related cargo and potential impacts of emission benefits.

The Port of Los Angeles should commit to fund a demonstration project to determine the feasibility and emission reduction benefit of electrified truck spaces.

Targeted Source Category: Heavy-Duty Diesel Vehicles

Measure Number: HDV19

Measure Focus: Operational Efficiencies or Improvements

Measure Category: Additional

Measure Title: *Idling Reduction Measures*

Lead Agency: Port of Los Angeles

Control Measure Narrative:

Unspecified control measures would reduce emissions from heavy-duty vehicles by reducing idling times. Development of a standard for terminal turn-time may be appropriate. This measure may be superseded by Measure O1.

Pollutants Targeted: PM.

Control Measure Schedule and Implementation:

No estimates are available on emission reductions and no credit has been taken for purposes of NNI attainment.

Implementation Issues:

To be determined.

Stakeholder Comments on Control Measures:

PMSA

A. Ocean Going Vessel Proposals

1. OGV1 - New Engine Standards (IMO) – PMSA supports this measure.

2. OGV2 - Vessel Speed Reduction VSR MOU - PMSA is a signatory to the VSR MOU and is in strong support of the program. We have been working with the Ports of Los Angeles, Long Beach and our members in an effort to improve the compliance level. Under the present system, a vessel is either in compliance if steaming at 12 knots or below and not in compliance if traveling at a faster speed. Since any reduction from full speed will provide emission reduction benefits we would suggest adjusting the compliance monitoring to reflect the actual emission benefits.

3. OGV3 - Alternative Maritime Power (AMP) – Our members believe that AMP is a proven technology in certain circumstances and suitable as an emission reduction strategy for certain qualifying vessels. Data indicates that it is not the most cost efficient method to achieve gross reduction benefits from the industry. There are also concerns within the industry in regards to the safety of this technology.

4. OGV4 – Auxiliary Engine Fuel Improvement Program – PMSA welcomes incentive programs that can facilitate the purchase and consumption of lower sulfur fuel prior to implementation of CARB's proposed auxiliary engine regulations or a SECA. There are concerns over the availability of such fuel. The ports must work closely with ship owners to schedule any necessary fuel tank modification to coincide with dry dock schedules. We question how an incentive program can be written to include penalties of fees for non participating vessels.

5. OGV5 – New EPA Engine Standards Cat 3 – We support the EPA, in cooperation with the International Maritime Organization (IMO) developing cleaner marine engine standards in the future and will work closely with the EPA in development of such proposals. The Port has committed to backstop these emissions reductions if the EPA engine standards are not promulgated and has failed to identify where these emissions reductions will come from. Once the source of emission reductions are identified, it will need to be considered in accordance with the requirements of CEQA and any other legal restraints.

6. OGV6 - Reroute Cleaner Ships – Market forces have effectively brought larger, newer and cleaner vessels into the Trans-Pacific trade calling at the Port of Los Angeles. This will likely continue as smaller, older vessels are moved into different trade lanes. There will nonetheless be a population of smaller, older vessels calling at the port for the foreseeable future. Many of these vessels call infrequently or service specialized trades. In addition, carriers often need to charter vessels from the world market for short to extended periods of time in order to cover additional cargo demands or unscheduled fleet repairs. It is possible that the available vessels would not satisfy the requirements of this proposal. Because of these complexities and variability with companies, trade routes and cargo mix, any requirement to route newer, cleaner vessels would need to be analyzed on a case-by-case basis, as this poses the potential for interfering with international trade. The Port has committed to backstop these emissions reductions if the proposed level of participation is not achieved and has failed to identify where these emissions reductions will come from. Once the source of emission reductions are identified, they need to be considered in accordance with the requirements of CEQA and any other legal restraints. PMSA has identified certain legal concerns that will be articulated in conjunction with the Legal Working Group (LWG) analysis.

7. OGV7- Low Emission Main Engines - We support the EPA, in cooperation with the International Maritime Organization (IMO) developing cleaner marine engine standards in the future and will work closely with the EPA in development of such proposals. However, the most recent modifications (received today, June 14, 2005) to this measure are of concern. The information cited from MAN B&W came as an answer to a question at a conference. There is no citation or discussion of the specifics of this concept or validation that the cost impact would be modest. While we believe that engine technology is advancing for oceangoing vessels this type of unsubstantiated comment cannot be used as the basis for a control measure. Further, it is not reasonable to assume that this measure only applies to NOx, there must also be a particulate benefit. More work on this is required before it can be included, especially at this late a date. Finally, these types of last minute changes have a ripple effect through the rest of the document. The emissions benefits and cost-effectiveness will have to be changed and it also opens additional issues for the legal implementation that have not been addressed. PMSA has identified certain legal concerns that will be articulated in conjunction with the LWG analysis.

8. OGV8 - Cleaner Fuels for Auxilary Engines (ARB) – Our industry recognizes the potential benefits of reducing NOx and PM emissions from auxiliary engines through the use of cleaner fuels. Our industry is working closely with CARB on this proposal and is currently participating in a survey and data gathering as part of that process. There have been questions raised regarding state versus federal jurisdiction over these sources and PMSA encourages a thorough analysis to clarify this issue and avoid potential legal challenges.

9. OGV9 – Main Engine Fuel Improvement Program – PMSA welcomes incentive programs that can facilitate the purchase and consumption of lower sulfur fuel prior to implementation of a SECA. There are concerns over the availability of such fuel. The ports must work closely with ship owners to schedule any necessary fuel tank modification to coincide with dry dock schedules. PMSA objects to the concept penalties and fees being assessed on a voluntary incentive program. This program would be mandatory and implemented on a terminal by terminal lease approach if the SECA is not developed by 2010. PMSA has identified certain legal concerns that will be articulated in conjunction with the LWG analysis.

10. OGV10 - Creation of a SECA – The PMSA supports the EPA's current efforts to collect data and petition the IMO for creation of a North American SECA. This will result in cleaner fuel being used in ALL U.S. ports and Canada and Mexico. By creating a North American SECA, California's ports will not be placed in an uncompetitive position versus ports in other states or countries. Limiting a SECA to the West Coast could succeed in diverting cargo to other ports that would have to be railed or trucked back into the South Coast – resulting in higher emissions.

11. OGV11- Expanded Auxiliary Fuel Improvement Program – We support this program and are working closely with CARB on the implementation of OGV8. We also support incentive programs that encourage the use of cleaner fuels. This program would be mandated by the Port if CARB does not go forward with their rule. PMSA objects to a voluntary program that applies fees and penalties for non compliance. In addition, PMSA has identified certain legal concerns that will be articulated in conjunction with the Legal Working Group (LWG) analysis.

12. OGV12 – Expanded Main Engine Fuel Improvement Program - PMSA welcomes incentive programs that can facilitate the purchase and consumption of lower sulfur fuel and building off the experience from previous (OGV9) efforts is a logical approach. This program would become mandatory if participation rates are not according to schedule. While the Port has committed to backstop these emissions reductions if the proposed level of participation is not achieved, the Port has failed to identify where these emissions reductions will come from and once they do they need to

consider them in accordance with the requirements of CEQA and any other legal restraints. In addition, PMSA has identified certain legal concerns that will be articulated in conjunction with the Legal Working Group (LWG) analysis.

13. OGV13 - Additional Auxiliary Engine Reductions for Frequent Visitors – As with OGV8, our industry is working with CARB to explore other options for reducing emissions from auxiliary engines and we are dedicated to implementing those measures that can feasibly provide additional emission reduction benefits. There are questions raised over state versus federal jurisdiction that need to be clarified. In addition, the concept of frequent fliers has been removed from the proposed CARB regulation and this measure should be modified accordingly.

14. OGV14 - Retrofit/Repower Requirements for Infrequent Callers – At this time it is difficult to determine what technical options will be available on short notice that could be used for infrequent callers. The inherent problem in dealing with infrequent callers is the dynamic nature of their schedules and the difficulty this creates in adhering to requirements not found anywhere else in the world. Should such a measure be a requirement to enter the port, it would essentially make the Port of Los Angeles uncompetitive for many cargoes in the spot market and vessels coming into the port to bunker only. That being said, PMSA supports the Port of Los Angeles working with these vessel owners to adopt whatever measures prove feasible without interfering with international trade. The Port has committed to advance this measure if benefits are not achieved from 50% participation by 2010 and 100% by 2015. We question the ability of this commitment when this technology is not commercially available today. Once the Port does identify how this will be accomplished they need to consider it in accordance with the requirements of CEQA and any other legal restraints. In addition, PMSA has identified certain legal concerns that will be articulated in conjunction with the LWG analysis.

15. OGV15 - Expanded VSR Program - While supportive of the concept, we feel this proposal needs additional study to investigate the ramifications in terms of navigational safety, logistics and cost. There should be an evaluation of the actual benefits of this measure since predominate wind patterns may result in very little if any benefit resulting to the Port area of the South Coast Air Basin prior to implementation.. This measure includes a mandatory provision through lease agreements or a port wide rule and PMSA as also identified certain legal concerns that will be articulated in conjunction with the LWG analysis.

16. OGV16 - Expanded AMP – As per our comments to OGV2, this technology is promising for vessels calling frequently, for relatively long durations and requiring large electrical loads. Data indicates that it is not the most cost efficient method to achieve gross reduction benefits from the industry. There are also concerns within the industry in regards to the safety of this technology. This technology may become used in other ports throughout the world, and if so will expand the population of vessels outfitted for electrification. This measure would require all terminals with leases to use AMP on 70% of the ship calls within two years of entering a new lease or renewing an existing lease. PMSA has identified certain legal concerns that will be articulated in conjunction with the Legal Working Group LWG analysis. In addition, the Port has committed to backstop this measure if benefits are not achieved but has failed to identify how they will do so. Once the Port does identify the backstop they need to consider it in accordance with the requirements of CEQA and any other legal restraints.

17. OGV17- Additional In Use Measures – We will work with CARB and EPA on developing additional measures to achieve emission reductions.

B. Cargo Handling Equipment (CHE) Proposals

1. CHE1 – Emission Standards for Heavy Duty Nonroad Diesel Engines – PMSA supports this measure. The benefits of this measure should be quantified in Tables 3-10 and 3-11.

2. CHE2 - Yard Tractor Modernization and ULSD Programs – PMSA supports this measure. The recently submitted changes are an improvement to the previous measure. The June 14, 2005 version is much more understandable and capable of being implemented. Although it is not clear why these changes did not impact the emissions benefits of the measure. The effect of the changes on the emissions benefit and cost-effectiveness should be evaluated. We would also recommend that these changes should replace the approach taken for CHE4 especially since the 2007 on-road engine standards are harmonized for all engines regardless of fuel type.

3. CHE3 - Early Implementation of ULSD for CHE (other than yard tractors) – PMSA supports this measure.
4. CHE4 – Alternative Fuel Yard Tractor Resolution. – In light of the changes proposed for CHE2 we believe that this measure should be removed since it will accomplish little if any additional air quality benefits.

5. CHE5 - Emulsified Fuels – PMSA supports this measure.

6. CHE6 - TAC Measures – We support the incentive program to assist in implementing some of the control measures.

7. CHE7 - Expanded Yard Tractor Modernization – We also support the long term incentive based approach here but believe that the cost effectiveness of replacing Tier 3 equipment with Tier 4 equipment should be evaluated to demonstrate the benefits of prematurely retiring equipment. This measure also needs to be modified to reflect the proposed changes in CHE2 for Phase 2 since there is now some overlap in the implementation schedule for 1996 to 2002 model year yard tractors. In addition, a clear demonstration of this measure not duplicating the benefits of the proposed CARB regulation for Cargo Handling Equipment is necessary.

8. CHE8 - Enhanced CHE Modernization – The intent of this measure is to mirror the proposed CARB Cargo Handling Equipment Regulation but it has not been updated to reflect the changes made by CARB in May 2005. Again, it must be demonstrated that this measure is not duplicating the benefits of the proposed CARB regulation but we do support the Port's efforts to provide incentives to transition to cleaner equipment. PMSA has identified certain legal concerns that will be articulated in conjunction with the LWG analysis.

9. CHE9 – Cargo Handling Equipment At Ports and Intermodal Rail Yards. PMSA is working with CARB on the development of this regulation and are supportive of the intent. The measure does not include the changes made by CARB in their May 2005 proposed regulatory concept document. Accordingly, this measure should be modified to be consistent with the modified proposed regulation.

C. Rail Industry

Measure R7 – Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1

This measure, which was presented for the first time at the general Task Force meeting in March 2005, would substitute "ultra low" switch engines and line haul locomotives for the Tier 2 locomotives that BNSF/UP have committed to purchase and place in service throughout the Basin by 2010 under their 1998 MOU agreement with ARB. The new Tier 2 locomotives just came on the market early this year and represent the cleanest engines available for this service. The "ultra low" switch engines mandated by this control measure would be required to meet 1) EPA's standards for truck engines and the line haul locomotives, which handle rail traffic to and from the Basin to destinations throughout the country, and 2) the estimated "high end" Tier 3 locomotive engine standards and Tier 4 nonroad engine standards.

The TWG has failed to explain why it believes the Tier 2 standards adopted by EPA are insufficient or why railroads, which account for only 2.7 percent of the $PM_{2.5}$ mobile source emissions in the entire Basin, should be expected to expend billions of dollars to purchase alternative technology that is unproven for this application and is not commercially available.

It addition, Rail has not been properly credited with the benefits of their affirmative program with ARB, which will produce a 67 percent reduction in NOx emissions from locomotives throughout the Basin and will reduce PM emissions by approximately 47 percent. Because the NOx reductions are attributable to an "adopted" measure, i.e., the MOU, the TWG determined they cannot be counted as a direct result of NNI so instead applied them to reduce the overall growth rate for all source categories. The railroads did not receive any credit for PM reductions that will be realized as a result of the early introduction of cleaner units into the Basin under the terms of the MOU. In addition, the TWG has not been willing to release its calculator tool which was developed through the NNI process to study the cumulative effects of the layering of control measures. However, it is apparent that in light of the substantial reductions that will be achieved as a result of the MOU, the net reductions that were attributed to this measure by the TWG are significantly overstated.

For costing purposes, the TWG has identified LNG locomotives as the only potentially available "ultra-low" technology for line haul operations associated with the Port. While one railroad is using LNG in limited switch operations, currently, there are no LNG-fueled line haul units that are technologically proven. LNG has not been shown to satisfy fundamental requirements related to performance, nor has any builder indicated a willingness to make such a unit. The engine must be able to deliver sufficient horsepower to ensure safe train handling and meet speed and traction requirements, as well as provide good fuel economy and reliability. It also needs to fit effectively into a fleet operation. Finally, engines must provide these "services" at an attractive level of emissions performance that meets regulatory requirements. The benchmark for these parameters is the modern diesel locomotive. Innovation has resulted in many improvements in the performance of the diesel engine which are incorporated into EPA's Tier 2 engine standards.

The requirements for separate fleets of locomotives dedicated to handling Port-related traffic are extremely onerous. The railroads cannot easily or efficiently deploy a mini-fleet of locomotives that only serve the Port or Port-related traffic. Any locomotive technology must have a wider geographic applicability, including LNG technology.

Additionally, LNG feedstock fuel costs are higher than diesel and the fueling infrastructure required to support operating LNG locomotives in the Basin will be costly to build and maintain (e.g., permitting, land acquisition, construction, training, safety/security, etc.). Until LNG fueling facilities were available, LNG would have to be trucked into the Basin from Arizona which would increase truck emissions.

Measure R9 – ARB Diesel Fuel for Class 1 Railroad Locomotives

The proposed control measure would extend to line haul locomotives and require that trains carrying Port related freight in and out of the Basin would have to switch to CARB diesel upon entering the Basin, by draining of fuel tanks or the installation of separate tanks, baffling of tanks, or adding a dedicated fuel tender car containing CARB diesel. However, with regard to line haul locomotives, neither BNSF nor UP operates a dedicated fleet to serve the Port. Interstate line haul locomotives are dispatched as ready to the ports. These line haul locomotives can come from anywhere in the nation at any time, and starting in 2006, the fuel that is contained in their fuel tanks will be a blend of U.S. EPA on-highway (15 ppm sulfur) and U.S. EPA non-road (500 ppm sulfur) diesel.

It would not be feasible for the railroads to use only CARB diesel in line haul locomotives that service the ports. Furthermore, since U.S. EPA fuel is getting cleaner over time, and since the railroads already purchase a considerable amount of CARB diesel for their line haul fleet, the emissions benefit from this measure would be quite small while the implementation costs would be extremely high. The implementation of ARB's intrastate locomotive fuels rule, adopted in October 2004, will mean that essentially all of the switcher and local trains operating at or from the Port will be required to refuel with CARB diesel. Therefore, this measure will provide no benefits from switch or local service. Because the TWG failed to even consider the cumulative effects or sequencing of measures, it is impossible to calculate the reductions associated with this measure for a proper cost-benefit analysis.

Measure R10 — Idling Controls for Switcher and Line Haul Locomotives

Measure R10 requires installation of "tamper proof" idling control devices on all switcher and line haul locomotives serving the Port by the end of 2006. It is unclear what technology would be required.

BNSF/UP have extensive experience with control technologies that limit locomotive idling and are in the process of applying this technology throughout their fleets. All new locomotives are manufacturer-equipped with this technology. To comply with the fleet average agreement, the vast majority of locomotive units in the Ports will be new in 2010, so these benefits will occur. Specific details regarding implementation schedule for other units will need to be worked out with the appropriate agency(s). BNSF/UP foresee that virtually all locomotives in the Basin will eventually be equipped with idle limiting devices. However, in order to equip ALL locomotives serving the Port with anti-idling devices by 2006 would require a dedicated fleet. As previously noted, this is extremely costly and inefficient.

It should also be noted that a certain amount of idling is necessary for the safe operation of a train. For example, the locomotive engine provides the air pressure necessary to maintain the brakes on the trailing train cars. Idling is necessary to keep the brake air pressure up and it can take up to 30 minutes to make up the air on a train.

Measure R11 — Efficiency Improvement on In-Use Class 1 Rail Equipment

This measure was only recently added and would require modifications to locomotives and rolling stock to achieve efficiency improvements. It does not state whether it would apply to equipment used to handle Port-related traffic or apply Basin-wide. However, because railroads must be able to freely interchange rail cars with other railroads, this measure could conceivably extend to the entire national rail fleet. The difficulties of monitoring and reporting of improvements appear potentially insurmountable.

Measure R12 — Electrification of Rail Lines Serving the Port

The NNI draft report lists electrification of the Alameda Corridor and the planned Alameda Corridor East as a potential control measure for locomotive operations associated with the Port. Such a measure would cost society billions of dollars for minor environmental benefits. Also, despite the technology's availability, it clearly is infeasible.

The cost of electrifying the Alameda and East Corridors would be several billions of dollars, require enormous environmental review, and take several years to complete. The railroads would have to purchase several hundred new locomotives. New or major changes would be needed at locomotive/crew change points. Significant decisions would have to be made on how to integrate electrified locomotives into the fleet of low emitting diesel units. Costs of any reductions would be in the millions of dollars per ton range.

Substantial emissions would continue even with electrification because electrification would not be an option for those tracks that have low train density or that serve industrial customers. Accordingly, the about 15-20 percent of the total current and future rail inventory which comes from switch and local operations would remain uncaptured. Also, a key aspect of electrification is ensuring that rail shipments continue to improve in terms of efficiency. To the extent that electrification creates more bottlenecks and results in the diversion of traffic to trucks, the emissions associated with goods movement would go up rather than down.

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TECHNICAL ATTACHMENT

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No Net Increase/Air Quality Task Force

ARB Modeled Emissions (before application of NNI measures)

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1. Ocean-Going Vessels

	2001		2005		2008		2010		2012		2025	
NOx	Main	Aux	Main	Aux	Main	Aux	Main	Aux	Main	Aux	Main	Aux
Auto Carrier	124.6	30.5	252.4	63.1	296.3	74.6	329.8	83.0	349.1	88.0	495.5	131.2
Bulk	170.6	98.8	342.1	208.8	399.9	246.8	444.3	274.6	467.0	291.0	686.8	434.0
Containership	2,967.6	1,290.3	5,878.2	2,647.6	6,825.6	3,130.2	7,582.9	3,482.3	7,997.6	3,691.0	11,806.1	5,503.9
Cruise	838.5	603.8	1,681.4	1,227.6	1,974.8	1,451.3	2,185.4	1,614.6	2,248.5	1,711.4	3,328.7	2,551.9
General Cargo	59.8	27.3	119.9	56.8	140.1	67.1	155.7	74.7	163.7	79.1	240.7	118.0
Misc.	5.3	9.6	10.7	20.0	12.5	23.6	13.9	26.3	14.6	27.9	21.5	41.6
Other Tug	10.6	1.1	21.3	2.3	24.9	2.8	27.7	3.1	29.1	3.3	42.8	4.9
Reefer	44.8	6.5	89.8	15.0	105.0	17.7	116.6	19.7	122.6	20.9	180.3	31.1
RORO	9.8	24.8	19.6	50.8	23.0	60.0	25.5	66.8	26.8	70.8	39.5	105.5
Tanker	231.9	341.7	464.2	699.8	547.5	827.3	608.6	920.4	643.8	975.5	937.4	1,454.7
Totals	4,463.6	2,434.4	8,879.6	4,991.7	10,349.7	5,901.5	11,490.4	6,565.4	12,062.9	6,958.8	17,779.3	10,376.8

	2001		2005		2008		2010		2012		2025	
PM	Main	Aux	Main	Aux	Main	Aux	Main	Aux	Main	Aux	Main	Aux
Auto Carrier	13.2	1.1	26.8	3.2	31.4	3.8	35.0	4.2	37.0	4.4	52.5	6.6
Bulk	18.0	4.3	36.1	10.4	42.2	12.3	46.9	13.7	49.3	14.5	72.5	21.6
Containership	319.8	44.2	633.5	106.9	735.6	126.4	817.2	140.7	861.8	149.1	1,272.3	222.3
Cruise	85.6	13.9	171.6	39.6	201.6	46.8	223.1	52.1	229.5	55.2	339.8	82.3
General Cargo	6.3	1.3	12.7	3.2	14.9	3.7	16.5	4.1	17.4	4.4	25.6	6.6
Misc.	0.6	0.5	1.1	1.2	1.3	1.4	1.5	1.5	1.6	1.6	2.3	2.4
Other Tug	0.6	0.0	1.2	0.1	1.4	0.1	1.6	0.1	1.7	0.1	2.5	0.1
Reefer	4.6	0.2	9.3	0.8	10.9	0.9	12.1	1.0	12.7	1.1	18.6	1.6
RORO	2.9	1.4	5.8	0.8	6.8	0.9	7.6	1.0	7.9	1.1	11.7	1.6
Tanker	26.0	13.7	52.0	30.0	61.4	35.4	68.2	39.4	72.2	41.8	105.1	62.3
Totals	477.7	80.7	950.2	196.0	1,107.5	231.7	1,229.6	257.8	1,291.1	273.2	1,902.9	407.4

Total OGV Emissions	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	6,898.0	13,951.6	16,591.2	18,434.0	19,422.6	28,753.8
PM	558.4	1,150.0	1,355.4	1,505.4	1,583.4	2,338.7

Main Engines	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	4,463.6	8,879.6	10,349.7	11,490.4	12,062.9	17,779.3
PM	477.7	950.2	1,107.5	1,229.6	1,291.1	1,902.9
Auxiliary Engines	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	2,434.4	5,071.9	6,241.4	6,943.6	7,359.7	10,974.5
PM	80.7	199.8	247.9	275.8	292.3	435.8

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2. Harbor Craft

NOx	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	269.6	291.8	309.7	322.2	335.2	433.5
Tugboat (Unit Tow)	161.0	161.0	161.0	161.0	161.0	161.0
Excursion Vessels	197.2	197.2	197.2	197.2	197.2	197.2
Ferries	146.8	146.8	146.8	146.8	146.8	146.8
Crew boat	35.3	35.3	35.3	35.3	35.3	35.3
Work boat	21.5	21.5	21.5	21.5	21.5	21.5
Government	20.5	20.5	20.5	20.5	20.5	20.5
Commercial Fishing	384.8	384.8	384.8	384.8	384.8	384.8
Recreational Vessel	35.8	35.8	35.8	35.8	35.8	35.8
Dredge/Support	17.3	17.3	17.3	17.3	17.3	17.3
Line Haul Towboat	2,240.7	2,240.7	2,240.7	2,240.7	2,240.7	2,240.7
Totals	3,530.6	3,552.7	3,570.6	3,583.1	3,596.1	3,694.4

PM	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	10.1	10.9	11.6	12.1	12.6	16.3
Tugboat (Unit Tow)	6.2	6.2	6.2	6.2	6.2	6.2
Excursion Vessels	4.9	4.9	4.9	4.9	4.9	4.9
Ferries	5.2	5.2	5.2	5.2	5.2	5.2
Crew boat	1.3	1.3	1.3	1.3	1.3	1.3
Work boat	0.8	0.8	0.8	0.8	0.8	0.8
Government	0.7	0.7	0.7	0.7	0.7	0.7
Commercial Fishing	14.0	14.0	14.0	14.0	14.0	14.0
Recreational Vessel	12.9	12.9	12.9	12.9	12.9	12.9
Dredge/Support	0.5	0.5	0.5	0.5	0.5	0.5
Line Haul Towboat	121.4	121.4	121.4	121.4	121.4	121.4
Totals	177.9	178.8	179.5	180.0	180.5	184.2

Harbor Craft Summary	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	**3,530.6**	**3,552.7**	**3,570.6**	**3,583.1**	**3,596.1**	**3,694.4**
PM	**177.9**	**178.8**	**179.5**	**180.0**	**180.5**	**184.2**

No Net Increase/Air Quality Task Force
ARB Modeled Emissions (before application of NNI measures)

3. Cargo Handling Equipment

CHE Summary	2001	2005	2008	2010	2012	2025
NOx	**1,862.6**	**2,434.6**	**2,482.0**	**2,547.7**	**2,405.4**	**401.5**
PM	**111.6**	**135.1**	**113.2**	**116.8**	**109.5**	**18.3**

4. Rail Locomotives (adjusted for fuel sulfur effects between baseline assumptions and actual fuel use, and for the effect of the Alameda Corridor)

NOx	2001	2005	2008	2010	2012	2025
In-Port Switching	151.3	186.0	231.4	314.7	299.7	537.0
Out-of-Port Switching	106.9	122.3	142.4	80.1	76.3	136.7
In-Port Line Haul	224.2	187.6	195.6	167.9	152.8	286.6
Out-of-Port Line Haul	1,553.7	1,299.5	1,354.9	1,163.4	1,058.8	1,985.5
Totals	2,036.1	1,795.4	1,924.4	1,726.1	1,587.6	2,945.8

PM	2001	2005	2008	2010	2012	2025
In-Port Switching	2.9	3.5	4.4	5.9	6.5	10.1
Out-of-Port Switching	2.2	2.6	3.2	4.3	4.6	4.5
In-Port Line Haul	4.3	5.0	5.6	7.1	7.6	7.7
Out-of-Port Line Haul	32.3	38.1	42.5	54.4	57.7	58.4
Totals	41.6	49.3	55.8	71.8	76.3	80.7

Locomotives Summary	2001	2005	2008	2010	2012	2025
NOx	**2,036.1**	**1,795.4**	**1,924.4**	**1,726.1**	**1,587.6**	**2,945.8**
PM	**41.6**	**49.3**	**55.8**	**71.8**	**76.3**	**80.7**

5. Heavy-Duty Trucks

On-Terminal

NOx	2001	2005	2008	2010	2012	2025
Transit	120.5	116.8	124.1	120.5	109.5	32.9
Idle	167.9	204.4	244.6	270.1	303.0	616.9
Totals	288.4	321.2	368.7	390.6	412.5	649.7

PM	2001	2005	2008	2010	2012	2025
Transit	5.5	3.3	2.9	2.6	2.6	1.8
Idle	5.1	2.2	1.8	1.8	1.8	3.7
Totals	10.6	5.5	4.7	4.4	4.4	5.5

Off-Terminal (on-port)

NOx	2001	2005	2008	2010	2012	2025
AM Period	73.0	87.6	91.3	87.6	80.3	21.9
MD Period	376.0	456.3	474.5	459.9	419.8	120.5
PM Period	98.6	120.5	124.1	120.5	109.5	32.9
NT Period	32.9	40.2	40.2	40.2	36.5	11.0
Totals	580.4	704.5	730.0	708.1	646.1	186.2

PM	2001	2005	2008	2010	2012	2025
AM Period	1.5	1.5	1.1	1.1	1.1	0.7
MD Period	9.1	9.1	7.7	7.7	7.3	5.5
PM Period	2.2	2.2	1.8	1.8	1.8	1.1
NT Period	0.7	0.7	0.7	0.7	0.7	0.4
Totals	13.5	13.5	11.3	11.3	11.0	7.7

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5. Heavy-Duty Trucks (continued)

Regional

NOx	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
AM Period	456.3	405.2	346.8	295.7	237.3	84.0
MD Period	2,252.1	1,996.6	1,708.2	1,463.7	1,175.3	412.5
PM Period	668.0	591.3	507.4	434.4	350.4	124.1
NT Period	215.4	189.8	164.3	138.7	113.2	40.2
Totals	3,591.6	3,182.8	2,726.6	2,332.4	1,876.1	660.7

PM	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
AM Period	7.3	6.2	5.1	4.4	3.7	2.2
MD Period	40.2	34.3	27.4	24.1	21.2	11.7
PM Period	7.3	6.2	5.1	4.4	3.7	2.2
NT Period	3.7	3.3	2.6	2.2	1.8	1.1
Totals	58.4	50.0	40.2	35.0	30.3	17.2

HD Truck Summary	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	**4,463.5**	**4,208.5**	**3,825.2**	**3,431.0**	**2,934.6**	**1,496.5**
PM	**87.9**	**69.0**	**56.2**	**50.7**	**45.6**	**30.3**

6. Total Emissions

Summary	**2001**	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	**18,790.8**	**25,942.6**	**28,393.3**	**29,721.9**	**29,946.3**	**37,292.0**
PM	**977.3**	**1,582.1**	**1,760.0**	**1,924.6**	**1,995.3**	**2,652.1**

No Net Increase/Air Quality Task Force

Emission Changes over Time

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PM	**2005**	2006	2007	2008	2009	**2010**	2011
Projected Emissions (unadjusted)	1,582	1,641	1,701	1,760	1,842	1,925	1,960
Projected Emissions (with NNI)	1,473	1,557	1,622	964	1,046	816	826
NOx							
Projected Emissions	25,943	26,760	27,576	28,393	29,058	29,722	29,834
Projected Emissions (with NNI)	23,512	24,034	24,444	20,189	20,506	16,829	16,912

PM	**2012**	2013	2014	2015	2016	**2017**	2018
Projected Emissions (unadjusted)	1,995	2,046	2,096	2,147	2,197	2,248	2,298
Projected Emissions (with NNI)	815	851	869	887	906	924	942
NOx							
Projected Emissions	29,946	30,511	31,076	31,641	32,206	32,772	33,337
Projected Emissions (with NNI)	15,751	16,932	17,406	17,880	18,353	18,827	19,301

PM	**2019**	2020	2021	2022	2023	**2024**	2025
Projected Emissions (unadjusted)	2,349	2,400	2,450	2,501	2,551	2,602	2,652
Projected Emissions (with NNI)	960	979	997	1,015	1,033	1,052	1,065
NOx							
Projected Emissions	33,902	34,467	35,032	35,597	36,162	36,727	37,292
Projected Emissions (with NNI)	19,775	14,202	13,418	12,634	11,850	11,066	10,177

"Projected Emissions (unadjusted)" are the projected emissions including the effect of existing regulations.
"Projected Emissions (with NNI)" are the projected emissions including the additional effect of NNI measures.
For NNI, these emissions are compared with the following 2001 baseline values:

PM	977	tons per year
NOx	18,791	tons per year

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MARPOL IMO Annex VI Main Engine Standards, included in ARB's projected emissions.

In forecast emissions (green line)

Emission Reductions from Cat 1& 2 Auxiliary engines on US Flagged Fleet

% of NOx & PM Auxiliary Emissions by Vessel Type

	% Aux NOx	% Aux PM
Containership	53.0%	54.8%
Tanker	14.0%	17.0%
Cruise Ship	24.8%	17.2%
Other	8.2%	11.0%

Notes:

From 2001 POLA Port-Wide Baseline Air Emissions Inventory (PWBAEI)

OGV1 -Cat 1 & 2 - Control Factors for Auxiliary Engines

NOx	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.000	0.993	0.984	0.982	0.963
Tanker	1.000	0.997	0.989	0.988	0.980
Cruise Ship	1.000	1.000	0.991	0.989	0.964
Other	1.000	0.997	0.989	0.995	0.973

PM	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.000	0.998	0.996	0.995	0.991
Tanker	1.000	0.998	0.993	0.993	0.988
Cruise Ship	1.000	1.000	1.000	1.000	1.000
Other	1.000	0.997	0.989	0.985	0.953

OGV1 -Cat 1 & 2 - Composite Control Factors for Auxiliary Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV1 Composite NOx	**1.000**	**0.995**	**0.987**	**0.986**	**0.967**
OGV1 Composite PM	**1.000**	**0.998**	**0.995**	**0.995**	**0.988**

Sample Calc:

Composite Control Factor = (CFaux containership x %Containership Aux NOx) + (CFaux tanker x %Tanker Aux NOx) + (CFaux cruise x %Cruise Aux NOx) (CFaux other x %Other Aux NOx)

No Net Increase/Air Quality Task Force

OGV1 - New Engine Standards for Ships

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NEW OGV1 - Engine Standards

Modelling provided by ARB **(Application of Cat2 engine standards to Auxilliary engines)**

Auxilliary ONLY	NOX	PM	NOX	PM	NOX	PM	NOX	PM
	2008	2008	2010	2010	2012	2012	2025	2025
	% Reductio	% Reductio	% Reductio	% Reductio	% Reductio	% Reduction	% Reduction	% Reduction
Container	0.74%	0.18%	1.56%	0.39%	1.83%	0.45%	3.68%	0.91%
Tanker	0.30%	0.19%	1.06%	0.66%	1.18%	0.73%	1.99%	1.23%
Cruise	0.00%	0.00%	0.94%	0.00%	1.06%	0.00%	3.62%	0.00%
Auto	0.00%	0.00%	0.10%	0.04%	0.25%	0.10%	1.98%	0.77%
Other	0.29%	0.33%	0.96%	1.10%	1.23%	1.41%	3.44%	3.92%

* Applied to US-Flagged ships only

Control Factor will be one minus reduction

Assumptions:

- Applied to US flagged only (11%)
- For auxilliary engines only
- RO and Dual are both at medium speed
- Cat2 std. were averaged for <3300 KW
- Dual used diesel fuel
- RO use residual oil

Date: 02-25-05

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Emission Reduction Percentages[1]

	ME	Auxiliaries
NO_x	57.6%	-6.7%
PM_{10}	57.0%	-8.1%

Average Speed w/o VSR	22 knots
Average Speed w/ VSR	12 knots

OGV2 - VSR MOU - Control Factors for Main Engines

	2005	**2008**	**2010**	**2012**	**2025**
Distance of Compliance Zone (nm)	20.0	20.0	20.0	20.0	20.0
Participation Rate[2] (at 12 kts)	48%	48%	48%	48%	48%
OGV2 NOx	**0.862**	**0.862**	**0.862**	**0.862**	**0.862**
OGV2 PM	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

OGV2 - VSR MOU - Adjustment Factor Applied to Auxiliary Engine Emissions

NO_x	1.02	1.02	1.02	1.02	1.02
PM_{10}	1.02	1.02	1.02	1.02	1.02

Notes:

1 - Reductions calculated using 20-mile VSR applicability distance @ 100% participation (12 knots)

2 - Participation Rate: Currently, as modeled, the participation rate only takes into account those vessels that reach the target speed of 12 knots, however the POLA VSR program takes into account the reductions associated w/all vessels that reduce speed over their baseline corrected speed. This difference will be incorporated into the next version of this control measure worksheet.

Sample Calc:

Control Factor, main engines = 1 - (Red'n% x Participation rate x (VSR distance/total transit distance))

Control Factor, auxiliary engines = 1 - (Red'n% x Participation rate x (VSR distance/total transit distance))

No Net Increase/Air Quality Task Force

OGV2 - Vessel Speed Reduction (VSR) Memorandum of Understanding (MOU)

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Reduction percentage calculation:

1. BLEI Speed Emissions Total, tpy[1]

Tons Per Year				
Type	**$NO_{x\ Main}$**	**$NO_{x\ Aux}$**	**PM_{Main}**	**PM_{Aux}**
Auto Carrier	124.6	30.5	13.2	1.1
Bulk	170.6	98.8	18.0	4.3
Containership	2,967.6	1,290.3	319.8	44.2
Cruise	838.5	603.8	85.6	13.9
General Cargo	59.8	27.3	6.3	1.3
Miscellaneous	5.3	9.6	0.6	0.5
Other Tug	10.6	1.1	0.6	0.0
Reefer	44.8	6.5	4.6	0.2
RoRo	9.8	24.8	2.9	1.4
Tanker	231.9	341.7	26.0	13.7
Totals	4,463.6	2,434.4	477.7	80.7

2. Modeled at 12-Knot Scenario in Fairway, tpy[2]

Tons Per Year				
Type	**$NO_{x\ Main}$**	**$NO_{x\ Aux}$**	**PM_{Main}**	**PM_{Aux}**
Auto Carrier	64.7	32.4	6.9	1.2
Bulk	137.3	103.3	14.5	4.8
Containership	1,068.6	1,356.0	117.0	47.4
Cruise	353.6	687.6	36.6	15.9
General Cargo	41.9	28.3	4.5	1.4
Miscellaneous	4.0	9.9	0.4	0.6
Other Tug	10.6	1.1	0.6	0.0
Reefer	20.1	7.5	2.1	0.4
RoRo	7.6	25.4	2.2	1.4
Tanker	183.6	345.7	20.7	14.1
Totals	1,892.0	2,597.3	205.6	87.0

3. Reduction between Corrected & 12 Knot Scenario, tpy

Tons Per Year				
Type	**$NO_{x\ Main}$**	**$NO_{x\ Aux}$**	**PM_{Main}**	**PM_{Aux}**
Auto Carrier	59.9	-1.9	6.3	-0.1
Bulk	33.3	-4.5	3.5	-0.4
Containership	1,899.0	-65.6	202.8	-3.2
Cruise	484.9	-83.8	49.0	-2.0
General Cargo	17.8	-1.1	1.9	-0.1
Miscellaneous	1.3	-0.3	0.1	-0.1
Other Tug	0.0	0.0	0.0	0.0
Reefer	24.7	-1.0	2.5	-0.2
RoRo	2.2	-0.5	0.7	0.0
Tanker	48.3	-4.0	5.3	-0.4
Totals	2,571.4	-162.7	272.1	-6.5

Percentage Reduction	**57.6%**	**-6.7%**	**57.0%**	**-8.1%**

Notes:

1 - Adjusted Speeds: 2001 Baseline OGV transit emissions modeled with speed correction factors that the Port uses in estimating reductions from the VSR program

2 - 12-Knot Scenario: Modeled Corrected Speed emissions at all OGVs transiting at 12 knots; auxiliary engine times increased (speed/distance)

No Net Increase/Air Quality Task Force

OGV3 - Alternative Maritime Power (AMP)

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OGV3 - AMP

Ship Calls per Year

	% of all calls	2001	2005	2008	2010	2012	2025
			Total (Estimated) Ship Calls per Year				
Containership	58%	1,584	3,216	3,802	4,229	4,483	6,684
Tanker	10%	276	560	662	737	781	1,165
Cruise Ship	12%	320	650	768	854	906	1,350
Other	20%	537	1,090	1,289	1,434	1,520	2,266
		2,717	5,516	6,521	7,254	7,689	11,466
Based on these growth factors:		1.00	2.03	2.40	2.67	2.83	4.22

Implementation Plan

	2005	2008	2010	2012	2025
	AMP'd Ship Calls per Year				
Containership	48	48	48	48	48
Tanker	0	0	0	0	0
Cruise Ship	0	0	0	0	0
Other	0	0	0	0	0

Hoteling emissions that can be AMP'd: 95% (time when at berth w/o onboard power)

OGV Auxiliary Emissions	**NOx**		**PM**	
Tons per year	**Transit**	**Hotelling**	**Transit**	**Hotelling**
Containership	202.1	1088.2	4.2	23.0
Tanker	18.5	323.1	0.4	6.8
Cruise Ship	240.0	363.8	5.2	7.8
Other	30.8	167.9	0.7	3.5
	491.4	1943.0	10.5	41.1

	NOx		**PM**	
Percent of total auxiliary engine emissions	**Transit**	**Hotelling**	**Transit**	**Hotelling**
Containership	8.30%	44.70%	8.14%	44.57%
Tanker	0.76%	13.27%	0.78%	13.18%
Cruise Ship	9.86%	14.94%	10.08%	15.12%
Other	1.27%	6.90%	1.36%	6.78%
	20.19%	79.81%	20.35%	79.65%

OGV3 -AMP - Composite Control Factors for Auxiliary Engines

No Net Increase/Air Quality Task Force

OGV4 - Auxiliary Engine Fuel Improvement Program

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Emission Reduction Percentages[(1)]

Auxiliary Engines	
NOx	0%
PM	18%

(1) Table VI.F-2, pg. 89; US EPA 40 CFR 94, RIN 2060-AJ98, Notice of Proposed Rule Making, *Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 30 Liters/Cylinder*

	Fuel Use Distribution[2]		% Emissions		% of Emissions from IFO380 in all Auxiliary Engines	
	% IFO380	%MDO	Aux NOx	Aux PM	NOx	PM
Containership	37.4%	62.6%	53.0%	54.8%	20.5%	33.6%
Tanker	54.8%	45.2%	14.0%	17.0%	7.9%	13.0%
Cruise Ship	4.1%	95.9%	24.8%	17.2%	1.1%	1.8%
Other	60.7%	39.3%	8.2%	11.0%	5.1%	8.9%
Composite					34.5%	57.2%

(2) Table 2.3, pg.53; FINAL DRAFT Port-Wide Baseline Air Emissions Inventory, 2004

Sample Calc:

% Emissions from IFO380 in Aux =

((%IFO x IFO EF) / ((%IFO x IFO EF)+(%MDO x MDO EF))) x % Emissions

OGV4 - Auxiliary Engine Fuel Improvement Program - Participation Rates

	2005	2008	2010	2012	2025
Containership	5%	100%	0%	0%	0%
Tanker	5%	100%	0%	0%	0%
Cruise Ship	5%	100%	0%	0%	0%
Other	5%	100%	0%	0%	0%

OGV4 - Near-Term Fuel Improvement Program - Control Factors

Auxiliary Engines - Transiting	**2005**	**2008**	**2010**	**2012**	**2025**
NO_x	1.000	1.000	1.000	1.000	1.000
PM_{10}	0.995	0.897	1.000	1.000	1.000

Calculation is: % reduction x participation x overall % PM from IFO

Auxiliary Engines - Hoteling

Enhanced AMP Participation[(2)]	no	yes	yes	yes	yes
NO_x	1.000	1.000	1.000	1.000	1.000
PM_{10}	0.995	0.924	1.000	1.000	1.000

(2) Participation rate is reduced by vessel type for vessels participating in OGV16 - Enhanced AMP
Calculation is: % reduction x participation x overall % PM from IFO x (1 - % on enhanced AMP)

OGV4 - Near-Term Fuel Improvement Program - Composite Control Factors for Auxiliary Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV4 Composite NOx	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
OGV4 Composite PM	**0.995**	**0.919**	**1.000**	**1.000**	**1.000**

(3) Composite is a weighted average of transiting and hoteling CFs based on the emission fractions listed below.

Emission fractions from 2001 baseline EI

	Auxiliary Engines	
	Transit	**Hoteling**
NO_x	20.2%	79.8%
PM_{10}	18.0%	82.0%

No Net Increase/Air Quality Task Force

OGV5 - New Engine Standards for Category 3 Marine Engines

DRAFT **DRAFT**

	% ME NOx	% ME PM
Containership	66.5%	66.9%
Tanker	5.2%	5.4%
Cruise Ship	18.8%	17.9%
Auto	2.8%	2.8%
Other	6.7%	6.9%

OGV5 - New Engine Standards - Control Factors for Main Engines

Low Scenario	**2012**		**2025**	
US Flagged Only	**NOx**	**PM**	**NOx**	**PM**
Containership	0.98	1.00	0.93	1.00
Tanker	0.98	1.00	0.97	1.00
Cruise Ship	1.00	1.00	0.93	1.00
Auto	1.00	1.00	0.97	1.00
Other	0.99	1.00	0.94	1.00

High Scenario	**2012**		**2025**	
	NOx	**PM**	**NOx**	**PM**
Containership	0.79	0.38	0.73	0.20
Tanker	0.84	0.69	0.80	0.60
Cruise Ship	0.98	0.38	0.98	0.21
Auto	1.00	0.75	1.00	0.33
Other	0.88	0.49	0.85	0.65

	2012		**2025**	
Composite CFs	**NOx**	**PM**	**NOx**	**PM**
OGV5 Low Scenario	**0.98**	**1.00**	**0.93**	**1.00**
OGV5 High Scenario	**0.84**	**0.41**	**0.80**	**0.26**

Notes:

Control factors provided by ARB (orginally OGV3)

Sample Calc for composite control factors:

Composite Control Factor = (Containership Wght'd NOx x CFcontainership) + (Tanker Wght'd NOx x CFtanker) + (Cruise Wght'd NOx x CFcruise) + (Auto Wght'd NOx x CFauto) + (Other Wght'd NOx x CFother)

No Net Increase/Air Quality Task Force

OGV6 - Reroute Cleaner Ships

DRAFT **DRAFT**

	Total NOx
Containership	66.5%
Tanker	5.2%
Cruise Ship	18.8%
Auto	2.8%
Other	6.7%

Participation Rates	2005	2008	2010	2012	2025
Containership	0%	58%	75%	100%	100%
Tanker	0%	0%	50%	75%	100%
Cruise Ship	0%	58%	75%	100%	100%
Auto	0%	0%	50%	75%	100%
Other	0%	0%	50%	75%	100%

OGV6 - IMO Standards - Control Factors (provided by ARB)

	2005	2008	2010	2012	2025
	NOx	NOx	NOx	NOx	NOx
Containership	0.98	0.96	0.96	0.95	0.94
Tanker	0.99	0.98	0.98	0.98	0.96
Cruise Ship	0.99	0.98	0.98	0.95	0.94
Auto	1.00	1.00	1.00	1.00	1.00
Other	0.99	0.98	0.98	0.97	0.95

OGV6 - Reroute Cleanest Ships - Control Factors Main Engines

	2005	2008	2010	2012	2025
	NOx	NOx	NOx	NOx	NOx
Containership	1.00	0.99	0.99	0.99	1.00
Tanker	1.00	1.00	0.99	0.99	1.00
Cruise Ship	1.00	0.98	0.97	0.99	1.00
Auto	1.00	1.00	1.00	1.00	1.00
Other	1.00	1.00	0.99	0.99	1.00

OGV6 - Reroute Cleanest Ships - Composite Control Factors for Main Engines

	2005	2008	2010	2012	2025
OGV6 Composite NOx	**1.00**	**0.99**	**0.98**	**0.99**	**1.00**

No Net Increase/Air Quality Task Force

OGV7 - Low Emissions Main Propulsion Engines

DRAFT							**DRAFT**
	2005	**2008**	**2010**	**2012**	**2015**	**2020**	**2025**
Participation Rate - Low	0%	0%	0%	0%	0%	50%	100%
Participation Rate - High	0%	0%	0%	0%	50%	100%	100%

% Reduction for "Blue Sky" Category 3 Engines	
NOx	80%

OGV7 - Low Emissions ME Engines - Control Factors Main Engines

	2005	**2008**	**2010**	**2012**	**2015**	**2020**	**2025**
OGV7 NOx - Low	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**0.600**	**0.254**
OGV7 NOx - High	**1.000**	**1.000**	**1.000**	**1.000**	**0.600**	**0.254**	**0.254**

Sample Calc:

Composite Control Factor = 1 - (Participation Rate x %Red'n NOx)

2020		2025	
35%	MAN B&W Reductions	35%	MAN B&W Reductions
50%	Fleet MAN engines	50%	Fleet MAN engines
0.4	CF goal	0.746	CF goal
0.175	CF for MAN Fleet	0.175	CF for MAN Fleet
0.225	CFx	0.571	CFx
80%	reduction from SCR	80%	reduction from SCR
0.28		0.71	
9803	calls 2020	11225	calls 2025
1396	frequent calls	9766	frequent + infrequent calls
163	frequent vessels	1140	frequent vessels
8.56	calls /vessels	8.57	calls /vessels
2757	calls affected	8012	calls affected
322	vessels with SCR	935	vessels with SCR
0.775	CF - SCR	0.429	CF - SCR
0.825	CF - MAN	0.825	CF - MAN
0.600	CF Total	0.254	CF Total

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines

DRAFT **DRAFT**

% of NOx & PM Auxiliary Emissions by Vessel Type

	% Aux NOx	% Aux PM
Containership	53.0%	54.8%
Tanker	14.0%	17.0%
Cruise Ship	24.8%	17.2%
Other	8.2%	11.0%

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OGV8 - Cleaner Fuels for Ship Auxiliary Engines - Participation Rates

	2005	**2008**	**2010**	**2012**	**2025**
Containership	0%	100%	100%	100%	100%
Tanker	0%	100%	100%	100%	100%
Cruise Ship	0%	100%	100%	100%	100%
Other	0%	100%	100%	100%	100%

OGV8 - Cleaner Fuels for Ship Auxiliary Engines - CF Development

Reductions IFO -> 0.2%/0.1%	35%	%Auxiliaries NOx Emissions from IFO
	57%	%Auxiliaries PM Emissions from IFO
	10%	NOx reduction
	63%	PM reduction
Reductions MDO -> 0.2%/0.1%	65%	%Auxiliaries NOx Emissions from MDO
	43%	%Auxiliaries PM Emissions from MDO
	10%	NOx reduction
	45%	PM reduction

OGV8 - Cleaner Fuels for Ship Auxiliary Engines - CFs - All OGVs

NOx	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.00	0.90	0.90	0.90	0.90
Tanker	1.00	0.90	0.90	0.90	0.90
Cruise Ship	1.00	0.90	0.90	0.90	0.90
Other	1.00	0.90	0.90	0.90	0.90

PM	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.00	0.45	0.45	0.45	0.45
Tanker	1.00	0.45	0.45	0.45	0.45
Cruise Ship	1.00	0.45	0.45	0.45	0.45
Other	1.00	0.45	0.45	0.45	0.45

OGV8 - Cleaner Fuels for Ship Auxiliary Engines -
Composite Control Factors for Auxiliary Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV8 Composite NOx	**1.00**	**0.90**	**0.90**	**0.90**	**0.90**
OGV8 Composite PM	**1.00**	**0.45**	**0.45**	**0.45**	**0.45**

Notes:

CF provided by ARB (orginally OGV4A)

No Net Increase/Air Quality Task Force

OGV9 - Main Engine Fuel Improvement Program

DRAFT **DRAFT**

	% ME NOx	% ME PM
Containership	66.5%	66.9%
Tanker	5.2%	5.4%
Cruise Ship	18.8%	17.9%
Auto	2.8%	2.8%
Other	6.7%	6.9%

Participation Rates (PR)	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	0%	50%	100%	100%	100%
Tanker	0%	50%	100%	100%	100%
Cruise Ship	0%	50%	100%	100%	100%
Auto	0%	50%	100%	100%	100%
Other	0%	50%	100%	100%	100%

IFO380 to 1.5% sulfur content in fuels for Main Engines

Reductions	0%	NOx
	18%	PM

OGV9 - ME Eng Fuel Imp Prog - Composite Control Factors for Main Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV10 NOx	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
OGV10 PM	**1.00**	**0.91**	**0.82**	**0.82**	**0.82**

Sample Calc:

Composite Control Factor = 1 - (((Containership %NOx x PRcontainership)
+ (Tanker %NOx x PRtanker) + (Cruise %NOx x PRcruise) +
(Other %NOx x PRother)) x (%NOx Reduction))

No Net Increase/Air Quality Task Force

OGV10 - Sulfur Oxide Emission Control Area (SECA)

DRAFT **DRAFT**

	2001	2005	2008	2010	2012	2025
Compliance Rate	0%	0%	0%	100%	100%	100%

IFO380 to 1.5% sulfur content in fuels for Main Engines

Reductions	0%	NOx
	18%	PM[1]

OGV10 - SECA - Control Factors for Main Engines

	2001	2005	2008	2010	2012	2025
OGV10 NOx	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
OGV10 PM	**1.00**	**1.00**	**1.00**	**0.82**	**0.82**	**0.82**

Notes:

1 - Table VI.F-2, pg. 89; US EPA 40 CFR 94, RIN 2060-AJ98, Notice of Proposed Rule Making, *Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 30 Liters/Cylinder*

Sample Calc:

CF = (Main PM_{10} x Compliance Rate) x PM Reduction (IFO380 -> 1.5%)

No Net Increase/Air Quality Task Force

OGV11 - Expanded Auxiliary Fuel Improvement Program

DRAFT **DRAFT**

% of NOx & PM Auxiliary Emissions by Vessel Type

	% Aux NOx	% Aux PM
Containership	53.0%	54.8%
Tanker	14.0%	17.0%
Cruise Ship	24.8%	17.2%
Other	8.2%	11.0%

OGV11 - Expanded Auxiliary Fuel Improvement Program - Participation Rates

	2005	**2008**	**2010**	**2012**	**2025**
Containership	0%	100%	100%	100%	100%
Tanker	0%	100%	100%	100%	100%
Cruise Ship	0%	100%	100%	100%	100%
Other	0%	100%	100%	100%	100%

OGV11 - Expanded Auxiliary Fuel Improvement Program - CF Development

Reductions IFO -> 0.2%/0.1%	35%	%Auxiliaries NOx Emissions from IFO
	57%	%Auxiliaries PM Emissions from IFO
	10%	NOx reduction
	63%	PM reduction
Reductions MDO -> 0.2%/0.1%	65%	%Auxiliaries NOx Emissions from MDO
	43%	%Auxiliaries PM Emissions from MDO
	10%	NOx reduction
	45%	PM reduction

OGV11 - Expanded Auxiliary Fuel Improvement Program - CFs - All OGVs

NOx	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.00	0.90	0.90	0.90	0.90
Tanker	1.00	0.90	0.90	0.90	0.90
Cruise Ship	1.00	0.90	0.90	0.90	0.90
Other	1.00	0.90	0.90	0.90	0.90

PM	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.00	0.45	0.45	0.45	0.45
Tanker	1.00	0.45	0.45	0.45	0.45
Cruise Ship	1.00	0.45	0.45	0.45	0.45
Other	1.00	0.45	0.45	0.45	0.45

OGV11 - Expanded Auxiliary Fuel Improvement Program -
Composite Control Factors for Auxiliary Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV8 Composite NOx	**1.00**	**0.90**	**0.90**	**0.90**	**0.90**
OGV8 Composite PM	**1.00**	**0.45**	**0.45**	**0.45**	**0.45**

Notes: (formerly OGV8)

Table VI.F-3, pg. 90; US EPA 40 CFR 94, RIN 2060-AJ98, Notice of Proposed Rule Making,
Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 30 Liters/Cylinder

63% PM reduction going from 2.7% to 0.3% ppm fuel -18% PM reduction going from 2.7% to 1.5% fuel;
Table VI.F-2&3, pgs. 89-90; US EPA 40 CFR 94, RIN 2060-AJ98, Notice of Proposed Rule Making,
Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 30 Liters/Cylinder

No Net Increase/Air Quality Task Force

OGV12 - Expanded Main Engine Fuel Improvement Program

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	% ME NOx	% ME PM
Containership	66.5%	66.9%
Tanker	5.2%	5.4%
Cruise Ship	18.8%	17.9%
Auto	2.8%	2.8%
Other	6.7%	6.9%

Participation Rates (PR)	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	0%	50%	90%	90%	90%
Tanker	0%	50%	90%	90%	90%
Cruise Ship	0%	50%	90%	90%	90%
Auto	0%	50%	90%	90%	90%
Other	0%	50%	90%	90%	90%

1.5% sulfur to 0.2% sulfur content in fuels for Main Engines		
Reductions	10%	NOx
	45%	PM
IFO380 to 0.2% sulfur content in fuels for Main Engines		
Reductions	10%	NOx
	63%	PM

OGV12 - ME Eng Fuel Imp Prog - Composite Control Factors for Main Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV12 NOx	**1.00**	**0.95**	**0.91**	**0.91**	**0.91**
OGV12 PM	**1.00**	**0.69**	**0.60**	**0.60**	**0.60**

Sample Calc:

Composite Control Factor = 1 - [((Containership %NOx x PRcontainership)
+ (Tanker %NOx x PRtanker) + (Cruise %NOx x PRcruise) +
(Other %NOx x PRother) x %Red'n NOx)) x (%NOx Reduction)]

No Net Increase/Air Quality Task Force

OGV13 - Additional Auxiliary Engine Reductions for Frequent Callers

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	% NOx	% PM
Frequent Callers	62.0%	62.0%

OGV13 - Additional Auxiliary Engine Reductions for Frequent Callers - Control Factors for Auxiliary Engines

NOx	**2005**	**2008**	**2010**	**2012**	**2025**
	1.00	**1.00**	**0.50**	**0.50**	**0.50**

PM	**2005**	**2008**	**2010**	**2012**	**2025**
	1.00	**1.00**	**0.50**	**0.50**	**0.50**
Participation (Not in OGV16 - Expanded AMP)			0.50	0.00	0.00

Composite Control Factors for Auxiliary Engines

	2005	**2008**	**2010**	**2012**	**2025**
OGV13 Composite NOx	**1.00**	**1.00**	**0.85**	**1.00**	**1.00**
OGV13 Composite PM	**1.00**	**1.00**	**0.84**	**1.00**	**1.00**

Notes:

CFs provided by ARB

Sample Calc:

Composite CF = (CF Auxiliaries x %NOx Auxiliary from Frequent Callers) + (1 - %NOx Auxiliary from Frequent Callers)

No Net Increase/Air Quality Task Force

OGV14 - Retrofit/Repower Requirements for Infrequent Callers

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	% Aux Emissions Infrequent Callers[1]
NOx	22.95%
PM	22.91%

[1] - vessels making 2 to 4 calls in a year

Reduction Goals	
NOx	50%
PM	50%

	2005	2008	2010	2012	2025
Partiticpation Rate	0%	0%	50%	50%	100%

OGV14 - Retrofit/Repower Requirements for Infrequent Callers - Control Factors for Auxiliary Engines

	2005	2008	2010	2012	2025
NO_x	**1.00**	**1.00**	**0.94**	**0.94**	**0.89**
PM_{10}	**1.00**	**1.00**	**0.94**	**0.94**	**0.89**

Sample Calc:

Control Factor = 1 - (% Aux Emis In-Freq Callers x % Red'n x Participation Rate)

No Net Increase/Air Quality Task Force

OGV15 - Expanded VSR Program

DRAFT **DRAFT**

Emission Reduction Percentages(1)

	ME	Auxiliaries	
NO_x	57.6%	-6.7%	Auxiliary engine emissions increase because
PM_{10}	57.0%	-8.1%	of increased time in transit (due to lower speeds)

Average fleet speed assumptions 22 knots w/o VSR
12 knots w/ VSR

OGV15 - Expanded VSR - Control Factors for Main Engines

	2005	2008	2010	2012	2025
Additional Distance of Compliance Zone (nm)	20.0	20.0	20.0	20.0	20.0
Participation Rate[2] (at 12 kts)	0%	85%	85%	85%	85%
Increase Over OGV2[3] (first 20 nm)	0%	37%	37%	37%	37%
NO_x	**1.000**	**0.781**	**0.781**	**0.781**	**0.781**
PM_{10}	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

OGV15 - Expanded VSR Program - Adjustment Factor Applied to Auxiliary Engine Emissions

NO_x	1.00	1.04	1.04	1.04	1.04
PM_{10}	1.00	1.05	1.05	1.05	1.05

Notes:

1 - Reductions calculated using 20-mile VSR applicability distance @ 100% participation (12 knots) (as calculated in worksheet for OGV2)

2 - Participation Rate: Currently, as modeled, the participation rate only takes into account those vessels that reach the target speed of 12 knots, however the POLA VSR program takes into account the reductions associated w/all vessels that reduce speed over their baseline corrected speed. This difference will be incorporated into the next version of this control measure worksheet.

3 - Increased participation rate over the first 20 nm covered in OGV2.

Sample Calc:

Control Factor = 1 - ((Red'n% x Participation Rate x (20 nm/40 nm)) x
1 - (Red'n% x Inc Over OGV2 PR x (20 nm/40 nm))

OGV Auxiliary Emissions	**NOx Hotelling**	**PM Hotelling**
Containership	84.34%	84.56%
Tanker	94.58%	94.44%
Cruise Ship	60.25%	60.00%
Other	84.50%	83.33%

OGV16 - Expanded AMP - Pariticpation Rates
Implementation Plan

	% Frequent Callers	**Percent Implementation 2005**	**2008**	**2010**	**2012**	**2025**
Containership	70.30%	0%	25%	50%	100%	100%
Tanker	32.57%	0%	25%	50%	100%	100%
Cruise Ship	87.40%	0%	50%	100%	100%	100%
Other	23.07%	0%	25%	50%	100%	100%

	% Frequent Callers	**Percent Implementation 2005**	**2008**	**2010**	**2012**	**2025**
Containership	70.30%	0%	25%	50%	100%	100%
Tanker	32.57%	0%	25%	50%	100%	100%
Cruise Ship	87.40%	0%	50%	100%	100%	100%
Other	23.07%	0%	25%	50%	100%	100%

Hotelling emissions that can be AMP'd 95% (time when at berth w/o onboard power)

OGV16 - Expanded AMP - Composite Control Factors for Auxiliary Engines

NOx	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	1.000	0.859	0.718	0.437	0.437
Tanker	1.000	0.927	0.854	0.707	0.707
Cruise Ship	1.000	0.750	0.500	0.500	0.500
Other	1.000	0.954	0.907	0.815	0.815
OGV16 Composite NOx	**1.000**	**0.849**	**0.699**	**0.521**	**0.521**

	2005	**2008**	**2010**	**2012**	**2025**
Containership	1.000	0.859	0.718	0.435	0.435
Tanker	1.000	0.927	0.854	0.708	0.708
Cruise Ship	1.000	0.751	0.502	0.502	0.502
Other	1.000	0.954	0.909	0.817	0.817
OGV16 Composite PM	**1.000**	**0.849**	**0.699**	**0.521**	**0.521**

	NOx Transit	NOx Hotelling		PM Transit	PM Hotelling	
Containership	202.1	1,088.2	53%	4.2	23.0	53%
Tanker	18.5	323.1	14%	0.4	6.8	14%
Cruise Ship	240.0	363.8	25%	5.2	7.8	25%
Other	30.8	167.9	8%	0.7	3.5	8%
	491.4	1,943.0		10.5	41.1	
	Total	2,434.4		Total	51.6	

No Net Increase/Air Quality Task Force

OGV17 - Additional In-Use Measures for Ships

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OGV17 - Additional Measures - Control Factors for Main & Auxiliary Engines

	2005	2008	2010	2012	2025
NOx (Low)	**1.00**	**1.00**	**0.83**	**0.79**	**0.79**
PM (Low)	**1.00**	**1.00**	**0.99**	**0.98**	**0.98**
NOx (High)	**1.00**	**1.00**	**0.68**	**0.64**	**0.64**
PM (High)	**1.00**	**1.00**	**0.84**	**0.83**	**0.83**

	ME % of Total	Aux % of Total
NOx	64.7%	35.3%
PM	85.6%	14.4%

Notes:

Low - Remaining reduction from a total 25% reduction from OGV8, OGV10, & OGV13

High - Remaining reduction from a total 40% reduction from OGV8, OGV10, & OGV13

No Net Increase/Air Quality Task Force

O3 - Growth Cap - Port Wide

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	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total OGV NO_x	25,943	26,760	27,576	28,393	29,058	29,722	29,834	29,946	30,511	31,076	31,641
Total OGV PM_{10}	1,582	1,641	1,701	1,760	1,842	1,925	1,960	1,995	2,046	2,096	2,147
Growth Cap?		no	no	no	no	no	no	no	no	no	no

O3 Control Factor for Total OGV											
NOx	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
PM	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

w/o Growth	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total OGV NO_x	25,943	26,760	27,576	28,393	29,058	29,722	29,834	29,946	30,511	31,076	31,641
Total OGV PM_{10}	1,582	1,641	1,701	1,760	1,842	1,925	1,960	1,995	2,046	2,096	2,147

No Net Increase/Air Quality Task Force

O3 - Vessel Growth Cap

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2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
32,206	32,772	33,337	33,902	34,467	35,032	35,597	36,162	36,727	37,292
2,197	2,248	2,298	2,349	2,400	2,450	2,501	2,551	2,602	2,652
no	no	no	no	no	no	no	no	no	no

1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
32,206	32,772	33,337	33,902	34,467	35,032	35,597	36,162	36,727	37,292
2,197	2,248	2,298	2,349	2,400	2,450	2,501	2,551	2,602	2,652

No Net Increase/Air Quality Task Force

HC1 - New Engine Standards for Harbor Craft

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Control Factor[1]

	2005	2008	2010	2012	2025
NO_x	0.970	0.950	0.870	0.930	0.890
PM	0.990	0.980	0.905	0.970	0.950

Notes:

1 - These control factors were developed by ARB

HC2 - Clean Fuels for Harbor Craft

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Control Factor[1]

	2005	2008	2010	2012	2025
NO_x	1.000	0.970	0.970	0.970	0.970
PM	1.000	0.920	0.920	0.920	0.920

Notes:

1 - These control factors were developed by ARB

No Net Increase/Air Quality Task Force

HC3 - Early ULSD Implementation

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Projected Emission Reductions[1]:

NOx Reduction ULSD	10%
PM Reduction ULSD	30%
SOx Reduction ULSD	99%

Vessel Type	Participation 2005	Control Factors[2] NO_x	Control Factors[2] PM_{10}	2005 Control Factors Scaled to Total HC Emissions[3] NO_x	2005 Control Factors Scaled to Total HC Emissions[3] PM_{10}
Assist Tug	50%	0.950	0.850	0.072	0.048
Tugboat (Unit Tows)	10%	0.990	0.970	0.046	0.034
Ferry	40%	0.960	0.880	0.054	0.025
Excursion	10%	0.990	0.970	0.042	0.028
Crew boat	5%	0.995	0.985	0.010	0.007
Work boat	5%	0.995	0.985	0.006	0.004
Government	50%	0.950	0.850	0.006	0.003
Commercial Fishing	0%	1.000	1.000	0.109	0.079
Recreational Vessels	3%	0.997	0.991	0.010	0.071
Dredges	10%	0.990	0.970	0.005	0.003
Line Haul Towboat	1%	0.999	0.997	0.634	0.680
Overall Control Factors:				**0.993**	**0.983**

Notes:

[1] - Reduction per participating vessel based on 15 ppm ULSD and 1,675 ppm current sulfur content.

[2] - Individual control factors calculated using the equation:
CF = 1 - (% Reduction x Participation Rate)

[3] - Overall CFs (scaled to total Harbor Craft emissions) calculated by summing the products of each individual control factor multiplied by each vessel type's percentage of total harbor craft emissions.
Fractional CF = (individual CF * % of total)   Overall CF = sum of fractional CFs for each year.

Percent of 2001 Baseline Emissions

	NO_x		PM_{10}	
Assist Tug	269.6	7.6%	10.1	5.7%
Tugboat (Unit Tow)	161.0	4.6%	6.2	3.5%
Ferry	197.2	5.6%	4.9	2.8%
Excursion	146.8	4.2%	5.2	2.9%
Crew boat	35.3	1.0%	1.3	0.7%
Work boat	21.5	0.6%	0.8	0.4%
Government	20.5	0.6%	0.7	0.4%
Commercial Fishing	384.8	10.9%	14.0	7.9%
Recreational Vessel	35.8	1.0%	12.9	7.2%
Dredge/Support	17.3	0.5%	0.5	0.3%
Line Haul Towboat	2,240.7	63.5%	121.4	68.2%

HC4 - Dredging Activities

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Assumed CF = 1.00 until effects of measure become quantifiable

No Net Increase/Air Quality Task Force

HC5 - TAC Harbor Craft Measures

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Projected Reductions from TAC Measures[1]:
(tons per year)

	2005	2008	2010	2012	2025
NOx	98.7	98.7	93.6	93.8	0.0
PM	8.9	8.9	8.6	8.6	0.0

2001 Baseline Emissions

	NO_x	PM_{10}
Assist Tug	269.6	10.1
Tugboat (Unit Tow)	161.0	6.2
Ferry	197.2	4.9
Excursion	146.8	5.2
Crew boat	35.3	1.3
Work boat	21.5	0.8
Government	20.5	0.7
Commercial Fishing	384.8	14.0
Recreational Vessel	35.8	12.9
Dredge/Support	17.3	0.5
Line Haul Towboat	2,240.7	121.4
	3,530.5	178.0

Notes:

[1] - The emission reductions were taken from TAC measures documentation dated 4/21/05.

No Net Increase/Air Quality Task Force

HC6 - New Engine Standards for Category 1 and 2 Marine Engines

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Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	0.773
PM	1.000	1.000	1.000	1.000	0.765

	NO_X CFs per vessel type		NO_X CFs relative to all harbor craft	
	% Red'n	**Ind. CF**	**%NO_X**[2]	**Fract. CF**[3]
Commercial fishing	17.86%	0.821	10.42%	0.086
Charter fishing	31.58%	0.684	5.34%	0.037
Pilot and tow	18.61%	0.814	65.01%	0.529
Tug	37.97%	0.620	11.73%	0.073
Crew and supply	18.95%	0.811	0.96%	0.008
Ferry	42.92%	0.571	3.97%	0.023
Working	29.50%	0.705	0.58%	0.004
Others	26.74%	0.733	1.99%	0.015
Overall Control Factor:			100%	**0.773**

	PM CFs per vessel type		PM CFs relative to all harbor craft	
	% Red'n	**Ind. CF**	**%PM**[2]	**Fract. CF**[3]
Commercial fishing	18.52%	0.815	7.60%	0.062
Charter fishing	31.32%	0.687	2.66%	0.018
Pilot and tow	22.14%	0.779	69.28%	0.539
Tug	32.02%	0.680	8.85%	0.060
Crew and supply	18.48%	0.815	0.71%	0.006
Ferry	29.15%	0.709	2.82%	0.020
Working	28.06%	0.719	0.43%	0.003
Others	25.82%	0.742	7.65%	0.057
Overall Control Factor:			100%	**0.765**

Notes:

[1] - The control factors for various harbor vessel categories were developed by ARB;
Combined CFs from ARB's individual control factors are calculated on this sheet.

[2] - Percent of total harbor craft emissions for the vessel category for 2025.

[3] - Fractional CF = Individual CF * %Emissions; Overall CF = sum(fractional CFs).

Assumptions:

Implementation in 2014.
90% reduction in PM and 70% reduction in NOx over USEPA's adopted standards for Category 1 and 2 engines.
HC 6 is independent of HC1. Therefore, CF for HC1 should be applied first before applying HC6.
Based on survey data collected by ARB staff and emission factors from mail--out 99-32.

HC7 - Emulsified Fuels for Harbor Craft

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NO_x Reduction 15% Average reduction

PM Reduction 50% Average reduction

	Participation Rates					Vessel Type NOx Control Factors[1]					Vessel Type PM Control Factors[1]				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	0%	0%	0%	0%	0%	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Tugboat (Unit Tows)	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Ferry	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Excursion	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Crew boat	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Work boat	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Government	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Commercial Fishing	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Recreational Vessels	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Dredges	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600
Line Haul Towboat	0%	80%	80%	80%	80%	1.000	0.880	0.880	0.880	0.880	1.000	0.600	0.600	0.600	0.600

Control Factors Scaled to Total Harbor Craft Emissions[2]

	NOx Control Factors					PM Control Factors				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	0.076	0.076	0.076	0.076	0.076	0.057	0.057	0.057	0.057	0.057
Tugboat (Unit Tows)	0.046	0.040	0.040	0.040	0.040	0.035	0.021	0.021	0.021	0.021
Ferry	0.056	0.049	0.049	0.049	0.049	0.028	0.017	0.017	0.017	0.017
Excursion	0.042	0.037	0.037	0.037	0.037	0.029	0.017	0.017	0.017	0.017
Crew boat	0.010	0.009	0.009	0.009	0.009	0.007	0.004	0.004	0.004	0.004
Work boat	0.006	0.005	0.005	0.005	0.005	0.004	0.002	0.002	0.002	0.002
Government	0.006	0.005	0.005	0.005	0.005	0.004	0.002	0.002	0.002	0.002
Commercial Fishing	0.109	0.096	0.096	0.096	0.096	0.079	0.047	0.047	0.047	0.047
Recreational Vessels	0.010	0.009	0.009	0.009	0.009	0.072	0.043	0.043	0.043	0.043
Dredges	0.005	0.004	0.004	0.004	0.004	0.003	0.002	0.002	0.002	0.002
Line Haul Towboat	0.635	0.559	0.559	0.559	0.559	0.682	0.409	0.409	0.409	0.409
Overall Control Factors:	**1.000**	**0.889**	**0.889**	**0.889**	**0.889**	**1.000**	**0.621**	**0.621**	**0.621**	**0.621**

Notes:

[1] - Individual control factors calculated using the equation: CF = 1 - (% Reduction x Participation Rate)

[2] - Overall CFs (scaled to total Harbor Craft emissions) calculated by summing the products of each individual control factor multiplied by each vessel type's percentage of total harbor craft emissions.

Fractional CF = (individual CF * % of total) Overall CF = sum of fractional CFs for each year and each emission control mechanism.

Percent of 2001 Baseline Emissions

Vessel Type	**NO_x**		**PM_{10}**	
Assist Tug	269.6	7.6%	10.1	5.7%
Tugboat (Unit Tows)	161.0	4.6%	6.2	3.5%
Ferry	197.2	5.6%	4.9	2.8%
Excursion	146.8	4.2%	5.2	2.9%
Crew boat	35.3	1.0%	1.3	0.7%
Work boat	21.5	0.6%	0.8	0.4%
Government	20.5	0.6%	0.7	0.4%
Commercial Fishing	384.8	10.9%	14.0	7.9%
Recreational Vessels	35.8	1.0%	12.9	7.2%
Dredges	17.3	0.5%	0.5	0.3%
Line Haul Towboat	2,240.7	63.5%	121.4	68.2%
		100%		100%

No Net Increase/Air Quality Task Force

HC8 - In-Use Harbor Craft Emission Reduction Measure/Airborne

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Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	0.780	0.758	0.500
PM	1.000	1.000	0.830	0.778	0.150

Notes:

[1] - These control factors were developed by ARB

No Net Increase/Air Quality Task Force

HC9 - Repower Existing Harbor Craft Fleet

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Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	0.994	0.978	0.972	0.972	0.972

NO_X Reduction[2] 2.8%

Commercial Fishing Participation Rates[3] **(tpy)**

	2005	2008	2010	2012	2025
NO_x	20%	80%	100%	100%	100%

Notes:

[1] - Control factors calculated using the equation:
CF = 1 - (% Reduction x Participation Rate)

[2] - Based on approximately 225 commercial fishing vessels and 28 harbor vessels (other than fishing) that might be candidates for repowering.

[3] - Approximately 50 vessels per year would be repowered between 2005 and 2009.

No Net Increase/Air Quality Task Force

HC10 - Retrofit Existing Harbor Craft

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NO_X Reduction using SCR	95%	Selective Catalytic Reduction (SCR) only controls NO_X emissions
PM Reduction using DOC	25%	Diesel Oxydation Catalyst (DOC) reduces PM emissions
PM Reduction using DPF	85%	Diesel Particulate Filter (DPF) reduces PM emissions when used with ULSD
Reduction using Lean NO_X Catalyst	25%	Used in conjuction with DPF to reduce NO_X emissions

Partipation Rate[1]	**SCR Participation Rates**					**DOC Participation Rates**					**DPF Participation Rates**					**QA Error Check**				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	0%	5%	10%	15%	20%	0%	10%	20%	20%	40%	0%	10%	20%	20%	40%	OK	OK	OK	OK	OK
Tugboat (Unit Tows)	0%	0%	0%	0%	0%	0%	7%	15%	15%	30%	0%	7%	15%	15%	30%	OK	OK	OK	OK	OK
Ferry	0%	0%	0%	0%	0%	0%	7%	15%	15%	30%	0%	7%	15%	15%	30%	OK	OK	OK	OK	OK
Excursion	0%	0%	0%	0%	0%	0%	7%	15%	15%	30%	0%	7%	15%	15%	30%	OK	OK	OK	OK	OK
Crew boat	0%	0%	0%	0%	0%	0%	5%	10%	10%	20%	0%	5%	10%	10%	20%	OK	OK	OK	OK	OK
Work boat	0%	0%	0%	0%	0%	0%	5%	10%	10%	20%	0%	5%	10%	10%	20%	OK	OK	OK	OK	OK
Government	0%	0%	0%	0%	0%	0%	5%	10%	10%	20%	0%	5%	10%	10%	20%	OK	OK	OK	OK	OK
Commercial Fishing	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	OK	OK	OK	OK	OK
Recreational Vessels	0%	0%	0%	0%	0%	0%	3%	6%	6%	12%	0%	3%	6%	6%	12%	OK	OK	OK	OK	OK
Dredges	0%	0%	0%	0%	0%	0%	7%	15%	15%	30%	0%	7%	15%	15%	30%	OK	OK	OK	OK	OK
Line Haul Towboat	0%	0%	0%	0%	0%	0%	2%	4%	4%	15%	0%	2%	4%	4%	15%	OK	OK	OK	OK	OK

Control Factors[2]	**SCR Control Factor (NOx)**					**DOC Control Factor (PM)**					**DPF Control Factor (PM)**					**Lean NO_X Catalyst Control Factor (NO_X)**				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	1.000	0.953	0.905	0.858	0.810	1.000	0.975	0.950	0.950	0.900	1.000	0.915	0.830	0.830	0.660	1.000	0.975	0.950	0.950	0.900
Tugboat (Unit Tows)	1.000	1.000	1.000	1.000	1.000	1.000	0.983	0.963	0.963	0.925	1.000	0.941	0.873	0.873	0.745	1.000	0.983	0.963	0.963	0.925
Ferry	1.000	1.000	1.000	1.000	1.000	1.000	0.983	0.963	0.963	0.925	1.000	0.941	0.873	0.873	0.745	1.000	0.983	0.963	0.963	0.925
Excursion	1.000	1.000	1.000	1.000	1.000	1.000	0.983	0.963	0.963	0.925	1.000	0.941	0.873	0.873	0.745	1.000	0.983	0.963	0.963	0.925
Crew boat	1.000	1.000	1.000	1.000	1.000	1.000	0.988	0.975	0.975	0.950	1.000	0.958	0.915	0.915	0.830	1.000	0.988	0.975	0.975	0.950
Work boat	1.000	1.000	1.000	1.000	1.000	1.000	0.988	0.975	0.975	0.950	1.000	0.958	0.915	0.915	0.830	1.000	0.988	0.975	0.975	0.950
Government	1.000	1.000	1.000	1.000	1.000	1.000	0.988	0.975	0.975	0.950	1.000	0.958	0.915	0.915	0.830	1.000	0.988	0.975	0.975	0.950
Commercial Fishing	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Recreational Vessels	1.000	1.000	1.000	1.000	1.000	1.000	0.993	0.985	0.985	0.970	1.000	0.975	0.949	0.949	0.898	1.000	0.993	0.985	0.985	0.970
Dredges	1.000	1.000	1.000	1.000	1.000	1.000	0.983	0.963	0.963	0.925	1.000	0.941	0.873	0.873	0.745	1.000	0.983	0.963	0.963	0.925
Line Haul Towboat	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.990	0.990	0.963	1.000	0.983	0.966	0.966	0.873	1.000	0.995	0.990	0.990	0.963

No Net Increase/Air Quality Task Force

HC10 - Retrofit Existing Harbor Craft

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Control Factors Scaled to Total Harbor Craft emissions[3]

	SCR Control Factor (NOx)					DOC Control Factor (PM)					DPF Control Factor (PM)					Lean NO_X Catalyst Control Factor (NO_X)				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	0.076	0.072	0.069	0.065	0.062	0.057	0.056	0.054	0.054	0.051	0.057	0.052	0.047	0.047	0.038	0.076	0.074	0.072	0.072	0.068
Tugboat (Unit Tows)	0.046	0.046	0.046	0.046	0.046	0.035	0.034	0.034	0.034	0.032	0.035	0.033	0.031	0.031	0.026	0.046	0.045	0.044	0.044	0.043
Ferry	0.056	0.056	0.056	0.056	0.056	0.028	0.028	0.027	0.027	0.026	0.028	0.026	0.024	0.024	0.021	0.056	0.055	0.054	0.054	0.052
Excursion	0.042	0.042	0.042	0.042	0.042	0.029	0.029	0.028	0.028	0.027	0.029	0.027	0.025	0.025	0.022	0.042	0.041	0.040	0.040	0.039
Crew boat	0.010	0.010	0.010	0.010	0.010	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.010	0.010	0.010	0.010	0.010
Work boat	0.006	0.006	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.006	0.006	0.006	0.006	0.006
Government	0.006	0.006	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.006	0.006	0.006	0.006	0.006
Commercial Fishing	0.109	0.109	0.109	0.109	0.109	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.079	0.109	0.109	0.109	0.109	0.109
Recreational Vessels	0.010	0.010	0.010	0.010	0.010	0.072	0.071	0.071	0.071	0.070	0.072	0.070	0.068	0.068	0.065	0.010	0.010	0.010	0.010	0.010
Dredges	0.005	0.005	0.005	0.005	0.005	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.005	0.005	0.005	0.005	0.005
Line Haul Towboat	0.634	0.634	0.634	0.634	0.634	0.682	0.679	0.675	0.675	0.657	0.682	0.670	0.659	0.659	0.595	0.634	0.631	0.628	0.628	0.611
Overall Control Factors:	**1.000**	**0.996**	**0.993**	**0.989**	**0.986**	**1.000**	**0.994**	**0.986**	**0.986**	**0.960**	**1.000**	**0.975**	**0.950**	**0.950**	**0.860**	**1.000**	**0.992**	**0.984**	**0.984**	**0.959**

Notes:

[1] - Participation Rate: The participation rate only takes into account those harbor vessels that are capable of being retroffited.

[2] - Individual control factors calculated using the equation:

CF = 1 - (% Reduction x Participation Rate)

[3] - Overall CFs (scaled to total Harbor Craft emissions) calculated by summing the products of each individual control factor multiplied by each vessel type's percentage of total harbor craft emissions.

Fractional CF = (individual CF * % of total) Overall CF = sum of fractional CFs for each year and each emission control mechanism.

Percent of 2001 Baseline Emissions	**NO_x**		**PM_{10}**	
Assist Tug	269.6	7.6%	10.1	5.7%
Tugboat (Unit Tow)	161.0	4.6%	6.2	3.5%
Ferry	197.2	5.6%	4.9	2.8%
Excursion	146.8	4.2%	5.2	2.9%
Crew boat	35.3	1.0%	1.3	0.7%
Work boat	21.5	0.6%	0.8	0.4%
Government	20.5	0.6%	0.7	0.4%
Commercial Fishing	384.8	10.9%	14.0	7.9%
Recreational Vessel	35.8	1.0%	12.9	7.2%
Dredge/Support	17.3	0.5%	0.5	0.3%
Line Haul Towboat	2,240.7	63.4%	121.4	68.2%
		100%		100%

Composite CFs[4]

		2005	2008	2010	2012	2025
NO_x	(SCR and Lean NOx Catalyst)	1.000	0.988	0.977	0.973	0.945
PM	(DOC and DPF)	1.000	0.969	0.936	0.936	0.820

[4] - Composite CFs calculated for each set of 2 CFs (2 each for NOx and PM) using the equation 1-((1-CF1)+(1-CF2))

No Net Increase/Air Quality Task Force

HC11 - AMP-Ready Staging Areas

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Percent Operating Time Reduced: **30%**

Control Factors	2005	2008	2010	2012	2025
NO_x	1.000	0.993	0.986	0.979	0.967
PM	1.000	0.995	0.989	0.984	0.975

	Participation Rates					NOx Control Factors[1]					PM Control Factors[1]				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	0%	20%	40%	60%	100%	1.00	0.94	0.88	0.82	0.70	1.00	0.94	0.88	0.82	0.70
Tugboat (Unit Tows)	0%	20%	40%	60%	80%	1.00	0.94	0.88	0.82	0.76	1.00	0.94	0.88	0.82	0.76
Ferry	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Excursion	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Crew boat	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work boat	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Government	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Commercial Fishing	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Recreational Vessels	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Dredges	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Line Haul Towboat	0%	0%	0%	0%	0%	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Control Factors Scaled to Total HC Emissions[2]

	NOx Control Factors					PM Control Factors				
Vessel Type	**2005**	**2008**	**2010**	**2012**	**2025**	**2005**	**2008**	**2010**	**2012**	**2025**
Assist Tug	0.076	0.071	0.067	0.062	0.053	0.057	0.054	0.050	0.047	0.040
Tugboat (Unit Tows)	0.046	0.043	0.040	0.038	0.035	0.035	0.033	0.031	0.029	0.027
Ferry	0.056	0.056	0.056	0.056	0.056	0.028	0.028	0.028	0.028	0.028
Excursion	0.042	0.042	0.042	0.042	0.042	0.029	0.029	0.029	0.029	0.029
Crew boat	0.010	0.010	0.010	0.010	0.010	0.007	0.007	0.007	0.007	0.007
Work boat	0.006	0.006	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004
Government	0.006	0.006	0.006	0.006	0.006	0.004	0.004	0.004	0.004	0.004
Commercial Fishing	0.109	0.109	0.109	0.109	0.109	0.079	0.079	0.079	0.079	0.079
Recreational Vessels	0.010	0.010	0.010	0.010	0.010	0.072	0.072	0.072	0.072	0.072
Dredges	0.005	0.005	0.005	0.005	0.005	0.003	0.003	0.003	0.003	0.003
Line Haul Towboat	0.635	0.635	0.635	0.635	0.635	0.682	0.682	0.682	0.682	0.682
Overall Control Factors:	**1.000**	**0.993**	**0.986**	**0.979**	**0.967**	**1.000**	**0.995**	**0.989**	**0.984**	**0.975**

Notes:

[1] - Individual control factors calculated using the equation:
CF = 1 - (% Operating Time Reduced x Participation Rate)

[2] - Overall CFs (scaled to total Harbor Craft emissions) calculated by summing the products of each individual control factor multiplied by each vessel type's percentage of total harbor craft emissions.
Fractional CF = (individual CF * % of total)   Overall CF = sum of fractional CFs for each year and each emission control mechanism.

Percent of 2001 Baseline Emissions

Vessel Type	NO_x		PM_{10}	
Assist Tug	269.6	7.6%	10.1	5.7%
Tugboat (Unit Tows)	161.0	4.6%	6.2	3.5%
Ferry	197.2	5.6%	4.9	2.8%
Excursion	146.8	4.2%	5.2	2.9%
Crew boat	35.3	1.0%	1.3	0.7%
Work boat	21.5	0.6%	0.8	0.4%
Government	20.5	0.6%	0.7	0.4%
Commercial Fishing	384.8	10.9%	14.0	7.9%
Recreational Vessels	35.8	1.0%	12.9	7.2%
Dredges	17.3	0.5%	0.5	0.3%
Line Haul Towboat	2,240.7	63.5%	121.4	68.2%
		100%		100%

No Net Increase/Air Quality Task Force

CHE1 - Emission Standards for Heavy-Duty Nonroad Diesel Engines

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Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

Notes:
Tier 1 & 2 standards already in place.
Tier 3 will start in 2006.
For Tier 4 standards, PM emission reductions in 2008-2013, NOX in 2011-2014,
for engines >750hp in 2011-2015.

No Net Increase/Air Quality Task Force

CHE2 - Yard Tractor Modernization

DRAFT **DRAFT**

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	0.750	0.880	0.980	0.990	0.990
PM	0.570	0.820	0.970	0.980	0.990

Notes:

[1] - Control factors calculated from percent reductions developed by ARB, using the equation:
CF = 1 - % reduction

Percent Reductions Developed by ARB:

	2005	2008	2010	2012	2025
NO_x	25%	12%	2%	1%	1%
PM	43%	18%	3%	2%	1%

No Net Increase/Air Quality Task Force

CHE3 - Early ULSD for other than Yard Tractors

DRAFT **DRAFT**

PM_{10} Reduction 4% (reduction from CARB fuel currently used in CHE)

Participation Rates

Fuel	2005	2006[1]
ULSD	50%	100%

Control Factors[2]

	2005	2006
PM_{10}	0.996	0.993

Notes:

1 - This measure will only be effective until Sept. 1, 2006, when the ARB fuels regulation comes into effect.

2 - Control factors calculated using the equation:

CF = 1 - (% reduction x participation rate x % "other CHE")

Equipment Type Breakdown of 2001 Baseline CHE Emissions

	Yard Tractors	Other CHE
NO_x	78%	22%
PM_{10}	82%	18%

Measure reductions to be developed

Pollutant	% Reduction[1]
NO_x	14%
PM_{10}	63%

Participation Rates

	2005	2006	2007	2008
	34%	16%	0%	0%

Control Factors[2]

	2005	2006	2007	2008
NO_x	0.952	0.978	1.000	1.000
PM_{10}	0.786	0.899	1.000	1.000

Notes:

[1] - ARB has confirmed that emulsified diesel provides 63% PM reduction and 14% NOx reduction compared with CARB diesel fuel, and that these reductions are not dependent on fuel sulfur content (i.e., 150 ppm vs 15 ppm).

[2] - Control factors calculated using the equation:

CF = 1 - (% reduction x participation)

No Net Increase/Air Quality Task Force

CHE6 - TAC CHE Measures

DRAFT **DRAFT**

Projected Reductions (tons) from TAC Measures:

	2005	2008	2010	2012	2025
NOx	134	134	0	0	0
PM	6	6	0	0	0

Notes:

The emission reductions were taken from TAC measures documentation.

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	0.550	0.550	0.570	0.960
PM	1.000	0.550	0.600	0.640	0.950

Notes:

[1] - Control factors calculated from percent reductions developed by ARB, using the equation:
CF = 1 - % reduction

Percent Reductions Developed by ARB:

	2005	2008	2010	2012	2025
NO_x	0%	45%	45%	43%	4%
PM	0%	45%	40%	36%	5%

No Net Increase/Air Quality Task Force

CHE8 - Enhanced CHE Modernization for Other Cargo Handling Equipment[1]

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Control Factors	**2005**	**2008**	**2010**	**2012**	**2025**
NO_x	1.00	0.95	0.96	0.97	0.93
PM_{10}	1.00	0.94	0.95	0.96	0.92

Notes:

[1] - "Other CHE" includes cranes, RTGs, top picks and side picks

[2] - Control factors calculated from percent reductions developed by ARB, using the equation:
CF = 1 - % reduction

Percent Reductions Developed by ARB:

	2005	**2008**	**2010**	**2012**	**2025**
NOx	0%	5%	4%	3%	7%
PM	0%	6%	5%	4%	8%

No Net Increase/Air Quality Task Force

CHE9 - CHE at Ports & Intermodal Rail Yards

DRAFT **DRAFT**

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	0.760	0.715	0.180
PM	1.000	1.000	0.760	0.715	0.180

Notes:

[1] - 2010, 2025 control factors developed by ARB; placeholder CF for 2012 developed by straight line interpolation between 2010 and 2025.

No Net Increase/Air Quality Task Force

R1 - Tier 0, Tier 1, and Tier 2 Locomotive Standards

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Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

R2 - ARB Diesel Fuel Used by Intrastate Locomotives

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Control Factors relative to total locomotive emissions

	2005	2008	2010	2012	2025
NO_x	1.00	0.98	0.98	0.98	0.98
PM_{10}	1.00	0.97	0.99	0.99	0.98

Measure control factors (developed by ARB)

NO_x	2005	2008	2010	2012	2025
In-Port Switching	1.00	0.93	0.93	0.93	0.93
Out-of-Port Switching	1.00	0.93	0.93	0.93	0.93
In-Port Line Haul	1.00	0.95	0.95	0.95	0.95
Out-of-Port Line Haul	1.00	1.00	1.00	1.00	1.00
PM_{10}	**2005**	**2008**	**2010**	**2012**	**2025**
In-Port Switching	1.00	0.97	0.97	0.97	0.97
Out-of-Port Switching	1.00	0.97	0.97	0.97	0.97
In-Port Line Haul	1.00	0.89	0.89	0.89	0.89
Out-of-Port Line Haul	1.00	1.00	1.00	1.00	1.00

Assumptions:
Above measure requires diesel fuel with sulfur content of 15 ppm and lower aromatic content similar to California's reformulated fuel in 2007. Applicable to In-Port-Switching, Out-Of-Port Switching and In-Port Line Haul
This rule does not apply to Out-of-Port Line Haul

Emissions Percentage Breakdown (based on emission growth projections)

	2005	2008	2010	2012	2025
In-Port Switching	9.1%	10.6%	16.2%	16.2%	16.2%
Out-of-Port Switching	6.5%	7.0%	4.4%	4.4%	4.4%
In-Port Line Haul	10.6%	10.4%	10.0%	10.0%	10.0%
Out-of-Port Line Haul	73.8%	72.0%	69.3%	69.3%	69.3%
	2005	**2008**	**2010**	**2012**	**2025**
In-Port Switching	5.5%	13.4%	6.3%	6.5%	9.8%
Out-of-Port Switching	5.0%	12.0%	5.7%	5.7%	5.2%
In-Port Line Haul	9.8%	21.4%	9.7%	9.6%	9.4%
Out-of-Port Line Haul	79.7%	53.2%	78.3%	78.2%	75.6%

No Net Increase/Air Quality Task Force

R3 - Federal Standards for Nonroad Diesel Fuel

DRAFT

Control Factors relative to total locomotive emissions

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	0.999	0.985	0.985
PM_{10}	1.000	0.940	0.930	0.900	0.902

Measure control factors (developed by ARB)

NO_x	2005	2008	2010	2012	2025
In-Port Switching	1.00	1.00	1.00	0.93	0.93
Out-of-Port Switching	1.00	1.00	1.00	0.93	0.93
In-Port Line Haul	1.00	1.00	1.00	1.00	1.00
Out-of-Port Line Haul	1.00	1.00	1.00	1.00	1.00
PM_{10}	**2005**	**2008**	**2010**	**2012**	**2025**
In-Port Switching	1.00	1.00	1.00	0.97	0.97
Out-of-Port Switching	1.00	1.00	1.00	0.97	0.97
In-Port Line Haul	1.00	0.92	0.92	0.89	0.89
Out-of-Port Line Haul	1.00	0.92	0.92	0.89	0.89

Assumptions
Reductions are off the fuel adjusted baseline.
Rule requires use of federal on-road diesel fuel with S content of 330 ppm and 15 ppm in 2007 and 2012 respectively. Aromatic content remains unchanged.

Emissions Percentage Breakdown (based on emission growth projections)

	2005	2008	2010	2012	2025
In-Port Switching	9.1%	10.6%	16.2%	16.2%	16.2%
Out-of-Port Switching	6.5%	7.0%	4.4%	4.4%	4.4%
In-Port Line Haul	10.6%	10.4%	10.0%	10.0%	10.0%
Out-of-Port Line Haul	73.8%	72.0%	69.3%	69.3%	69.3%
	2005	**2008**	**2010**	**2012**	**2025**
In-Port Switching	5.5%	13.4%	6.3%	6.5%	9.8%
Out-of-Port Switching	5.0%	12.0%	5.7%	5.7%	5.2%
In-Port Line Haul	9.8%	21.4%	9.7%	9.6%	9.4%
Out-of-Port Line Haul	79.7%	53.2%	78.3%	78.2%	75.6%

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Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

R5 - PHL Fleet Modernization & ULSD

DRAFT

Replace 16 of 20 in-port switch locomotive fleet with low-emission locomotives

Control Factors relative to total locomotive emissions

	2005	2008	2010	2012	2025
Percent participation[(1)]:	40%	80%	80%	80%	80%
NO_x	0.98	0.96	0.93	0.93	0.93
PM_{10}	0.98	0.95	0.98	0.98	0.96

[(1)] Percentage of full in-port switch locomotive fleet (20 locomotives)
Full participation is the sum of participations for measures R5 and R6

Emission Reduction Percentages[(2)]

	Tier 2	ULSD
NO_x	53%	0%
PM_{10}	45%	30%

[(2)] Switch engine emission reduction percentage calculation

	Baseline (g/hp-hr)	Tier 2 Std (g/hp-hr)	Red'n	
NO_x	17.4	8.1	53%	(Tier 2 Emission Standard)
PM_{10}	0.44	0.24	45%	(Tier 2 Emission Standard)

Source of emisison reduction data: EPA Regulatory Support Document
Baseline EFs: Table 4-8, RSD
Tier 2 in-use EFs: Table 4-9, RSD

ULSD - Control Factors relative to total locomotive emissions

	2005	2008	2010	2012	2025
Percent participation[(1)]:	50%	100%	100%	100%	100%
NO_x	1.00	1.00	1.00	1.00	1.00
PM_{10}	0.99	1.00	1.00	1.00	1.00

[(1)] Percentage of full switch locomotive fleet

PHL emissions as a fraction of total locomotive emissions
(from baseline emissions inventory and ARB projections))

	2005	2008	2010	2012	2025
NO_x	9.1%	10.6%	16.2%	16.2%	16.2%
PM_{10}	5.5%	13.4%	6.3%	6.5%	9.8%

No Net Increase/Air Quality Task Force

R6 - Ultra-Low Emission Switcher Locomotives: PHL

DRAFT

Replace remaining 4 locomotives that are not part of the current Fleet Modernization Program with ultra-low-emission locomotives (hybrid or equivalent)

Control Factors relative to total locomotive emissions

	2006	**2008**	**2010**	**2012**	**2025**
Percent participation[2]:	0%	10%	20%	20%	20%
NO_x	1.00	0.99	0.97	0.97	0.97
PM_{10}	1.00	0.99	0.99	0.99	0.98

[2] Percentage of full switch locomotive fleet (20 locomotives)
Note: Total participation in replacement programs cannot exceed 100%
Full participation is the sum of participations for measures R5 and R6

Emission reduction percentage calculation

	Typical **(g/hp-hr)**	Ultra-Low **(g/hp-hr)**	Percent Reduction
NO_x	17.4	3.0	83%
PM_{10}	0.44	0.0225	95%

Notes on emission reduction estimate:
EF for typical locomotive is from Table 4-8 of EPA's RSD. The 2,000 hp is an average of switch locomotives in use at the Port.

PHL emissions as a fraction of total locomotive emissions
(from baseline emissions inventory and ARB projections))

	2005	**2008**	**2010**	**2012**	**2025**
NO_x	9.1%	10.6%	16.2%	16.2%	16.2%
PM_{10}	5.5%	13.4%	6.3%	6.5%	9.8%

No Net Increase/Air Quality Task Force

R7 - Ultra-Low Emission Switcher and Line Haul Locomotives: Class 1

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Replace Class 1 railroad locomotives with ultra-low-emission locomotives (hybrid or equivalent)

Phase 1&2 Combined Control Factor

	2006	2008	2010	2012	2025
NOx	**1.00**	**0.99**	**0.97**	**0.74**	**0.74**
PM	**1.00**	**0.98**	**0.58**	**0.17**	**0.19**

Participation rates for Phase 1 and Phase 2 are as listed in the narrative description of this measure. Control factors for each phase are calculated separately in the same manner as other control factors (below) then a combined control factor is calculated by the equation 1-((1-CF1)+(1-CF2)) (above).

Control Factors relative to total locomotive emissions

Phase 1 - Switch locomotives	2006	2008	2010	2012	2025
Percent participation:	0%	20%	60%	100%	100%
NOx	1.00	0.99	0.99	0.98	0.98
PM	1.00	0.98	0.97	0.95	0.95
Phase 2 - Line haul locomotives					
Percent participation:	0%	0%	50%	100%	100%
NOx	1.00	1.00	0.98	0.76	0.76
PM	1.00	1.00	0.61	0.22	0.24

Phase 1 - Off-Port Switchers	Baseline **(g/hp-hr)**	Ultra-Low **(g/hp-hr)**	Percent Reduction
NOx	6.8	3.0	56%
PM	0.44	0.0225	95%
Phase 2 - Line Haul Locomotives			
NOx	6.8	3.0	56%
PM	0.32	0.035	89%

EFs for baseline locomotives are from MOU provisions and Tier 2 standards
EFs for ULE locomotives are from the narrative description of this measure.

Out-of-port switching and line haul emissions as a fraction of total locomotive emissions

		2005	2008	2010	2012	2025
Out-of-Port Switching	**NOx**	6.5%	7.0%	4.4%	4.4%	4.4%
Out-of-Port Switching	**PM**	5.0%	12.0%	5.7%	5.7%	5.2%
Line Haul (In and Out of Po	**NOx**	84.4%	82.4%	79.3%	79.3%	79.3%
Line Haul (In and Out of Po	**PM**	89.5%	74.6%	88.0%	87.8%	85.0%

Emission reductions were not modeled or credited for purposes of NNI attainment; their display is included for information only.

Potential Emission Reductions, tons per year

Switch Locomotives - low	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	124.2	159.5	141.9	162.0	291.2
PM	6.2	8.1	9.3	10.5	15.5
Switch Locomotives - high	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	286.6	368.1	327.4	373.9	672.1
PM	8.1	10.6	12.1	13.8	20.3

Line Haul - Low	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	672.1	743.7	544.9	622.2	1,118.5
PM	52.8	23.8	68.1	75.9	87.6
Line Haul - High	**2005**	**2006**	**2007**	**2008**	**2009**
NOx	1,551.0	1,716.2	1,257.6	1,435.8	2,581.2
PM	69.0	31.1	89.1	99.2	114.6

These reductions estimated on the basis of the following low and high estimates of possible Tier 3 standards.

	Baseline (g/hp-hr)	Tier 3 low end (g/hp-hr)	Percent Reduction low	Tier 3 high end (g/hp-hr)	Percent Reduction high
NOx	6.8	5.0	26%	2.7	60%
PM	0.24	0.085	65%	0.035	85%

EFs for baseline locomotives are the same as R7 line hail EFs
EFs for Tier 3 locomotives are from the narrative description of this measure.

Port-related locomotive emissions

Switch Locomotives	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	477.6	613.5	545.6	623.1	1,120.2
PM	9.5	12.4	14.3	16.2	23.9
Line Haul Locomotives					
NOx	2,585.0	2,860.3	2,095.9	2,392.9	4,302.0
PM	81.2	36.6	104.8	116.8	134.8

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Line haul locomotives required to use ARB diesel fuel for port-related activities.

Control Factors relative to total locomotive emissions

	2005	2008	2010	2012	2025
NO_x	1.00	0.95	0.95	0.95	0.95
PM_{10}	1.00	0.85	0.85	0.85	0.85

These control factors were developed by ARB and will be revised pending analysis of recent information of fuel sulfur content and refueling practices.

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Automatic shut-off devices will prevent excessive idling by locomotives.

Switching and line haul combined Control Factors relative to total locomotive emissions

30-minute shut-off	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	0.995	0.989	0.989	0.989	0.990
PM_{10}	0.986	0.976	0.972	0.972	0.974

20-minute shut-off	**2005**	**2008**	**2010**	**2012**	**2025**
NOx	0.994	0.988	0.987	0.987	0.987
PM_{10}	0.984	0.972	0.969	0.969	0.970

For this measure, locomotive event recorder data was analyzed for the amount of continuous idle time in excess of 20 and 30 minutes. This excess idle time, either in excess of 20 minutes or 30 minutes, would be eliminated by idle controllers.

Control factors for switch and line haul locomotives are calculated and displayed separately on the following two pages.
Combined control factors displayed above are calculated by the equation
1-((1-CF1)+(1-CF2)).

There is no "warm start" emissions penalty for diesel engines (per Mark Carlock, ARB), so the benefit from the 20-minute shut-off compared with a 30-minute shut-off results only from a greater amount of shut-down time.

30-minute and 20-minute shut-off triggers are shown for comparison. Calculator currently reads values based on 20-minute idling cut-off.

Automatic shut-off devices will prevent excessive idling by locomotives.

Control Factors for switch engine participation relative to total locomotive emissions

30-minute shut-off	**2005**	**2008**	**2010**	**2012**	**2025**
Percent participation:	50%	100%	100%	100%	100%
NOx	0.995	0.988	0.986	0.986	0.990
PM_{10}	0.996	0.979	0.990	0.990	0.990
20-minute shut-off	**2005**	**2008**	**2010**	**2012**	**2025**
Percent participation:	50%	100%	100%	100%	100%
NOx	0.994	0.987	0.984	0.984	0.984
PM_{10}	0.995	0.976	0.989	0.989	0.986

Idling emission reduction calculation for switch engines

Overall idling % 67.4% (based on switch engine event recorder data)

30-minute shut-off

Excess idling % (30 mins)	21.6%	(idling periods in excess of 30 mins based on event recorder data)
Idling time reduction	32.0%	(excess % / overall %)

Emission reductions estimated by multiplying the percent of NOx and PM at idle by the idling time reduction listed above.

NOx	6.7%	(idling time reduction x % of NOx emissions)
PM_{10}	8.3%	(idling time reduction x % of PM emissions)

20-minute shut-off

Excess idling % (20 mins)	24.5%	(idling periods in excess of 20 mins based on event recorder data)
Idling time reduction	36.4%	(excess % / overall %)

Emission reductions estimated by multiplying the percent of NOx and PM at idle by the idling time reduction listed above.

NOx	7.6%	(idling time reduction x % of NOx emissions)
PM_{10}	9.4%	(idling time reduction x % of PM emissions)

Background Switcher data from 2001 baseline EI:

Used to determine the fraction of emissions that come from idling

Notch Position	**wt'd avg % time in mode**	**NO_x % x lb/hr**	**PM_{10} % x lb/hr**	**% of NOx Emissions**	**% of PM Emissions**
Idle	**67.4%**	**1.85**	**0.05**	**20.8%**	**25.8%**
1	5.9%	0.21	0.004	2.4%	2.1%

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Automatic shut-off devices will prevent excessive idling by locomotives.

Control Factors for line haul engine participation relative to total locomotive emissions

30-minute shut-off	**2005**	**2008**	**2010**	**2012**	**2025**
Percent participation:	50%	100%	100%	100%	100%
NOx	0.995	0.989	0.990	0.990	0.990
PM_{10}	0.985	0.975	0.970	0.970	0.971
20-minute shut-off	**2005**	**2008**	**2010**	**2012**	**2025**
Percent participation:	50%	100%	100%	100%	100%
NOx	0.994	0.988	0.988	0.988	0.988
PM_{10}	0.983	0.971	0.966	0.966	0.967

Idling emission reduction calculation for line haul engines

Overall idling %	67.4%	(based on switch engine event recorder data)
30-minute shut-off		
Excess idling % (30 mins)	21.6%	(idling periods in excess of 30 mins based on event recorder data)
Idling time reduction	32.0%	(excess % / overall %)
Emission reductions estimated by multiplying the percent of NOx and PM at idle by the idling time reduction listed above.		
NOx	1.3%	(idling time reduction x % of NOx emissions)
PM_{10}	3.4%	(idling time reduction x % of PM emissions)
20-minute shut-off		
Excess idling % (20 mins)	24.5%	(idling periods in excess of 20 mins based on event recorder data)
Idling time reduction	36.4%	(excess % / overall %)
Emission reductions estimated by multiplying the percent of NOx and PM at idle by the idling time reduction listed above.		
NOx	1.5%	(idling time reduction x % of NOx emissions)
PM_{10}	3.9%	(idling time reduction x % of PM emissions)

Background Line Haul data from 2001 baseline EI:
Used to determine the fraction of emissions that come from idling

Notch Position	**RSD avg. % in mode**	**C lb/hr x %**	**PM_{10} lb/hr x %**	**% of NOx Emissions**	**% of PM Emissions**
Idle	**38.0%**	**1.29**	**0.07**	**4.2%**	**10.6%**
1	6.5%	0.42	0.01	1.4%	1.5%

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Class 1 (line haul) railroads to improve operational efficiency through a combination of means

Control Factors relative to total locomotive emissions

	2005	2008	2010	2012	2025
NO_x	0.993	0.989	0.987	1.000	1.000
PM_{10}	0.993	0.990	0.980	1.000	1.000

ARB Estimated Emission Reduction Percentages
(applicable to both NOx and PM emissions)

Train Type		2001 - 2010	2010 - 2020
Intermodal	Line Haul	1.6%	0.0%
Mixed & Bulk	Manifest	1.6%	0.0%

Source: ARB document "Current Growth Estimates Based on BAH Report
Tables 7 and 8
Switching operations are forecast to have no reduction due to these efficiency inprovements.

Linear Interpolation

Train Type	2005	2008	2010	2012	2025
Intermodal	0.8%	1.3%	1.6%	0.0%	0.0%
Mixed & Bulk	0.8%	1.3%	1.6%	0.0%	0.0%

Line Haul emissions as a fraction of total locomotive emissions

	2005	2008	2010	2012	2025
NO_x	84.4%	82.4%	79.3%	79.3%	79.3%
PM_{10}	89.5%	74.6%	88.0%	87.8%	85.0%

No Net Increase/Air Quality Task Force

R12 - Electrification of Alameda Corridor

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Potential Emission Reductions, tons per year

	2005	2008	2010	2012	2025
NOx	129	142	104	118	213
PM_{10}	4.1	1.4	5.2	5.8	6.7

Not modeled or credited for purpose of NNI attainment

Background of estimate:

The entire Alameda Corridor is approximately 20 miles long, including approximately 10 miles below grade (the Mid-Corridor Trench)[1].

The data provided by the Weston study for the ACTA[2] lists 19.1 miles of track as included in their analysis of Alameda Corridor emission benefits.

The emission reductions presented on this worksheet are based on the 20 miles since this represents a conservatively low percentage of total mileage (compared with 19.1 miles as used in the Weston study).

If electrification is deemed appropriate only for the 10 miles of the Mid-Corridor Trench, then anticipated reductions would be approximately half the reductions presented in this worksheet.

(1) www.acta.org/newsroom_factsheet.htm

(2) *Revised Air Quality Benefits from Alameda Corridor-Related Locomotive Emission Reductions* January 27, 2005

UP mileage included in baseline EI	239
BN mileage included in baseline EI	110
Total line haul (port to edge of air basin)	349
Corridor length subject to electrification	20
Percent corridor represent of total	5.7%

Off-port line haul percent of total locomotive emissions
(from baseline emissions inventory and ARB projections)

	2005	2008	2010	2012	2025
NOx	73.3%	71.4%	68.5%	68.5%	68.5%
PM_{10}	78.1%	50.7%	76.6%	76.4%	73.4%

Percent reductions (from total locomotive emissions) based on mileage percentage

	2005	2008	2010	2012	2025
NOx	4.2%	4.1%	3.9%	3.9%	3.9%
PM_{10}	4.5%	2.9%	4.4%	4.4%	4.2%

Locomotive emissions (from baseline emissions inventory and ARB projections)

	2005	2008	2010	2012	2025
NOx	3,062.6	3,473.8	2,641.5	3,016.1	5,422.2
PM_{10}	90.7	49.1	119.1	132.9	158.7

No Net Increase/Air Quality Task Force

HDV1 - 2004 On-Road Standards for Heavy Duty Vehicles

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

HDV2 - 2007 On-Road Standards for Heavy Duty Vehicles

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

HDV3 - Gateway Cities Truck Modernization Program (Existing)

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The reductions due to this measure have been calculated as "tons reduced" rather than control factors because they are based on a discrete number of trucks and not on a percentage of the whole truck fleet.

Emission Reductions (tons per year)

		2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2012**	**2025**
HDVs replaced		135	111	111	0	0	0	0	0
Cumulative Emission	**NO_x**	19	35	51	51	51	51	51	0
Reductions	**PM_{10}**	5	9	13	13	13	13	13	0

Existing Program to Date[1]	
Trucks replaced	135
Tons per year NO_x reduced[1]	75
Tons per year PM_{10} reduced[1]	20
Direct port-related fraction[2]	25%
Tons NO_x reduced per truck	0.14
Tons PM_{10} reduced per truck	0.04

Notes:

(1) Information provided by Gateway Cities (includes reductions for activities not included in 2001 baseline)

(2) Port-related truck emissions are taken to be from port to first drop, or from pick-up and transport into port.

No Net Increase/Air Quality Task Force

HDV4 - Engine Software Upgrade

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

HDV6 - Heavy-Duty Vehicle Inspection

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

HDV7 - Periodic Smoke Inspection Program (PSIP)

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

HDV8 - Augment Truck & Bus Highway Inspections with Community-Based Inspections

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force
HDV9 - Reduced Truck Idling

DRAFT

Anticipated reductions from this measure are included in the adjusted out-year emissions growth.

No Net Increase/Air Quality Task Force

HDV10 - Expanded Truck Modernization Program

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Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	0.940	0.840	0.780	0.890
PM	1.000	0.770	0.570	0.500	0.900

Notes:

[1] - These control factors have been developed by ARB

Three additional new scenarios to be developed (but "for information only"):

1 - Replacement of old trucks with 1998 and newer, plus PM after-treatment and lean NOx catalyst.

2 - Replacement of old trucks with 2004 and newer, plus PM after-treatment.

3 - Replacement of old trucks with 2004 and newer, plus PM after-treatment and lean NOx catalyst.

No Net Increase/Air Quality Task Force

HDV11 - California HDV Standards and Fleet Modernization for Mexican Trucks

DRAFT

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	1.000	1.000	1.000	1.000

Notes:

[1] - These control factors are not quantifiable at this time.

No Net Increase/Air Quality Task Force

HDV12 - Early ULSD Implementation

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Emission Reduction Percentages

NO_x	0%
PM_{10}	4%

Early ULSD - Control Factors

	2005	
HDV participation:	5%	of truck fleet
NO_x	1.000	
PM_{10}	0.998	

Source of emission reduction percentages: ARB

Only one year of control is forecast because ULSD becomes mandatory in 2006

Control factors calculated from percent reductions developed by ARB, using the equation:

CF = 1 - (% reduction x participation)

No Net Increase/Air Quality Task Force

HDV13 - Retrofit HDVs w/ DOC

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Control Factors

		2005	2008	2010	2012	2025
Cumulative Emission	**NO_x**	1.00	1.00	1.00	1.00	1.00
Reductions	**PM_{10}**	0.980	1.00	1.000	1.00	1.00

Emission Reductions (tons per year)

		2005	2008	2010	2012	2025
Gateway Cities Retrofits		171	0	0	0	0
Cumulative Emission	**NO_x**	0.00	0.00	0.00	0.00	0.00
Reductions	**PM_{10}**	1.40	0.00	0.00	0.00	0.00

Existing Program to Date[1]

						DOC Rd'n per truck (tons per year)
Trucks replaced	135					
Tons per year NO_x reduced[1]	75					
Tons per year PM_{10} reduced[1]	20					
Direct port-related fraction[2]	20%					
Tons NO_x reduced per truck	0.111	w/o DOC	0.111	w/DOC[3]		**0.000**
Tons PM_{10} reduced per truck	0.030	. .	0.038	. .		**0.008**

DOC Control Effectiveness[3]

NO_x	0%
PM_{10}	20%

Notes:

(1) Information provided by Gateway Cities (includes reductions for activities not included in 2001 baseline)

(2) Port-related truck emissions are assumed to be from port to first drop, or from pick-up and transport into port.

(3) Average/typical DOC PM control efficiency

HDV Emissions Summary	2005	2008	2010	2012	2025
NOx	4,208.5	3,825.2	3,431.0	2,934.6	1,496.5
PM	69.0	56.2	50.7	45.6	30.3

No Net Increase/Air Quality Task Force

HDV14 - Retrofit Heavy-Duty Diesel Trucks with DPF

DRAFT

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	0.640	0.880	0.870	1.000

%Reduction for NO_X	0%
%Reduction for PM	85%

Notes:

[1] - These control factors have been developed by ARB

Applies to 1994-2003 and 2004-20006 model years.

There is no double counting between HDV14 and HDV10.

No Net Increase/Air Quality Task Force

HDV15 - PM In-Use Emission Control

DRAFT

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	0.880	0.750	0.780	0.950

Notes:

[1] - These control factors have been developed by ARB

No Net Increase/Air Quality Task Force

HDV16 - On-Board Diagnostics for Heavy-Duty Trucks

DRAFT

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	1.000	1.000	1.000	1.000

Notes:

[1] - These control factors are not quantifiable at this time.

No Net Increase/Air Quality Task Force

HDV17 - Transportation Refrigeration Units (TRU)

DRAFT

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	1.000	1.000	1.000	1.000

Notes:

[1] - These control factors are not quantifiable at this time.

No Net Increase/Air Quality Task Force

HDV18 - Truck Stop Electrification

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Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	1.000	1.000	1.000	1.000

Notes:

[1] - These control factors are not quantifiable at this time.

No Net Increase/Air Quality Task Force

HDV19 - Idling Reduction Measures

DRAFT **DRAFT**

Control Factors[1]

	2005	2008	2010	2012	2025
NO_x	1.000	1.000	1.000	1.000	1.000
PM	1.000	1.000	1.000	1.000	1.000

Notes:

[1] - These control factors are not quantifiable at this time.

APPENDIX D

FINANCIAL ATTACHMENT

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No Net Increase/Air Quality Task Force

NNI Control Measure Cost Summary

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20-Jun-05

KEY TO COLOR CODES:

Existing Regulatory Costs (to industry)	Existing regulatory requirements (may have future effective dates) with costs that will be incurred by industry
Proposed Regulatory Costs (to industry)	Proposed regulatory requirements with costs that will be incurred by industry if enacted
Non-Regulatory Industry-Funded Costs	Existing non-regulatory programs that are currently funded by industry
Proposed Non-Regulatory Industry-Funded Costs	Proposed non-regulatory programs that will be funded by industry if implemented
Non-Regulatory Port-Funded Costs	Existing non-regulatory programs that are currently funded by the port (or other entities)
Proposed Non-Regulatory Unfunded Costs	Proposed non-regulatory programs for which port/industry/other funding will be required if implemented

Summary Costs	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
Existing Regulatory Costs (to industry)	$1,000,000	$3,000,000	$4,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$30,000,000	**$288,000,000**
Proposed Regulatory Costs (to industry)	$0	$0	$0	$10,000,000	$10,000,000	$90,000,000	$50,000,000	$60,000,000	$70,000,000	$70,000,000	$80,000,000	$90,000,000	$90,000,000	$100,000,000	$100,000,000	$110,000,000	$110,000,000	$120,000,000	$120,000,000	$130,000,000	$140,000,000	**$1,550,000,000**
Non-Regulatory Industry-Funded Costs	$10,000,000	$1,000,000	$1,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	**$262,000,000**
Proposed Non-Regulatory Industry-Funded Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs	$15,600,000	$17,400,000	$2,700,000	$3,200,000	$1,400,000	$1,400,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	**$50,000,000**
Proposed Non-Regulatory Unfunded Costs (SCAQMD Rail Costing Scenario)	$10,000,000	$110,000,000	$70,000,000	$230,000,000	$200,000,000	$910,000,000	$180,000,000	$490,000,000	$200,000,000	$210,000,000	$920,000,000	$200,000,000	$480,000,000	$220,000,000	$490,000,000	$620,000,000	$240,000,000	$250,000,000	$1,130,000,000	$1,140,000,000	$1,150,000,000	**$9,450,000,000**
Prop. Non-Reg. Unfunded (Rail Group's Costing Scenario)	$11,000,000	$115,000,000	$125,000,000	$257,000,000	$228,000,000	$790,000,000	$195,000,000	$358,000,000	$245,000,000	$521,000,000	$1,841,000,000	$1,122,000,000	$1,395,000,000	$1,135,000,000	$935,000,000	$491,000,000	$228,000,000	$234,000,000	$1,114,000,000	$1,121,000,000	$1,130,000,000	**$13,591,000,000**
Total Costs (SCAQMD Rail Costing Scenario)	**$36,600,000**	**$131,400,000**	**$77,700,000**	**$263,200,000**	**$231,400,000**	**$1,021,400,000**	**$250,600,000**	**$570,600,000**	**$290,600,000**	**$300,600,000**	**$1,020,600,000**	**$310,600,000**	**$600,600,000**	**$350,600,000**	**$630,600,000**	**$770,600,000**	**$390,600,000**	**$410,600,000**	**$1,290,600,000**	**$1,310,600,000**	**$1,340,600,000**	$11,600,000,000
Total Costs (Rail Group's Rail Costing Scenario)	**$37,600,000**	**$136,400,000**	**$132,700,000**	**$290,200,000**	**$259,400,000**	**$901,400,000**	**$265,600,000**	**$438,600,000**	**$335,600,000**	**$611,600,000**	**$1,941,600,000**	**$1,232,600,000**	**$1,515,600,000**	**$1,265,600,000**	**$1,075,600,000**	**$641,600,000**	**$378,600,000**	**$394,600,000**	**$1,274,600,000**	**$1,291,600,000**	**$1,320,600,000**	$15,700,000,000

Note: Certain costs currently presented in the yellow band (Proposed Non-Regulatory Unfunded Costs) may be reassigned to the blue band (Proposed Non-Regulatory Industry-Funded Costs) after evaluation by the port and/or the NNI Task Force)

Source Category Details

Ocean-Going Vessel Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
OGV1 - New Engine Standards for Ships	Green	$/ton	$0	$0	$0	$1,200,000	$2,500,000	$3,800,000	$4,100,000	$4,400,000	$5,300,000	$6,100,000	$7,000,000	$7,800,000	$8,700,000	$9,500,000	$10,300,000	$11,200,000	$12,000,000	$12,900,000	$13,700,000	$14,600,000	$15,400,000	**$150,500,000**
OGV2 - VSR MOU	Blue	Operational	$8,600,000	$500,000	$1,100,000	$10,200,000	$10,800,000	$11,300,000	$11,700,000	$12,000,000	$12,500,000	$12,900,000	$13,400,000	$13,800,000	$14,300,000	$14,700,000	$15,200,000	$15,600,000	$16,100,000	$16,500,000	$17,000,000	$17,400,000	$17,900,000	**$263,500,000**
OGV3 - AMP	Blue	Capital	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$500,000**
		Capital	$3,900,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	
		Operational	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	**$14,700,000**
OGV4 - Auxiliary Engine Fuel Improvement Prog	Blue	Operational	$100,000	$500,000	$1,000,000	$1,500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$3,100,000**
OGV5 - New Cat3 Eng Standards (Low)	Green	$/ton	$0	$0	$0	$0	$0	$0	$5,000,000	$10,000,000	$13,100,000	$16,300,000	$19,500,000	$22,700,000	$25,900,000	$29,100,000	$32,300,000	$35,400,000	$38,600,000	$41,800,000	$45,000,000	$48,200,000	$51,400,000	**$434,300,000**
OGV6 - Reroute Cleanest Ships	Blue	$/ton	$0	$0	$0	$4,300,000	$6,900,000	$9,500,000	$7,200,000	$5,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$32,900,000**
OGV7 - Low Emissions Main Engines	Blue	Capital	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$258,600,000	$0	$258,600,000	$258,600,000	$0	$0	$847,400,000	$847,400,000	$847,400,000	**$3,318,000,000**
		Operational	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$400,000	$0	$900,000	$1,300,000	$1,300,000	$1,300,000	$2,100,000	$2,900,000	$4,900,000	**$15,100,000**
OGV8 - Cleaner Fuels for Ship Aux Engines	Blue	Operational	$0	$0	$0	$6,600,000	$7,000,000	$7,300,000	$7,600,000	$7,800,000	$8,100,000	$8,400,000	$8,700,000	$8,900,000	$9,200,000	$9,500,000	$9,800,000	$10,100,000	$10,400,000	$10,700,000	$11,000,000	$11,300,000	$11,600,000	**$164,000,000**
OGV9 - Main Eng Fuel Improvement Prog	Blue	Operational	$0	$0	$0	$3,400,000	$5,500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$8,900,000**
OGV10 - SECA	Blue	Operational	$0	$0	$0	$0	$0	$7,500,000	$7,700,000	$8,000,000	$8,300,000	$8,600,000	$8,900,000	$9,200,000	$9,500,000	$9,800,000	$10,100,000	$10,400,000	$10,700,000	$11,000,000	$11,300,000	$11,600,000	$11,900,000	**$154,500,000**
OGV11 - Expanded Auxiliary Fuel Imprv Prog	Blue	Operational	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
OGV12 - Expanded Main Eng Fuel Imprv Prog	Blue	Operational	$0	$0	$0	$9,000,000	$13,700,000	$18,500,000	$19,100,000	$19,600,000	$20,400,000	$21,100,000	$21,800,000	$22,600,000	$23,300,000	$24,100,000	$24,800,000	$25,500,000	$26,300,000	$27,000,000	$27,800,000	$28,500,000	$29,200,000	**$402,300,000**
OGV13 - Additional Auxiliary Eng Red Freq Callers	Blue	$/ton	$0	$0	$0	$0	$0	$46,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$46,200,000**
OGV14 - Retro/Repower Req Infreq Callers	Blue	Capital	$0	$0	$0	$0	$0	$520,000,000	$0	$0	$0	$0	$704,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,224,000,000**
OGV15 - Expanded VSR	Blue	Capital	$0	$40,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$40,000,000**
Add in Fuel Savings		Operational	$0	$9,400,000	$9,400,000	$28,300,000	$1,600,000	$31,400,000	$1,000,000	$33,300,000	$34,600,000	$35,800,000	$37,100,000	$38,400,000	$39,600,000	$40,900,000	$42,100,000	$43,400,000	$44,700,000	$45,900,000	$47,200,000	$48,400,000	$49,700,000	**$662,200,000**
OGV16 - Expanded AMP	Blue	Capital	$0	$10,500,000	$10,500,000	$61,200,000	$10,500,000	$65,403,750	$0	$56,246,250	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$214,350,000**
		Operational	$0	$0	$0	$24,700,000	$39,700,000	$54,800,000	$80,200,000	$105,500,000	$109,500,000	$113,500,000	$117,500,000	$121,500,000	$125,500,000	$129,400,000	$133,400,000	$137,400,000	$141,400,000	$145,400,000	$149,400,000	$153,400,000	$157,400,000	**$2,039,600,000**
OGV17 - Add In-Use Measures for Ships	Blue	$/ton	$0	$0	$0	$0	$0	$19,400,000	$23,100,000	$26,800,000	$27,800,000	$28,800,000	$29,800,000	$30,800,000	$31,800,000	$32,900,000	$33,900,000	$34,900,000	$35,900,000	$36,900,000	$37,900,000	$38,900,000	$39,900,000	**$510,000,000**
Existing Regulatory Costs (to industry)			$0	$0	$0	$1,200,000	$2,500,000	$3,800,000	$4,100,000	$4,400,000	$5,300,000	$6,100,000	$7,000,000	$7,800,000	$8,700,000	$9,500,000	$10,300,000	$11,200,000	$12,000,000	$12,900,000	$13,700,000	$14,600,000	$15,400,000	**$150,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$6,600,000	$7,000,000	$80,400,000	$43,400,000	$52,600,000	$57,300,000	$62,100,000	$66,900,000	$71,600,000	$76,400,000	$81,300,000	$86,100,000	$90,800,000	$95,600,000	$100,400,000	$105,200,000	$110,000,000	$114,800,000	**$1,310,000,000**
Non-Regulatory Industry-Funded Costs			$12,500,000	$500,000	$1,100,000	$10,200,000	$10,800,000	$11,300,000	$11,700,000	$12,000,000	$12,500,000	$12,900,000	$13,400,000	$13,800,000	$14,300,000	$14,700,000	$15,200,000	$15,600,000	$16,100,000	$16,500,000	$17,000,000	$17,400,000	$17,900,000	**$270,000,000**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$1,300,000	$1,200,000	$1,700,000	$2,200,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	$700,000	**$20,000,000**
Proposed Non-Regulatory Unfunded Costs			$0	$59,900,000	$19,900,000	$130,900,000	$77,900,000	$699,603,750	$107,500,000	$219,646,250	$164,500,000	$170,400,000	$880,400,000	$182,500,000	$447,400,000	$194,400,000	$459,800,000	$466,200,000	$213,700,000	$219,600,000	$1,073,900,000	$1,080,600,000	$1,088,600,000	**$7,960,000,000**
Total Costs			$12,500,000	$500,000	$1,100,000	$18,000,000	$20,300,000	$95,500,000	$59,200,000	$69,000,000	$75,100,000	$81,100,000	$87,300,000	$93,200,000	$99,400,000	$105,500,000	$111,600,000	$117,600,000	$123,700,000	$129,800,000	$135,900,000	$142,000,000	$148,100,000	**$9,710,000,000**

Harbor Craft Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
HC1 - New Engine Standards for Harbor Craft	Green	$/ton	$700,000	$800,000	$1,000,000	$1,100,000	$2,100,000	$3,000,000	$2,300,000	$1,600,000	$1,700,000	$1,800,000	$1,800,000	$1,900,000	$2,000,000	$2,100,000	$2,200,000	$2,200,000	$2,300,000	$2,400,000	$2,500,000	$2,500,000	$2,600,000	**$40,600,000**
HC2 - Clean Fuels for Harbor Craft	Green	Operational	$0	$0	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$500,000	$500,000	**$7,800,000**
HC3 - Early Implementation ULSD	Blue	Operational	$200,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$300,000**
HC4 - Dredging Activities	Blue	No reduction taken																						
HC5 - TAC HC Measures (Included in China Shipping Settlement Fu	Blue																							**$2,700,000**
HC6 - New Engine Stds - Cat 1/Cat 2	Green	$/ton	$0	$0	$0	$0	$0	$0	$0	$0	$400,000	$900,000	$1,300,000	$1,700,000	$2,100,000	$2,600,000	$3,000,000	$3,400,000	$3,800,000	$4,300,000	$4,700,000	$5,100,000	$5,500,000	**$38,800,000**
HC7 - Emulsified Fuel for Harbor Craft Mrn Eng	Blue	Operational	$0	$600,000	$600,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	**$40,800,000**
HC8 - In-Use HC Emission Reduction Measure (ATCM)	Blue	$/ton	$0	$0	$0	$0	$0	$5,100,000	$5,400,000	$5,700,000	$6,200,000	$6,800,000	$7,300,000	$7,800,000	$8,400,000	$8,900,000	$9,400,000	$9,900,000	$10,500,000	$11,000,000	$11,500,000	$12,100,000	$12,600,000	**$138,600,000**
HC9 - Repower Existing Craft	Blue	Capital	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$40,000,000**
HC10 - Retrofit Existing Craft	Blue	Capital	$0	$0	$0	$1,800,000	$1,800,000	$1,800,000	$1,800,000	$1,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,000,000**
HC11 - AMP Ready Staging Areas	Blue	Capital	$0	$0	$0	$200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$200,000**
Existing Regulatory Costs (to industry)			$700,000	$800,000	$1,400,000	$1,500,000	$2,500,000	$3,400,000	$2,700,000	$2,000,000	$2,100,000	$2,200,000	$2,200,000	$2,300,000	$2,400,000	$2,500,000	$2,600,000	$2,600,000	$2,700,000	$2,800,000	$2,900,000	$3,000,000	$3,100,000	**$50,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$5,100,000	$5,400,000	$5,700,000	$6,600,000	$7,700,000	$8,600,000	$9,500,000	$10,500,000	$11,500,000	$12,400,000	$13,300,000	$14,300,000	$15,300,000	$16,200,000	$17,200,000	$18,100,000	**$180,000,000**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$200,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$300,000**
Proposed Non-Regulatory Unfunded Costs			$8,000,000	$8,600,000	$8,600,000	$12,200,000	$12,000,000	$4,000,000	$4,000,000	$4,000,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	**$90,000,000**
Total Costs			$8,900,000	$9,500,000	$10,000,000	$13,700,000	$14,500,000	$12,500,000	$12,100,000	$11,700,000	$10,900,000	$12,100,000	$13,000,000	$14,000,000	$15,100,000	$16,200,000	$17,200,000	$18,100,000	$19,200,000	$20,300,000	$21,300,000	$22,400,000	$23,400,000	**$320,000,000**

No Net Increase/Air Quality Task Force

NNI Control Measure Cost Summary

DRAFT **DRAFT**

20-Jun-05

KEY TO COLOR CODES:

Existing Regulatory Costs (to industry)	Existing regulatory requirements (may have future effective dates) with costs that will be incurred by industry
Proposed Regulatory Costs (to industry)	Proposed regulatory requirements with costs that will be incurred by industry if enacted
Non-Regulatory Industry-Funded Costs	Existing non-regulatory programs that are currently funded by industry
Proposed Non-Regulatory Industry-Funded Costs	Proposed non-regulatory programs that will be funded by industry if implemented
Non-Regulatory Port-Funded Costs	Existing non-regulatory programs that are currently funded by the port (or other entities)
Proposed Non-Regulatory Unfunded Costs	Proposed non-regulatory programs for which port/industry/other funding will be required if implemented

Cargo Handling Equipment Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
CHE1 - Emission Stands. for HD Nonroad Diesel Engines	Green		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
CHE2 - YT Modernization & ULSD	Blue	Captial	$2,100,000	$4,500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$6,600,000**
		Operational	$1,000,000	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,500,000**
CHE3 - Early Impl. ULSD for non-YT	Blue	Operational	$200,000	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$500,000**
CHE4 - Alternative Yard Tractor Resolution	Blue	No reduction taken																						
CHE5 - Emulsified Fuels	Blue	Operational	$300,000	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$600,000**
CHE6 - TAC CHE Measures (Included in China Shipping Settleme	Blue																							**$800,000**
CHE7 - Expanded YT Modernization	Blue	Capital	$0	$0	$4,500,000	$6,600,000	$3,000,000	$4,500,000	$5,900,000	$6,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$31,100,000**
CHE8 - Enhanced CHE Modernization	Blue	Capital	$0	$17,900,000	$17,900,000	$0	$0	$0	$18,700,000	$18,700,000	$18,700,000	$18,700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$110,600,000**
CHE9 - CHE at Ports & IM Rail Yards	Blue	$/ton	$0	$0	$0	$0	$0	$4,300,000	$4,500,000	$4,800,000	$4,600,000	$4,400,000	$4,200,000	$4,000,000	$3,800,000	$3,600,000	$3,400,000	$3,200,000	$3,100,000	$2,900,000	$2,700,000	$2,500,000	$2,300,000	**$58,300,000**
Existing Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$4,300,000	$4,500,000	$4,800,000	$4,600,000	$4,400,000	$4,200,000	$4,000,000	$3,800,000	$3,600,000	$3,400,000	$3,200,000	$3,100,000	$2,900,000	$2,700,000	$2,500,000	$2,300,000	**$60,000,000**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$3,600,000	$5,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,200,000**
Proposed Non-Regulatory Unfunded Costs			$0	$17,900,000	$22,400,000	$6,600,000	$3,000,000	$4,500,000	$24,600,000	$25,300,000	$18,700,000	$18,700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$140,000,000**
Total Costs			$3,600,000	$23,500,000	$22,400,000	$6,600,000	$3,000,000	$8,800,000	$29,100,000	$30,100,000	$23,300,000	$23,100,000	$4,200,000	$4,000,000	$3,800,000	$3,600,000	$3,400,000	$3,200,000	$3,100,000	$2,900,000	$2,700,000	$2,500,000	$2,300,000	**$210,000,000**

Rail Locomotive Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
R1 - Tier 0, 1, 2 Locomotive Standards	Green																							
R2 - ARB Diesel Fuel Used by Intrastate Locomotives	Blue	$/ton	$0	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$200,000	$200,000	$200,000	$200,000	$200,000	**$2,500,000**
R3 - Federal Standards for Nonroad Diesel Fuel	Blue	$/ton	$0	$0	$0	$40,000	$50,000	$90,000	$250,000	$410,000	$430,000	$450,000	$470,000	$500,000	$520,000	$540,000	$560,000	$580,000	$600,000	$620,000	$640,000	$660,000	$680,000	**$8,090,000**
R4 - Railroad MOU	Green																							
R5 - PHL Modernization & ULSD Program	Blue	Capital	$4,800,000	$4,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,600,000**
		Operational	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$200,000**
R6 - Ultra-Low Emission Switcher Locomotives: PHL	Blue	Capital	$0	$0	$1,100,000	$1,100,000	$800,000	$800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$3,800,000**
		Operational	$0	$0	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	**-$1,900,000**
R7 - Ultra-Low Emission Switcher & Line Haul: Class 1	Blue	Capital	$0	$0	$0	$26,300,000	$26,300,000	$167,700,000	$26,300,000	$178,300,000	$0	$0	$0	$700,000	$700,000	$2,500,000	$700,000	$117,800,000	$0	$0	$0	$700,000	$700,000	**$548,700,000**
(SCAQMD Cost Est)		Operational	$0	$0	$0	-$1,400,000	-$1,400,000	$6,300,000	$6,300,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$7,900,000	$15,100,000	$15,100,000	$15,100,000	$15,100,000	$15,100,000	$20,000,000	**$168,500,000**
R7 - ULE Switcher & Line Haul: Class 1 (Rail Group Cost Est)	Blue	Capital/Op	$0	$0	$0	$0	$0	$0	$0	$0	$0	$270,000,000	$877,500,000	$877,500,000	$877,500,000	$877,500,000	$455,000,000	$0	$0	$0	$0	$0	$0	**$4,235,000,000**
R8 - Tier 3 Engine Standards	Not included	No reduction taken																						
R9 - ARB Diesel for Class 1 (SCAQMD Cost Est)	Blue	Operational	$0	$0	$1,900,000	$2,100,000	$2,300,000	$2,600,000	$2,700,000	$2,800,000	$2,900,000	$3,000,000	$3,100,000	$3,200,000	$3,400,000	$3,500,000	$3,500,000	$3,700,000	$3,900,000	$4,000,000	$4,100,000	$4,200,000	$4,400,000	**$61,300,000**
R9 - ARB Diesel for Class 1 (Rail Group Cost Est)	Blue	Operational	$0	$0	$51,900,000	$52,100,000	$52,300,000	$52,600,000	$52,700,000	$52,800,000	$52,900,000	$53,000,000	$53,100,000	$53,200,000	$53,400,000	$53,500,000	$3,500,000	$3,700,000	$3,900,000	$4,000,000	$4,100,000	$4,200,000	$4,400,000	**$661,300,000**
R10 - Idling Controls for Switchers & Line Haul	Blue	Capital	$0	$2,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$2,800,000**
		Operational	$0	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	-$40,000	**-$800,000**
R11 - Efficiency Improvement on In-Use Rail Equipment	Blue	$/ton	$600,000	$800,000	$900,000	$1,100,000	$1,100,000	$1,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$5,700,000**
R12 - Electrification of Alameda Corridor	Not included	No reduction taken																						
Existing Regulatory Costs (to industry)			$0	$100,000	$100,000	$140,000	$150,000	$190,000	$350,000	$510,000	$530,000	$550,000	$570,000	$600,000	$620,000	$640,000	$660,000	$680,000	$800,000	$820,000	$840,000	$860,000	$880,000	**$10,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$4,900,000	$4,900,000	$1,000,000	$1,000,000	$700,000	$700,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	-$100,000	**$10,000,000**
Proposed Non-Regulatory Unfunded Costs			$600,000	$3,560,000	$2,760,000	$28,060,000	$28,260,000	$177,760,000	$35,260,000	$188,960,000	$10,760,000	$10,860,000	$10,960,000	$11,760,000	$11,960,000	$13,860,000	$12,060,000	$136,560,000	$18,960,000	$19,060,000	$19,160,000	$19,960,000	$25,060,000	**$790,000,000**
Prop. Non-Reg. Unfunded (high end)			$600,000	$3,560,000	$52,760,000	$53,160,000	$53,360,000	$53,760,000	$52,660,000	$52,760,000	$52,860,000	$322,960,000	$930,560,000	$930,660,000	$930,860,000	$930,960,000	$458,460,000	$3,660,000	$3,860,000	$3,960,000	$4,060,000	$4,160,000	$4,360,000	**$4,900,000,000**
Total Costs (SCAQMD Rail Costing Scenario)			$5,500,000	$8,560,000	$3,860,000	$29,200,000	$29,110,000	$178,650,000	$35,510,000	$189,370,000	$11,190,000	$11,310,000	$11,430,000	$12,260,000	$12,480,000	$14,400,000	$12,620,000	$137,140,000	$19,660,000	$19,780,000	$19,900,000	$20,720,000	$25,840,000	**$810,000,000**
Total Costs (Rail Group's Rail Costing Scenario)			$5,500,000	$8,560,000	$53,860,000	$54,300,000	$54,210,000	$54,650,000	$52,910,000	$53,170,000	$53,290,000	$323,410,000	$931,030,000	$931,160,000	$931,380,000	$931,500,000	$459,020,000	$4,240,000	$4,560,000	$4,680,000	$4,800,000	$4,920,000	$5,140,000	**$4,920,000,000**

Heavy-Duty Vehicle Control Measures	*Projection Line*	*Cost Type*	2005 (2005 $)	2006 (2005 $)	2007 (2005 $)	2008 (2005 $)	2009 (2005 $)	2010 (2005 $)	2011 (2005 $)	2012 (2005 $)	2013 (2005 $)	2014 (2005 $)	2015 (2005 $)	2016 (2005 $)	2017 (2005 $)	2018 (2005 $)	2019 (2005 $)	2020 (2005 $)	2021 (2005 $)	2022 (2005 $)	2023 (2005 $)	2024 (2005 $)	2025 (2005 $)	Total Program Cost (2005 $)
HDV1 - 2004 Emission Stds	Green																							
HDV2 - 2007 Emission Stds	Green																							
HDV3 - Gateway Cities (Portion maybe funded under Near Term M	Blue	Capital	$5,600,000	$5,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$11,200,000**
HDV4 - Engine Software Upgrade	Green																							
HDV5 - ULSD	Green	Operational	$0	$2,100,000	$2,200,000	$2,300,000	$2,400,000	$2,600,000	$2,700,000	$2,900,000	$3,100,000	$3,300,000	$3,600,000	$3,800,000	$4,000,000	$4,200,000	$4,500,000	$4,700,000	$4,900,000	$5,200,000	$5,400,000	$5,600,000	$5,900,000	**$75,400,000**
HDV6 - HD I&M	Green																							
HDV7 - Periodic Smoke Inspection	Green																							
HDV8 - Community-Based Inspections	Green																							
HDV 9 - Reduced Truck Idling	Green																							
HDV10 - Exp Gateway Cities	Not included	Capital	$0	$13,800,000	$15,300,000	$39,200,000	$75,000,000	$0	$0	$41,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$184,500,000**
HDV11 - CA HDV Stds & Fleet Mod for Mexican Trucks	Not included																							
HDV12 - Early ULSD Implementation	Blue	Operational	$200,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$300,000**
HDV13 - Retrofit HDVs with DOCs	Blue	Capital	$700,000	$700,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$1,400,000**
HDV14 - Retrofit HDVs w/ DPFs	Blue	Capital	$0	$6,300,000	$2,600,000	$7,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$16,300,000**
HDV15 - PM In-Use Emission Control	Blue	$/ton	$0	$0	$0	$1,089	$1,568	$2,047	$1,834	$1,620	$1,514	$1,409	$1,303	$1,197	$1,091	$985	$879	$774	$668	$562	$456	$350	$244	**$20,000**
HDV16 - On-Board Diagnostics	Not included	No reduction taken																						
HDV17 - Transportation Refrigeration Units	Not included	No reduction taken																						
HDV18 - Electrified Truck Spaces	Not included	No reduction taken																						
Existing Regulatory Costs (to industry)			$0	$2,100,000	$2,200,000	$2,300,000	$2,400,000	$2,600,000	$2,700,000	$2,900,000	$3,100,000	$3,300,000	$3,600,000	$3,800,000	$4,000,000	$4,200,000	$4,500,000	$4,700,000	$4,900,000	$5,200,000	$5,400,000	$5,600,000	$5,900,000	**$80,000,000**
Proposed Regulatory Costs (to industry)			$0	$0	$0	$1,089	$1,568	$2,047	$1,834	$1,620	$1,514	$1,409	$1,303	$1,197	$1,091	$985	$879	$774	$668	$562	$456	$350	$244	**$20,000**
Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Proposed Non-Regulatory Industry-Funded Costs			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Non-Regulatory Port-Funded Costs			$5,600,000	$5,600,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$11,000,000**
Proposed Non-Regulatory Unfunded Costs			$900,000	$20,900,000	$17,900,000	$46,600,000	$75,000,000	$0	$0	$41,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$200,000,000**
Total Costs			$6,500,000	$28,600,000	$20,100,000	$48,901,089	$77,401,568	$2,602,047	$2,701,834	$44,101,620	$3,101,514	$3,301,409	$3,601,303	$3,801,197	$4,001,091	$4,200,985	$4,500,879	$4,700,774	$4,900,668	$5,200,562	$5,400,456	$5,600,350	$5,900,244	**$290,000,000**

Administration/Research & Development Costs			2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
NNI Program Administration (3% of non-reg cost)			$300,000	$3,000,000	$2,000,000	$7,000,000	$6,000,000	$27,000,000	$5,000,000	$15,000,000	$6,000,000	$6,000,000	$28,000,000	$6,000,000	$14,000,000	$7,000,000	$15,000,000	$19,000,000	$7,000,000	$8,000,000	$34,000,000	$34,000,000	$35,000,000	**$280,000,000**
NNI Measure Research & Development			$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$21,000,000**
Total Costs			$1,300,000	$4,000,000	$3,000,000	$8,000,000	$7,000,000	$28,000,000	$6,000,000	$15,000,000	$7,000,000	$7,000,000	$28,000,000	$7,000,000	$15,000,000	$7,000,000	$15,000,000	$19,000,000	$8,000,000	$8,000,000	$34,000,000	$34,000,000	$35,000,000	**$301,000,000**

No Net Increase / Air Quality Task Force
NNI Control Measure Cost Summary - by projection type

PRELIMINARY DRAFT **PRELIMINARY DRAFT**

20-Jun-05

SUMMARY and KEY TO COLOR CODES:	Total Program Cost (2005 $)
Measures included in green (non-NNI projection) emissions line	**$800,000,000**
Measures included in blue (NNI) emissions line (low cost estimate)	**$10,600,000,000**
Measures included in blue (NNI) emissions line (high cost estimate)	**$14,700,000,000**

Source Category Details

Ocean-Going Vessel Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
OGV1 - New Engine Standards for Ships	Green		$150,500,000
OGV2 - VSR MOU	Blue	Operational	$263,500,000
OGV3 - AMP	Blue	Capital	$500,000
	Blue	Capital	$3,900,000
	Blue	Operational	$14,700,000
OGV4 - Auxiliary Engine Fuel Improvement Prog	Blue	Operational	$3,100,000
OGV5 - New Cat3 Eng Standards (Low)	Green		$434,300,000
OGV6 - Reroute Cleanest Ships	Blue		$32,900,000
OGV7 - Low Emissions Main Engines	Blue	Capital	$3,318,000,000
	Blue	Operational	$15,100,000
OGV8 - Cleaner Fuels for Ship Aux Engines	Blue	Operational	$164,000,000
OGV9 - Main Eng Fuel Improvement Prog	Blue	Operational	$8,900,000
OGV10 - SECA	Blue	Operational	$154,500,000
OGV11 - Expanded Auxiliary Fuel Imprv Prog	Blue	Operational	$0
OGV12 - Expanded Main Eng Fuel Imprv Prog	Blue	Operational	$402,300,000
OGV13 - Additional Auxiliary Eng Red Freq Callers	Blue	Cap/Op	$46,200,000
OGV14 - Retro/Repower Req Infreq Callers	Blue	Capital	$1,224,000,000
OGV15 - Expanded VSR	Blue	Capital	$40,000,000
Add in Fuel Savings	Blue	Operational	$662,200,000
OGV16 - Expanded AMP	Blue	Capital	$214,350,000
	Blue	Operational	$2,039,600,000
OGV17 - Add In-Use Measures for Ships	Blue		$510,000,000
Total OGV Green Projection Line			**$600,000,000**
Total OGV Blue Projection Line			**$9,100,000,000**

Harbor Craft Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
HC1 - New Engine Standards for Harbor Craft	Green		$40,600,000
HC2 - Clean Fuels for Harbor Craft	Green	Operational	$7,800,000
HC3 - Early Implementation ULSD	Blue	Operational	$300,000
HC4 - Dredging Activities			$0
HC5 - TAC HC Measures (Included in China Shipping Settlem	Blue		$2,700,000
HC6 - New Engine Stds - Cat 1/Cat 2	Green		$38,800,000
HC7 - Emulsified Fuel for Harbor Craft Mrn Eng	Blue	Operational	$40,800,000
HC8 - In-Use HC Emission Reduction Measure	Blue		$138,600,000
HC9 - Repower Existing Craft	Blue	Capital	$40,000,000
HC10 - Retrofit Existing Craft	Blue	Capital	$9,000,000
HC11 - AMP Ready Staging Areas	Blue	Capital	$200,000
Total Green Projection Line			**$90,000,000**
Total Blue Projection Line			**$230,000,000**

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NNI Control Measure Cost Summary - by projection type

PRELIMINARY DRAFT **PRELIMINARY DRAFT**

20-Jun-05

SUMMARY and KEY TO COLOR CODES:	Total Program Cost (2005 $)
Measures included in green (non-NNI projection) emissions line	**$800,000,000**
Measures included in blue (NNI) emissions line (low cost estimate)	**$10,600,000,000**
Measures included in blue (NNI) emissions line (high cost estimate)	**$14,700,000,000**

Cargo Handling Equipment Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
CHE1 - Emission Stands. for HD Nonroad Diesel Engines	Green		$0
CHE2 - YT Modernization & ULSD	Blue	Captial	$6,600,000
	Blue	Operational	$1,500,000
CHE3 - Early Impl. ULSD for non-YT	Blue	Operational	$500,000
CHE4 - Alternative Yard Tractor Resolution			$0
CHE5 - Emulsified Fuels	Blue	Operational	$600,000
CHE6 - TAC CHE Measures (Included in China Shipping Se	Blue		$800,000
CHE7 - Expanded YT Modernization	Blue	Captial	$31,100,000
CHE8 - Enhanced CHE Modernization	Blue	Captial	$110,600,000
CHE9 - CHE at Ports & IM Rail Yards	Blue		$58,300,000
Total Green Projection Line			**$0**
Total Blue Projection Line			**$210,000,000**

Rail Locomotive Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
R1 - Tier 0, 1, 2 Locomotive Standards	Green		$0
R2 - ARB Diesel Fuel Used by Intrastate Locomotives	Blue	Operational	$2,500,000
R3 - Federal Standards for Nonroad Diesel Fuel	Blue	Operational	$8,090,000
R4 - Railroad MOU	Green		$0
R5 - PHL Modernization & ULSD Program	Blue	Capital	$9,600,000
	Blue	Operational	$200,000
R6 - Ultra-Low Emission Switcher Locomotives: PHL	Blue	Capital	$3,800,000
	Blue	Operational	-$1,900,000
R7 - Ultra-Low Emission Switcher & Line Haul: Class 1	Blue	Capital	$548,700,000
(low end)	Blue	Operational	$168,500,000
R7 - ULE Switcher & Line Haul: Class 1 (high end)	Blue	Capital/Op	$4,235,000,000
R8 - Tier 3 Engine Standards			$0
R9 - ARB Diesel Fuel for Class 1 Locomotives (low)	Blue	Operational	$61,300,000
R9 - ARB Diesel Fuel for Class 1 Locomotives (high)	Blue	Capital/Op	$661,300,000
R10 - Idling Controls for Switchers & Line Haul	Blue	Capital	$2,800,000
	Blue	Operational	-$800,000
R11 - Efficiency Improvement on In-Use Rail Equipment	Blue		$5,700,000
Total Green Projection Line			**$0**
Total Blue Projection Line (low end)			**$810,000,000**
Total Blue Projection Line (high end)			**$4,900,000,000**

No Net Increase / Air Quality Task Force

NNI Control Measure Cost Summary - by projection type

PRELIMINARY DRAFT **PRELIMINARY DRAFT**

20-Jun-05

SUMMARY and KEY TO COLOR CODES:	Total Program Cost (2005 $)
Measures included in green (non-NNI projection) emissions line	**$800,000,000**
Measures included in blue (NNI) emissions line (low cost estimate)	**$10,600,000,000**
Measures included in blue (NNI) emissions line (high cost estimate)	**$14,700,000,000**

Heavy-Duty Vehicle Control Measures	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
HDV1 - 2004 Emission Stds	Green		$0
HDV2 - 2007 Emission Stds	Green		$0
HDV3 - Gateway Cities	Blue	Capital	$11,200,000
HDV4 - Engine Software Upgrade	Green		$0
HDV5 - ULSD	Green	Operational	$75,400,000
HDV6 - HD I&M	Green		$0
HDV7 - Periodic Smoke Inspection	Green		$0
HDV8 - Community-Based Inspections	Green		$0
HDV 9 - Reduced Truck Idling	Green		$0
HDV10 - Exp Gateway Cities		Capital	$184,500,000
HDV11 - CA HDV Stds & Fleet Mod for Mexican Trucks			$0
HDV12 - Early ULSD Implementation	Blue	Operational	$300,000
HDV13 - Retrofit HDVs with DOCs	Blue	Capital	$1,400,000
HDV14 - Retrofit HDVs w/ DPFs	Blue		$16,300,000
HDV15 - PM In-Use Emission Control	Blue		$20,000
HDV16 - On-Board Diagnostics			$0
HDV17 - Transportation Refrigeration Units			$0
HDV18 - Electrified Truck Spaces			$0
Total Green Projection Line			**$80,000,000**
Total Blue Projection Line			**$210,000,000**

Administration/Research & Development Costs	*Projection Line*	*Cost Type*	Total Program Cost (2005 $)
NNI Program Administration (3% of non-reg cost)	Blue	Admin	**$280,000,000**
NNI Measure Research & Development	Blue	R&D	**$21,000,000**

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Extrapolation of Estimated Measure Costs

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Measures		Totals	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
OGV1	Est. Cost	$150,395,882	$0	$0	$0	$1,200,797	$2,486,609	$3,772,422	$4,105,602	$4,438,781	$5,281,501	$6,124,221
New Engine Standards for Ships	NOx (tons)	3,591.4	0.0	0.0	0.0	28.7	59.4	90.2	98.1	106.0	126.1	146.2
	PM (tons)	52.4	0.0	0.0	0.0	0.4	0.8	1.2	1.4	1.6	1.9	2.2
OGV5	Est. Cost	$434,261,263	$0	$0	$0	$0	$0	$0	$4,978,907	$9,957,815	$13,143,232	$16,328,649
New Cat3 Eng Standards	NOx (tons)	10,521.3	0.0	0.0	0.0	0.0	0.0	0.0	120.6	241.3	318.4	395.6
	PM (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OGV6	Est. Cost	$32,846,592	$0	$0	$0	$4,271,800	$6,878,533	$9,485,265	$7,232,086	$4,978,907	$0	$0
Reroute Cleanest Ships	NOx (tons)	795.8	0.0	0.0	0.0	103.5	166.7	229.8	175.2	120.6	0.0	0.0
(Main engines)	PM (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OGV13	Est. Cost	$46,160,934	$0	$0	$0	$0	$0	$46,160,934	$0	$0	$0	$0
Additional Aux Eng Red Freq Callers	NOx (tons)	1,075.6	0.0	0.0	0.0	0.0	0.0	1,075.6	0.0	0.0	0.0	0.0
(Auxiliary engines)	PM (tons)	42.8	0.0	0.0	0.0	0.0	0.0	42.8	0.0	0.0	0.0	0.0
OGV17	Est. Cost	$510,188,676	$0	$0	$0	$0	$0	$19,471,024	$23,142,184	$26,813,345	$27,826,407	$28,839,469
Add In-Use Measures for Ships	NOx (tons)	30,069.6	0.0	0.0	0.0	0.0	0.0	1,149.2	1364.7	1,580.2	1639.9	1699.6
(All Engines)	PM (tons)	89.5	0.0	0.0	0.0	0.0	0.0	1.8	3.3	4.8	5.0	5.2
HC1	Est. Cost	$40,680,952	$680,798	$835,238	$989,678	$1,144,118	$2,088,911	$3,033,704	$2,324,564	$1,615,423	$1,691,995	$1,768,566
New Engine Standards for Harbor Craft	NOx (tons)	6,323.7	106.6	130.6	154.5	178.5	322.2	465.8	358.8	251.7	263.6	275.5
	PM (tons)	151.8	1.8	2.4	3.0	3.6	10.3	17.1	11.3	5.4	5.7	6.0
HC6	Est. Cost	$38,760,587	$0	$0	$0	$0	$0	$0	$0	$0	$425,941	$851,881
New Engine Stds - Cat 1/Cat 2	NOx (tons)	5,867.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.5	129.0
	PM (tons)	302.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	6.6
HC8	Est. Cost	$138,725,084	$0	$0	$0	$0	$0	$5,144,399	$5,431,638	$5,718,878	$6,247,282	$6,775,686
In-Use Emission Reduction Measure	NOx (tons)	20,639.7	0.0	0.0	0.0	0.0	0.0	788.3	829.3	870.3	945.4	1020.6
	PM (tons)	1,442.4	0.0	0.0	0.0	0.0	0.0	30.6	35.3	40.1	49.0	58.0
CHE9	Est. Cost	$58,154,786	$0	$0	$0	$0	$0	$4,253,030	$4,509,923	$4,766,817	$4,576,228	$4,385,639
CHE at Ports & IM Rail Yards	NOx (tons)	8,363.2	0.0	0.0	0.0	0.0	0.0	611.4	648.5	685.5	658.1	630.7
	PM (tons)	380.9	0.0	0.0	0.0	0.0	0.0	28.0	29.6	31.2	30.0	28.7
R3	Est. Cost	$8,107,593	$0	$0	$0	$42,749	$53,819	$87,031	$249,592	$412,152	$433,078	$454,004
Federal Standards for Nonroad Diesel Fuel	NOx (tons)	504.2	0.0	0.0	0.0	0.0	0.0	1.7	13.1	24.5	26.1	27.7
	PM (tons)	127.9	0.0	0.0	0.0	3.3	4.2	5.1	6.4	7.6	7.7	7.7
R11	Est. Cost	$5,682,864	$628,286	$773,987	$919,688	$1,065,389	$1,120,301	$1,175,214	$0	$0	$0	$0
Efficiency Improvement on In-Use Equip	NOx (tons)	108.6	12.1	15.0	17.8	20.6	21.3	21.9	0.0	0.0	0.0	0.0
	PM (tons)	4.2	0.4	0.4	0.5	0.5	1.0	1.4	0.0	0.0	0.0	0.0
HDV15	Est. Cost	$19,590	$0	$0	$0	$1,089	$1,568	$2,047	$1,834	$1,620	$1,514	$1,409
PM In-Use Emission Control	NOx (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PM (tons)	121.4	0.0	0.0	0.0	6.7	9.7	12.7	11.4	10.0	9.4	8.7

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Extrapolation of Estimated Measure Costs
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Measures		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
OGV1	Est. Cost	$6,966,941	$7,809,661	$8,652,381	$9,495,101	$10,337,821	$11,180,541	$12,023,261	$12,865,981	$13,708,701	$14,551,421	$15,394,141
New Engine Standards for Ships	NOx (tons)	166.3	186.5	206.6	226.7	246.9	267.0	287.1	307.2	327.4	347.5	367.6
	PM (tons)	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.3
OGV5	Est. Cost	$19,514,066	$22,699,483	$25,884,900	$29,070,317	$32,255,734	$35,441,151	$38,626,568	$41,811,985	$44,997,402	$48,182,819	$51,368,236
New Cat3 Eng Standards	NOx (tons)	472.8	550.0	627.1	704.3	781.5	858.7	935.8	1013.0	1090.2	1167.4	1,244.5
	PM (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OGV6	Est. Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Reroute Cleanest Ships	NOx (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Main engines)	PM (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OGV13	Est. Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Additional Aux Eng Red Freq Callers	NOx (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(Auxiliary engines)	PM (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OGV17	Est. Cost	$29,852,531	$30,865,593	$31,878,655	$32,891,717	$33,904,779	$34,917,841	$35,930,903	$36,943,965	$37,957,027	$38,970,088	$39,983,150
Add In-Use Measures for Ships	NOx (tons)	1759.3	1819.0	1878.7	1938.4	1998.1	2057.8	2117.5	2177.2	2236.9	2296.6	2,356.3
(All Engines)	PM (tons)	5.4	5.6	5.8	5.9	6.1	6.3	6.5	6.7	6.8	7.0	7.2
HC1	Est. Cost	$1,845,138	$1,921,710	$1,998,281	$2,074,853	$2,151,424	$2,227,996	$2,304,568	$2,381,139	$2,457,711	$2,534,282	$2,610,854
New Engine Standards for Harbor Craft	NOx (tons)	287.4	299.3	311.2	323.1	335.0	346.9	358.8	370.7	382.6	394.5	406.4
	PM (tons)	6.3	6.6	6.9	7.2	7.5	7.8	8.0	8.3	8.6	8.9	9.2
HC6	Est. Cost	$1,277,822	$1,703,762	$2,129,703	$2,555,643	$2,981,584	$3,407,524	$3,833,465	$4,259,405	$4,685,346	$5,111,286	$5,537,227
New Engine Stds - Cat 1/Cat 2	NOx (tons)	193.4	257.9	322.4	386.9	451.3	515.8	580.3	644.8	709.2	773.7	838.2
	PM (tons)	10.0	13.3	16.6	19.9	23.3	26.6	29.9	33.2	36.6	39.9	43.2
HC8	Est. Cost	$7,304,090	$7,832,494	$8,360,897	$8,889,301	$9,417,705	$9,946,109	$10,474,513	$11,002,917	$11,531,321	$12,059,725	$12,588,129
In-Use Emission Reduction Measure	NOx (tons)	1095.7	1170.9	1246.0	1321.2	1396.3	1471.5	1546.6	1621.8	1696.9	1772.1	1,847.2
	PM (tons)	67.0	75.9	84.9	93.8	102.8	111.8	120.7	129.7	138.6	147.6	156.6
CHE9	Est. Cost	$4,195,050	$4,004,461	$3,813,872	$3,623,283	$3,432,694	$3,242,105	$3,051,516	$2,860,927	$2,670,338	$2,479,749	$2,289,159
CHE at Ports & IM Rail Yards	NOx (tons)	603.3	575.9	548.5	521.1	493.7	466.3	438.9	411.5	384.0	356.6	329.2
	PM (tons)	27.5	26.2	25.0	23.7	22.5	21.2	20.0	18.7	17.5	16.2	15.0
R3	Est. Cost	$474,930	$495,856	$516,783	$537,709	$558,635	$579,561	$600,487	$621,413	$642,339	$663,265	$684,191
Federal Standards for Nonroad Diesel Fuel	NOx (tons)	29.3	30.9	32.5	34.1	35.8	37.4	39.0	40.6	42.2	43.8	45.4
	PM (tons)	7.7	7.7	7.8	7.8	7.8	7.8	7.8	7.9	7.9	7.9	7.9
R11	Est. Cost	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Efficiency Improvement on In-Use Equip	NOx (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PM (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HDV15	Est. Cost	$1,303	$1,197	$1,091	$985	$879	$774	$668	$562	$456	$350	$244
PM In-Use Emission Control	NOx (tons)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PM (tons)	8.1	7.4	6.8	6.1	5.4	4.8	4.1	3.5	2.8	2.2	1.5

No Net Increase/Air Quality Task Force

Extrapolation of Estimated Measure Costs
Ocean-Going Vessels
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Legend
Fuels-based measures
Engine/retrofit-based measures
Operational improvements
All costed measures

Measure	Measure Focus		Reduction tons	Cost $	Cost Factor $ / ton	Extrapolated Cost
OGV1 - New Engine Standards for Ships	Engine Stds					
Adopted (aux. engines)		NOx	3,591.4	$150,395,882		$150,395,882
Reductions are in projected (green line) baseline		PM	52.4			
OGV2 - VSR MOU	Operational improvements					
Adopted		NOx	38,852.6	$263,500,000	$6,782	
(Main engines)		PM	0.0			
OGV3 - AMP	Operational improvements					
Adopted		NOx	700.2	$19,300,000	$27,565	
(Auxiliary engines)		PM	27.7		$696,600	
OGV4 - Auxiliary Engine Fuel Improvement Prog	Fuels					
Adopted		NOx	0.0	$3,100,000		
(Auxiliary engines)		PM	2.0		$1,551,644	
OGV5 - New Cat3 Eng Standards (Low)	Engine Stds					
Additional (main engines)		NOx	10,521.3	$434,261,263		$434,261,263
Reductions are in projected (green line) baseline		PM	0.0			
OGV5 - New Cat3 Eng Standards (High)	Engine Stds					
Additional		NOx	0.0	$0		
(Main engines)		PM	0.0			
OGV6 - Reroute Cleanest Ships	Engine Stds					
Additional		NOx	795.8	$32,846,592		$32,846,592
(Main engines)		PM	0.0			
OGV7 - Low Emissions Main Engines (Low)	Engine Stds					
Additional		NOx	92,843.3	$3,333,100,000	$35,900	
(Main engines)		PM	0.0			
OGV7 - Low Emissions Main Engines (High)	Engine Stds					
Additional		NOx	0.0			
(Main engines)		PM	0.0			
OGV8 - Cleaner Fuels for Ship Aux Engines	Fuels					
Additional		NOx	15,526.9	$164,000,000	$10,562	
(Auxiliary engines)		PM	3,391.5		$48,356	
OGV9 - Main Eng Fuel Improvement Prog	Fuels					
Additional		NOx	0.0	$8,900,000		
(Main engines)		PM	149.5		$59,527	
OGV10 - SECA	Fuels					
Additional		NOx	0.0	$154,500,000		
(Main engines)		PM	4,472.7		$34,543	

No Net Increase/Air Quality Task Force

Extrapolation of Estimated Measure Costs
Ocean-Going Vessels
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Fuels-based measures
Engine/retrofit-based measures
Operational improvements
All costed measures

Measure	Measure Focus		Reduction tons	Cost $	Cost Factor $ / ton	Extrapolated Cost
OGV11 - Expanded Auxiliary Fuel Imprv Prog	Fuels					
Additional		NOx	0.0	$0		
(Auxiliary engines)		PM	0.0			
OGV12 - Expanded Main Eng Fuel Imprv Prog	Fuels					
Additional		NOx	22,187.9	$402,300,000	$18,132	
(Main engines)		PM	10,835.7		$37,127	
OGV13 - Additional Auxiliary Eng Red Freq Callers	Retrofit/repower					
Additional		NOx	1,075.6	$46,160,934		$46,160,934
(Auxiliary engines)		PM	42.8			
OGV14 - Retro/Repower Req Infreq Callers	Retrofit/repower					
Additional		NOx	12,577.8	$1,224,000,000	$97,314	
(Auxiliary engines)		PM	498.8		$2,453,803	
OGV15 - Expanded VSR	Operational improvements					
Adopted		NOx	55,501.6	$702,200,000	$12,652	
(Main engines)		PM	0.0			
OGV16 - Expanded AMP	Operational improvements					
Additional		NOx	68,808.6	$2,253,953,920	$32,757	
(Auxiliary engines)		PM	2,732.6		$824,841	
OGV17 - Add In-Use Measures for Ships (Low)	Operational improvements					
Proposed		NOx	30,069.6	$510,188,676		$510,188,676
(All Engines)		PM	89.5			
OGV17 - Add In-Use Measures for Ships (High)	Operational improvements					
Proposed		NOx	0.0			
(All Engines)		PM	0.0			

	NOx plus (PM*10)		
Fuels-based measures	226,228.9	$732,800,000	$3,239
Engine/retrofit-based measures	110,409.3	$4,557,100,000	$41,275
Operational improvements	191,466.0	$3,238,953,920	$16,917
All costed measures	528,104.2	$8,528,853,920	$16,150

No Net Increase/Air Quality Task Force

Extrapolation of Estimated Measure Costs

Harbor Craft

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Fuels-based measures
Engine/retrofit-based measures
All costed measures

Measure	Measure Focus		Reduction tons	Cost $	Cost Factor $ / ton	Extrapolated Cost
HC1 - New Engine Standards for Harbor Craft	Engine Stds					
Adopted		NOx	6,323.7	$40,680,952		$40,680,952
Reductions are in projected (green line) baseline		PM	151.8			
HC2 - Clean Fuels for Harbor Craft	Fuels					
Adopted		NOx	1,960.6	$7,800,000	$3,978	
Reductions are in projected (green line) baseline		PM	261.8		$29,795	
HC3 - Early Implementation ULSD	Fuels					
Adopted		NOx	49.8	$300,000	$6,019	
		PM	6.2		$48,272	
HC4 - Dredging Activities	Engine Stds					
Adopted		NOx	0.0	$0		
Measure not used for NNI calculations		PM	0.0			
HC5 - TAC HC Measures	Retrofit/repower					
Adopted		NOx	772.1	$2,721,846		$5,290,888
		PM	70.2			
HC6 - New Engine Stds - Cat 1/Cat 2	Engine Stds					
Additional		NOx	5,867.4	$38,760,587		$38,760,587
Reductions are in projected (green line) baseline		PM	302.5			
HC7 - Emulsified Fuel for Harbor Craft Mrn Eng	Fuels					
Additional		NOx	7,254.3	$40,800,000	$5,624	
		PM	1,240.2		$32,897	
HC8 - In-Use Emission Reduction Measure (ATCM)	Retrofit/repower					
Proposed		NOx	20,639.7	$138,725,084		$138,725,084
		PM	1,442.4			
HC9 - Repower Existing Craft	Retrofit/repower					
Additional		NOx	1,919.0	$40,000,000	$20,845	
		PM	0.0			
HC10 - Retrofit Existing Craft	Retrofit/repower					
Additional		NOx	2,379.6	$9,000,000	$3,782	
		PM	350.1		$25,706	
HC11 - AMP Ready Staging Areas	Operational improvements					
Proposed		NOx	1,557.6	$200,000	$128	
		PM	59.2		$3,378	

	NOx plus (PM*10)			
Fuels-based measures	24,347.2	$48,900,000	$2,008	
Engine/retrofit-based measures	7,799.8	$49,000,000	$6,282	
All costed measures	32,147.0	$97,900,000	$3,045	

No Net Increase/Air Quality Task Force

Extrapolation of Estimated Measure Costs
Cargo Handling Equipment
DRAFT

Fuels-based measures
Engine/retrofit-based measures
All costed measures

Measure	Measure Focus		Reduction tons	Cost $	Cost Factor $ / ton	Extrapolated Cost
CHE1 - Emission Stds. for HD Nonroad Diesel Engines	Engine Stds					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
CHE2 - YT Modernization & ULSD	Engine Stds					
Adopted		NOx	2,272.3	$8,100,000	$3,565	
		PM	191.8		$42,238	
CHE3 - Early Impl. ULSD for non-YT	Fuels					
Adopted		NOx	0.0	$500,000		
		PM	1.0		$514,213	
CHE4 - Alternative Yard Tractor Resolution	Engines/Fuels/Retrofit/ Repower					
Adopted		NOx	0.0	$0		
		PM	0.0			
CHE5 - Emulsified Fuels	Fuels					
Adopted		NOx	233.7	$600,000	$2,567	
		PM	57.8		$10,380	
CHE6 - TAC CHE Measures	Fuels/Retrofit/Repower					
Adopted		NOx	603.0	$762,410		$4,072,232
		PM	27.0			
CHE7 - Expanded YT Modernization	Engine Stds					
Additional		NOx	11,838.0	$31,100,000	$2,627	
		PM	471.9		$65,910	
CHE8 - Enhanced CHE Modernization	Engine Stds/Retrofit/repower					
Additional		NOx	1,127.9	$110,600,000	$98,058	
		PM	64.9		$1,703,281	
CHE9 - CHE at Ports & IM Rail Yards	Retrofit/repower					
Proposed		NOx	8,363.2	$58,154,786		$58,154,786
		PM	380.9			

	NOx plus (PM*10)			
Fuels-based measures	821.5	$1,100,000	$1,339	
Engine/retrofit-based measures	22,523.7	$149,800,000	$6,651	
All costed measures	23,345.2	$150,900,000	$6,464	

Fuels-based measures
Engine/retrofit-based measures
All costed measures

No Net Increase/Air Quality Task Force

Extrapolation of Estimated Measure Costs
Locomotives
DRAFT

Measure	Measure Focus		Reduction tons	Cost $	Cost Factor $ / ton	Extrapolated Cost
R1 - Tier 0, 1, 2 Locomotive Standards	Engine Stds					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
R2 - ARB Diesel Fuel Used by Intrastate Locomotives	Fuels					
Adopted		NOx	767.7	$2,500,000	$3,256	
Reductions are in projected (green line) baseline		PM	21.6		$115,480	
R3 - Federal Standards for Nonroad Diesel Fuel	Fuels					
Adopted		NOx	504.2	$8,107,593		$8,107,593
Reductions are in projected (green line) baseline		PM	127.9			
R4 - Railroad MOU	Engine Stds					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
R5 - PHL Modernization & ULSD Program	Retrofit/Repower					
Adopted		NOx	2,782.8	$9,800,000	$3,522	
		PM	45.8		$213,774	
R6 - Ultra-Low Emission Switcher Locomotives: PHL	Engine Stds					
		NOx	1,108.3	$1,900,000	$1,714	
Additional		PM	19.3		$98,513	
R7 - Ultra-Low Emission Switcher & Line Hauls: Class 1	Engine Stds					
Additional		NOx	8,477.5	$717,200,000	$84,600	
		PM	994.3		$721,343	
R8 - Tier 3 Engine Standards	Engine Stds					
Additional (illustration only)		NOx	16,263.8	$0		$995,428,934
Measure not used for NNI calculations		PM	852.7			
R9 - ARB Diesel Fuel for Class 1 Locomotives	Fuels					
Additional		NOx	1,943.3	$61,300,000	$31,544	
		PM	204.6		$299,604	
R10 - Idling Controls for Switcher & Line Hauls	Engine/Retrofit/repower					
Additional		NOx	541.1	$664,016,798	$1,227,173	
		PM	44.8		$14,830,219	
R11 - Efficiency Improvement on In-Use Equipment	Operational improvements					
Additional		NOx	108.6	-$800,000		$5,682,864
		PM	4.2			
R12 - Electrification of Alameda Corridor	Operational improvements					
Additional		NOx	0.0	$5,682,864		
Measure not used for NNI calculations		PM	0.0			

	NOx plus (PM*10)		
Fuels-based measures	4,973.6	$63,800,000	$12,828
Engine/retrofit-based measures	23,951.3	$1,392,916,798	$58,156
All costed measures	28,924.9	$1,456,716,798	$50,362

No Net Increase/Air Quality Task Force
Extrapolation of Estimated Measure Costs
Heavy-Duty Diesel Vehicles
DRAFT

Fuels-based measures
Engine/retrofit-based measures
All costed measures

Measure	Measure Focus		Reduction tons	Cost	Cost Factor $ / ton	Extrapolated Cost
HDV1 - 2004 Emission Stds	Engine Stds					
Adopted		NOx	0.0	(2005 $)		
Reductions are in projected (green line) baseline		PM	0.0			
HDV2 - 2007 Emission Stds	Engine Stds					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
HDV3 - Gateway Cities	Engine Stds					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
HDV4 - Engine Software Upgrade	Engine Stds					
Adopted		NOx	0.0	$11,200,000		
Reductions are in projected (green line) baseline		PM	0.0			
HDV5 - ULSD	Engine Stds					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
HDV6 - HD I&M	Operational improvements					
Adopted		NOx	0.0	$75,400,000		
Reductions are in projected (green line) baseline		PM	0.0			
HDV7 - Periodic Smoke Inspection	Operational improvements					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
HDV8 - Community-Based Inspections	Operational improvements					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
HDV 9 - Reduced Truck Idling	Operational improvements					
Adopted		NOx	0.0	$0		
Reductions are in projected (green line) baseline		PM	0.0			
HDV10 - Exp Truck Modernization	Engine Stds					
Adopted		NOx	7,436.6	$0	$0	
		PM	255.3		$0	
HDV11 - CA HDV Stds & Fleet Mod for Mexican Trucks	Engine Stds					
Additional		NOx	0.0	$184,500,000		
Measure not used for NNI calculations		PM	0.0			

No Net Increase/Air Quality Task Force

Extrapolation of Estimated Measure Costs
Heavy-Duty Diesel Vehicles
DRAFT

Fuels-based measures
Engine/retrofit-based measures
All costed measures

Measure	Measure Focus		Reduction tons	Cost	Cost Factor $ / ton	Extrapolated Cost
HDV12 - Early ULSD Implementation	Fuels					
Additional		NOx	0.0	$0		
		PM	0.3		$0	
HDV13 - Retrofit HDVs with DOCs	Retrofit/repower					
Adopted		NOx	0.0	$300,000		
		PM	2.8		$107,143	
HDV14 - Retrofit HDVs w/ DPFs	Retrofit/repower					
		NOx	0.0	$1,400,000		
		PM	51.4		$27,223	
HDV15 - PM In-Use Emission Control	Retrofit/repower					
Additional		NOx	0.0	$16,300,000		$19,590
		PM	121.4			
HDV16 - On-Board Diagnostics	Operational improvements					
Proposed		NOx	0.0	$19,590		
Measure not used for NNI calculations		PM	0.0			
HDV17 - Transportation Refrigeration Units	Operational improvements					
Additional		NOx	0.0	$0		
Measure not used for NNI calculations		PM	0.0			
HDV18 - Electrified Truck Spaces	Operational improvements					
Additional		NOx	0.0	$0		
Measure not used for NNI calculations		PM	0.0			
HDV19 - Idling Reduction Measures	Operational improvements					
Additional		NOx	0.0			
Measure not used for NNI calculations		PM	0.0			

	NOx plus (PM*10)			
Fuels-based measures	2.8	$0	$0	
Engine/retrofit-based measures	10,532.1	$1,700,000	$161	
All costed measures	10,534.9	$1,700,000	$161	

No Net Increase/Air Quality Task Force

Fuel Cost Summary

DRAFT

January 2002 to April, 2005 Singapore Bunker Price Summary

Fuel	3 year Average	3 year Max	1st Q 2005
IFO380 (2.7% S)	$171	$283	$201
IFO180 (1.5%)	$191	$348	$260
MDO (0.6% S)	$273	$520	$403
MGO (<1.5% S)	$280	$526	$421
MGO (0.2% S)	$280	$526	$421

Note:

Fuel Price data from Singapore Price History from Bunkerworld
Max and Min are based on 3 year maximum and average prices (1/02 to 4/05).
Three month, 2005 fuel cost is based on average from Jan -mid April, 2005.
Sulfur contents shown are "typical" or average sulfur.
At this time, Bunkerworld only has prices for "regular" sulfur IFO, MDO, and MGO.
In Bunkerwold website, it states to take highest prices of MGO for low sulfur MGO (0.2% S) price.
For NNI, MGO 0.2% price is assumed to be max MGO pricefrom Bunkerworld.
At this time, IFO 1.5% costs are not published by Bunkerworld.
If IFO 1.5% is not available in the future due to high demand, a blend of IFO 380 and marine distillate may have to be used. This will raise the cost considerably to the cost of MDO.

Projected Emissions

Main Engines	2001	2005	2008	2010	2012	2025
NOx	4,463.6	8,879.6	10,349.7	11,490.4	12,062.9	17,779.3
PM	477.7	950.2	1,107.5	1,229.6	1,291.1	1,902.9

Auxiliary Engines	2001	2005	2008	2010	2012	2025
NOx	2,434.4	5,158.9	6,426.1	7,285.4	7,722.0	11,514.8
PM	80.7	203.9	256.7	292.1	309.6	461.7

No Net Increase/Air Quality Task Force

Ocean-going vessels - Summary of measures for which no cost estimates have been developed
DRAFT

The following measures do not have cost estimates:

OGV1 - New Engine Standards for Ships
Brief Description:
IMO established limits for Category 3 diesel marine vessel engines.
Explanation for no Cost Estimate:
This measure will be dependent on the introduction of new vessels in the future due to turnover and increase in trade.
New vessels include the new engine, so one cannot estimate cost of engine alone or estimate number of new vessels that will be in service at the Port.

OGV5 - New Engine Standards for Category 3 Marine Engines
Brief Description:
EPA has committed to adopting technology-forcing Tier 2 standards for Cat 3 engines by 2007, but has not committed to controlling foreign-flagged vessels at this time.
Explanation for no Cost Estimate:
There are many uncertainties in the measure due to the different technologies that could be used and not knowing whether the final standard will include both U.S. flagged and foreign-flagged vessels.

OGV6 - Reroute Cleanest Ships
Brief Description:
This measure would require shipping lines to reroute the cleanest ships to the Port of Los Angeles.
Explanation for no Cost Estimate:
It is difficult to estimate the number of vessels and how much it costs to the shipping lines to change their deployment plans.

OGV13 - Additional Auxiliary Engine Reductions for Frequent Callers
Brief Description:
ARB proposed regulation for auxiliary engines used on ships that call frequently at CA ports.
Explanation for no Cost Estimate:
This proposed measure is still under development and may change in the future. The ARB does not currently have cost estimate.

OGV17 - Additional In-Use Measures for Ships
Brief Description:
This measure is designed to include various strategies to achieve emission reductions.
Explanation for no Cost Estimate:
At this time, measure is too vague to determine which control strategies will be used in the future.

No Net Increase/Air Quality Task Force

OGV2 - Vessel Speed Reduction (VSR) Memorandum of Understanding (MOU)

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Vessels reduce speed to 12 knots at 20 nm.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Costs

Vessels	$3,000	Per vessel per hour cost estimate given by one shipping line
Port	$8,500	Annual cost to Port for Marex monthly reports & Lloyd's annual fee

OGV 2 VSR Participation Rate

	2005	2008	2010	2012	2025
	48%	48%	48%	48%	48%

Participation Rate: Currently, as modeled, the participation rate only takes into account those vessels that reach the target speed of 12 knots; however, the POLA VSR program takes into account the reductions associated w/all vessels that reduce speed over their baseline corrected speed. This difference will be incorporated into the next version of this control measure worksheet.

VSR Hour Delayed

2001	2005	2008	2010	2012	2025
2,944	2,869	3,391	3,773	3,999	5,963

Note: Hours delayed for 2001 were estimated from 2001 PWBAEI assuming 100% compliance. Future years were adjusted to OGV growth index and to participation rate shown above.

Cost per Year

	2005	2006	2007	2008	2009	2010	2011
Shipping Lines	$8,605,901	$522,854	$1,045,709	$10,174,464	$10,746,778	$11,319,091	$11,662,490
Port	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500
Total	$8,614,401	$531,354	$1,054,209	$10,182,964	$10,755,278	$11,327,591	$11,670,990

	2012	2013	2014	2015	2016	2017	2018
Shipping Lines	$12,005,889	$12,458,520	$12,911,152	$13,363,784	$13,816,415	$14,269,047	$14,721,678
Port	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500
	$12,014,389	$12,467,020	$12,919,652	$13,372,284	$13,824,915	$14,277,547	$14,730,178

	2019	2020	2021	2022	2023	2024	2025
Shipping Lines	$15,174,310	$15,626,941	$16,079,573	$16,532,204	$16,984,836	$17,437,468	$17,890,099
Port	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500
	$15,182,810	$15,635,441	$16,088,073	$16,540,704	$16,993,336	$17,445,968	$17,898,599

Note: Annual costs incurred by shipping lines and Port shown separately.

Cost Effectiveness ($/ton reduced)

NO_x	
PM	

No Net Increase/Air Quality Task Force

OGV3 - Alternative Maritime Power (AMP)

Cost Worksheet

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Brief Measure Description:

Existing program for shore power electrification to China Shipping (Berth 100), P&O Nedlloyd (Berth 206-209) and NYK vessel (Berth 212-225). Port pays up to $810,000 for one vessel retrofit.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Ship Infrastructure Costs

	Cost Vessel	Cost Port	Note	
China Shipping	$320,000	$6,800,000	7 outlets and 1 vessel - PAID FOR ALREADY	
NYK	$3,240,000	$1,500,000	1 outlet and 1 vessel	4 vessels @ $810,000 ea
P&O Nedlloyd	$810,000	$1,500,000	1 outlet and 1 vessel	
Evergreen	$2,500,000			5 vessels @ $500,000 ea
	$4,370,000	$9,800,000		

Connection/Disconnection Costs

Laborers	4	
Rate	$100	per hour
Hours	8	hours per shift
Shifts per Call	2	1 shift connect/1 shift disconnect
Connection/Disc Costs	$6,400	per call

Costing based on Actual Consumption

	Number of Ships AMP'd	Aux Eng Hotelling kW-hr	Total Power Cost	Port Recouped Cost*	Total Port Cost
May 04	1	57,600	$22,369	$2,430	$19,939
Jun 04	2	103,200	$23,786	$4,454	$19,332
Jul 04	1	57,600	$22,649	$2,286	$20,363
Aug-Sep 04	2	117,600	$17,732	$3,030	$14,702
Oct 04	3	204,000	$24,234	$12,582	$11,652
Nov 04	2	187,200	$20,674	$8,143	$12,531
Dec 04	3	96,000	$16,697	$5,286	$11,411
Jan 05	2	184,800	$25,487	$6,242	$19,245
Feb 05	3	172,800	$18,100	$7,476	$10,624
Mar 05	2	no data	no data	$7,430	no data
Apr 05	3	no data	no data	no data	no data
Total**	19	1,180,800	$191,728	$51,929	$139,799
Per Call		62,147	$10,091	$2,733	$7,358

* The Per Call cost ($7,358) includes a discount for IFO fuels not burned during hotelling

** - not including Mar & Apr 05

AMP'd Ship Calls per Year

	2005	2008	2010	2012	2025
Vessel Calls	48	48	48	48	48

No Net Increase/Air Quality Task Force

OGV3 - Alternative Maritime Power (AMP)

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Existing program for shore power electrification to China Shipping (Berth 100), P&O Nedlloyd (Berth 206-209) and NYK vessel (Berth 212-225). Port pays up to $810,000 for one vessel retrofit.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

AMP Total Cost per year

	2005	2006	2007	2008	2009	2010	2011
Capital (Port)	$482,000	$0	$0	$0	$0	$0	$0
Capital (Industry)	$3,888,000	$0	$0	$0	$0	$0	$0
Operational	$660,376	$660,376	$660,376	$660,376	$660,376	$660,376	$660,376

	2012	2013	2014	2015	2016	2017	2018
Capital (Port)	$0	$0	$0	$0	$0	$0	$0
Capital (Industry)	$0	$0	$0	$0	$0	$0	$0
Operational	$660,376	$660,376	$660,376	$660,376	$660,376	$660,376	$660,376

	2019	2020	2021	2022	2023	2024	2025
Capital (Port)	$0	$0	$0	$0	$0	$0	$0
Capital (Industry)	$0	$0	$0	$0	$0	$0	$0
Operational	$660,376	$660,376	$660,376	$660,376	$660,376	$660,376	$660,376

No Net Increase/Air Quality Task Force

OGV4 - Auxiliary Engine Fuel Improvement Program
Cost Worksheet
DRAFT
Brief Measure Description:
From 40 nm, auxiliary engines switch fuel to IFO (<1.5% S)
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Participation Rates

	2005	2008	2010	2012	2025
Transitting	5%	100%	0%	0%	0%
Hotelling	5%	100%	0%	0%	0%

Estimated Fuel Price

	3-Year Avg	3-Year Max	1st Q 2005
IFO (2.7%)	$171	$283	$201
IFO180 (1.5%)	$191	$348	$260

Note: Cost of retrofitting vessels with extra fuel tanks is part of the measure.
At this time, an adequate cost estimate is not available for retrofitting vessel.
An unconfirmed cost estimate to retrofit a vessel could range from $200,000-$500,000/vessel.
Not all vessels will need to be retrofitted, some vessels are already equipped with extra fuel tanks.

Auxiliary Engines - Transit - 3-Year Average Scenario Costs
Fuel IFO 2.7% S to IFO 1.5% S
Units= U.S. Dollars 3-yr Avg Cost Premium: $20

Ship Type	2005	2008	2010	2012	2025
Containership	$2,079	$49,156	$0	$0	$0
Cruise	$228	$5,395	$0	$0	$0
Tanker	$461	$10,910	$0	$0	$0
Other	$476	$11,256	$0	$0	$0
	$3,244	**$76,716**	**$0**	**$0**	**$0**

Auxiliary Engines - Hotelling - 3-Year Average Scenario Cost
Fuel IFO 2.7% S to IFO 1.5% S
Units= U.S. Dollars 3-yr Avg Cost Premium: $20

Ship Type	2005	2008	2010	2012	2025
Containership	$11,192	$264,647	$0	$0	$0
Cruise	$412	$9,737	$0	$0	$0
Tanker	$4,860	$114,926	$0	$0	$0
Other	$2,602	$61,528	$0	$0	$0
	$19,067	**$450,838**	**$0**	**$0**	**$0**

Combined 3-Year Average Scenario Costs

2005	2008	2010	2012	2025
$22,311	**$527,555**	**$0**	**$0**	**$0**

Auxiliary Engines - 3-Year Average Scenario Costs - Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV4 - Auxiliary Engine Fuel Improvement Program
Cost Worksheet
DRAFT
Brief Measure Description:
From 40 nm, auxiliary engines switch fuel to IFO (<1.5% S)
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 3-Year Maximum Scenario Costs
Fuel IFO 2.7% S to IFO 1.5% S
Units = U.S. Dollars 3-yr Max Cost Premium: $65

Ship Type	2005	2008	2010	2012	2025
Containership	$6,595	$155,931	$0	$0	$0
Cruise	$724	$17,113	$0	$0	$0
Tanker	$1,464	$34,607	$0	$0	$0
Other	$1,510	$35,707	$0	$0	$0
	$10,292	**$243,358**	**$0**	**$0**	**$0**

Auxiliary Engines - Hotelling - 3-Year Maximum Scenario Cost
Fuel IFO 2.7% S to IFO 1.5% S
Units= U.S. Dollars 3-yr Max Cost Premium: $65

Ship Type	2005	2008	2010	2012	2025
Containership	$35,504	$839,508	$0	$0	$0
Cruise	$1,306	$30,888	$0	$0	$0
Tanker	$15,418	$364,566	$0	$0	$0
Other	$8,254	$195,177	$0	$0	$0
	$60,483	**$1,430,139**	**$0**	**$0**	**$0**

Combined 3-Year Maximum Scenario Costs

Costs	2005	2008	2010	2012	2025
	$70,775	**$1,673,497**	**$0**	**$0**	**$0**

Auxiliary Engines - 3-Year Maximum Scenario Costs - Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV4 - Auxiliary Engine Fuel Improvement Program

Cost Worksheet

DRAFT

Brief Measure Description:

From 40 nm, auxiliary engines switch fuel to IFO (<1.5% S)

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 1stQ 2005 Scenario Costs

Fuel IFO 2.7% S to IFO 1.5% S

Units = U.S. Dollars 1st Q05 Cost Premium: $59

Ship Type	2005	2008	2010	2012	2025
Containership	$5,986	$141,538	$0	$0	$0
Cruise	$657	$15,533	$0	$0	$0
Tanker	$1,328	$31,413	$0	$0	$0
Other	$1,371	$32,411	$0	$0	$0
	$9,342	**$220,894**	**$0**	**$0**	**$0**

Auxiliary Engines - Hotelling - 1stQ 2005 Scenario Cost

Fuel IFO 2.7% S to IFO 1.5% S

Units= U.S. Dollars 1st Q05 Cost Premium: $59

Ship Type	2005	2008	2010	2012	2025
Containership	$32,227	$762,015	$0	$0	$0
Cruise	$1,186	$28,037	$0	$0	$0
Tanker	$13,995	$330,914	$0	$0	$0
Other	$7,492	$177,161	$0	$0	$0
	$54,900	**$1,298,126**	**$0**	**$0**	**$0**

Combined 1stQ 2005 Scenario Costs

	2005	2006	2007	2008	2009	2010	2011
Operational	**$64,242**	**$549,168**	**$1,034,094**	**$1,519,020**	**$0**	**$0**	**$0**

	2012	2013	2014	2015	2016	2017	2018
Operational	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

	2019	2020	2021	2022	2023	2024	2025
Operational	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Auxiliary Engines - 2005 Average Scenario Costs - Cost Effectiveness ($/ton reduced)

NO_x
PM

No Net Increase/Air Quality Task Force

OGV7 Low Emissions Main Propulsion Engines
Cost Worksheet
DRAFT
Brief Measure Description:
Use of SCR and advanced engine technology to control emissions from main engines
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

NNI Measure	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost per Unit	Total Capital Cost
OGV7 Low Emissions Main Propulsion Engines	322	2,020	10	SCR	$1,970,000			$634,340,000
	1,280	2,025	10	SCR	$1,970,000			$2,521,600,000
	1,416	2,020	20	Man B &W	$100,000			$141,600,000
	206	2,025	20	Man B &W	$100,000			$20,600,000
	646,200	2,020				Urea Cost per Unit	$2.00	
	2,461,000	2,025				Urea Cost per Unit	$2.00	

These estimates provided by SCAQMD staff

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital Costs - SCR	$0	$0	$0	$0	$0	$0	$0
Capital Costs - MAN B&W	$0	$0	$0	$0	$0	$0	$0
Operating Costs	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital Costs - SCR	$0	$0	$0	$0	$0	$0	$211,446,667
Capital Costs - MAN B&W	$0	$0	$0	$0	$0	$0	$47,200,000
Operating Costs	$0	$0	$0	$0	$0	$0	$430,800

	2019	2020	2021	2022	2023	2024	2025
Capital Costs - SCR	$211,446,667	$211,446,667	$0	$0	$840,533,333	$840,533,333	$840,533,333
Capital Costs - MAN B&W	$47,200,000	$47,200,000	$0	$0	$6,866,667	$6,866,667	$6,866,667
Operating Costs	$861,600	$1,292,400	$1,292,400	$1,292,400	$2,112,733	$2,933,067	$4,922,000

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines

Cost Worksheet

DRAFT

Brief Measure Description:

ARB proposed regulation to switch fuel used by auxiliary engines to MGO 0.2% S in 2006 and MGO 0.1% S in 2008 near coast and at dock.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Estimated Fuel Price

	3-Year Avg	3-Year Max	1st Q 2005
IFO (2.7%)	$171	$283	$201
MDO (0.6%)	$273	$520	$403
MGO (0.2%)	$280	$526	$421

Auxiliary Engines - Transit - 3-Year Average Scenario Costs

Fuel IFO 2.7% S to MGO 0.2%S

Units= U.S. Dollars 3-yr Avg Cost Premium: $109

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$262,662	$292,211	$309,722	$461,847
Cruise	$0	$28,826	$32,069	$33,990	$50,685
Tanker	$0	$58,295	$64,853	$68,739	$102,502
Other	$0	$60,147	$66,913	$70,923	$105,758
	$0	**$409,929**	**$456,046**	**$483,375**	**$720,792**

Auxiliary Engines - Hotelling - 3-Year Average Scenario Cost

Fuel IFO 2.7% S to MGO 0.2%S

Units= U.S. Dollars 3-yr Avg Cost Premium: $109

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$1,414,128	$1,573,217	$1,667,492	$2,486,508
Cruise	$0	$52,030	$57,883	$61,352	$91,486
Tanker	$0	$614,101	$683,188	$724,128	$1,079,794
Other	$0	$328,770	$365,757	$387,675	$578,088
	$0	**$2,409,029**	**$2,680,045**	**$2,840,647**	**$4,235,876**

Auxiliary Engines 3-Year Average Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines

Cost Worksheet

DRAFT

Brief Measure Description:

ARB proposed regulation to switch fuel used by auxiliary engines to MGO 0.2% S in 2006 and MGO 0.1% S in 2008 near coast and at dock.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 3-Year Maximum Scenario Costs

Fuel IFO 2.7% S to MGO 0.2%S

Units = U.S. Dollars 3-yr Max Cost Premium: $243

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$582,943	$648,524	$687,387	$1,025,008
Cruise	$0	$63,975	$71,172	$75,437	$112,489
Tanker	$0	$129,378	$143,933	$152,558	$227,489
Other	$0	$133,487	$148,505	$157,404	$234,716
	$0	**$909,783**	**$1,012,134**	**$1,072,786**	**$1,599,702**

Auxiliary Engines - Hotelling - 3-Year Maximum Scenario Cost

Fuel IFO 2.7% S to MGO 0.2%S

Units= U.S. Dollars 3-yr Max Cost Premium: $243

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$3,138,469	$3,491,546	$3,700,778	$5,518,474
Cruise	$0	$115,473	$128,464	$136,162	$203,041
Tanker	$0	$1,362,916	$1,516,244	$1,607,105	$2,396,461
Other	$0	$729,662	$811,749	$860,394	$1,282,990
	$0	**$5,346,521**	**$5,948,004**	**$6,304,439**	**$9,400,965**

Auxiliary Engines 3-Year Maximum Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines

Cost Worksheet

DRAFT

Brief Measure Description:

ARB proposed regulation to switch fuel used by auxiliary engines to MGO 0.2% S in 2006 and MGO 0.1% S in 2008 near coast and at dock.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 1stQ 2005 Scenario Costs

Fuel IFO 2.7% S to MGO 0.2%S

Units = U.S. Dollars 1st Q05 Cost Premium: $220

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$527,768	$587,141	$622,326	$927,991
Cruise	$0	$57,920	$64,436	$68,297	$101,842
Tanker	$0	$117,132	$130,309	$138,118	$205,957
Other	$0	$120,853	$134,449	$142,506	$212,500
	$0	**$823,672**	**$916,335**	**$971,247**	**$1,448,290**

Auxiliary Engines - Hotelling - 1stQ 2005 Scenario Cost

Fuel IFO 2.7% S to MGO 0.2%S

Units= U.S. Dollars 1st Q05 Cost Premium: $220

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$2,841,412	$3,161,071	$3,350,498	$4,996,149
Cruise	$0	$104,544	$116,305	$123,275	$183,823
Tanker	$0	$1,233,916	$1,372,731	$1,454,992	$2,169,635
Other	$0	$660,600	$734,917	$778,957	$1,161,555
	$0	**$4,840,471**	**$5,385,024**	**$5,707,722**	**$8,511,162**

Combined 1stQ 2005 Scenario Cost

	2005	2006	2007	2008	2009	2010	2011
Operational	**$0**	**$0**	**$0**	**$6,590,030**	**$6,960,719**	**$7,331,408**	**$7,551,076**

	2012	2013	2014	2015	2016	2017	2018
Operational	**$7,770,744**	**$8,064,338**	**$8,357,932**	**$8,651,526**	**$8,945,121**	**$9,238,715**	**$9,532,309**

	2019	2020	2021	2022	2023	2024	2025
Operational	**$9,825,903**	**$10,119,498**	**$10,413,092**	**$10,706,686**	**$11,000,281**	**$11,293,875**	**$11,587,469**

Auxiliary Engines 1st Q 2005 Cost Effectiveness ($/ton reduced)

NO_x	
PM	

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines
Cost Worksheet
DRAFT
Brief Measure Description:
ARB proposed regulation to switch fuel used by auxiliary engines
to MGO 0.2% S in 2006 and MGO 0.1% S in 2008 near coast and at dock.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

OGV8 - Cleaner Fuels for Ship Auxiliary Engines - Participation Rates

	2005	2008	2010	2012	2025
Containership	0%	100%	100%	100%	100%
Tanker	0%	100%	100%	100%	100%
Cruise Ship	0%	100%	100%	100%	100%
Other	0%	100%	100%	100%	100%

Auxiliary Engines - Transit - 3-Year Average Scenario Costs
Fuel MDO 0.6% S to MGO 0.2%
Units= U.S. Dollars 3-yr Avg Cost Premium: $7

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$28,051	$31,207	$33,077	$49,324
Cruise	$0	$51,557	$57,357	$60,794	$90,654
Tanker	$0	$380	$423	$449	$669
Other	$0	$2,952	$3,285	$3,481	$5,191
	$0	**$82,941**	**$92,272**	**$97,801**	**$145,837**

Auxiliary Engines - Hotelling - 3-Year Average Scenario Cost
Fuel MDO 0.6% S to MGO 0.2%
Units= U.S. Dollars 3-yr Avg Cost Premium: $7

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$151,023	$168,014	$178,082	$265,549
Cruise	$0	$77,616	$86,348	$91,522	$136,475
Tanker	$0	$32,349	$35,988	$38,145	$56,880
Other	$0	$16,138	$17,954	$19,030	$28,376
	$0	**$277,126**	**$308,303**	**$326,778**	**$487,280**

Combined 3-Year Average Scenario Cost

2005	2008	2010	2012	2025
$0	$3,179,025	$3,536,666	$3,748,601	$5,589,786

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines

Cost Worksheet

DRAFT

Brief Measure Description:

ARB proposed regulation to switch fuel used by auxiliary engines
to MGO 0.2% S in 2006 and MGO 0.1% S in 2008 near coast and at dock.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 3-Year Maximum Scenario Costs

Fuel MDO 0.6% S to MGO 0.2%

Units = U.S. Dollars | 3-yr Max Cost Premium: $6

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$24,044	$26,749	$28,352	$42,277
Cruise	$0	$44,191	$49,163	$52,109	$77,703
Tanker	$0	$326	$363	$384	$573
Other	$0	$2,531	$2,815	$2,984	$4,450
	$0	**$71,092**	**$79,090**	**$83,829**	**$125,004**

Auxiliary Engines - Hotelling - 3-Year Maximum Scenario Cost

Fuel MDO 0.6% S to MGO 0.2%

Units= U.S. Dollars | 3-yr Max Cost Premium: $6

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$129,449	$144,012	$152,642	$227,614
Cruise	$0	$66,528	$74,012	$78,447	$116,978
Tanker	$0	$27,728	$30,847	$32,695	$48,754
Other	$0	$13,833	$15,389	$16,311	$24,323
	$0	**$237,537**	**$264,260**	**$280,095**	**$417,669**

Combined 3-Year Maximum Scenario Cost

	2005	2008	2010	2012	2025
	$0	$6,564,933	$7,303,487	$7,741,150	$11,543,340

No Net Increase/Air Quality Task Force

OGV8 - Cleaner Fuels for Ship Auxiliary Engines
Cost Worksheet
DRAFT
Brief Measure Description:
ARB proposed regulation to switch fuel used by auxiliary engines
to MGO 0.2% S in 2006 and MGO 0.1% S in 2008 near coast and at dock.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 1stQ 2005 Scenario Costs
Fuel MDO 0.6% S to MGO 0.2%
Units = U.S. Dollars 1st Q05 Cost Premium: $18

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$72,132	$80,247	$85,055	$126,832
Cruise	$0	$132,574	$147,489	$156,327	$233,110
Tanker	$0	$978	$1,088	$1,153	$1,720
Other	$0	$7,592	$8,446	$8,952	$13,349
	$0	**$213,276**	**$237,270**	**$251,488**	**$375,011**

Auxiliary Engines - Hotelling - 1stQ 2005 Scenario Cost
Fuel MDO 0.6% S to MGO 0.2%
Units= U.S. Dollars 1st Q05 Cost Premium: $18

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$388,346	$432,035	$457,925	$682,841
Cruise	$0	$199,584	$222,037	$235,342	$350,935
Tanker	$0	$83,183	$92,541	$98,086	$146,263
Other	$0	$41,498	$46,167	$48,933	$72,968
	$0	**$712,610**	**$792,779**	**$840,286**	**$1,253,007**

No Net Increase/Air Quality Task Force

OGV9 - Main Engine Fuel Improvement Program
Cost Worksheet
DRAFT
Brief Measure Description:

Main engines switch from using IFO (2.7% S) to IFO (1.5%S) from 2006 to 2010.
After 2010 measure ends if SECA becomes effective.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Participation Rates	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	0%	50%	100%	100%	100%
Tanker	0%	50%	100%	100%	100%
Cruise Ship	0%	50%	100%	100%	100%
Other	0%	50%	100%	100%	100%

Estimated Fuel Price

	3-Year Avg	3-Year Max	1st Q 2005
IFO (2.7%)	$171	$283	$201
IFO180 (1.5%)	$191	$348	$260

Note: Cost for demonstration project not included in estimate.

Main Engines - 3-Year Average Scenario Costs

Fuel = IFO 2.7% S to IFO 1.5% S
Units = U.S. Dollars 3-yr Avg Cost Premium: $20

Ship Type	**2005**	**2008**	**2010**	**2012**	**2025**
Containership	$0	$764,484	$1,700,978	$1,802,909	$2,688,436
Cruise	$0	$209,949	$467,136	$495,129	$738,320
Tanker	$0	$73,174	$162,812	$172,568	$257,328
Other	$0	$128,367	$285,616	$302,732	$451,423
	$0	**$1,175,974**	**$2,616,542**	**$2,773,339**	**$4,135,508**

Main Engine 3-Year Average Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV9 - Main Engine Fuel Improvement Program

Cost Worksheet

DRAFT

Brief Measure Description:

Main engines switch from using IFO (2.7% S) to IFO (1.5%S) from 2006 to 2010.
After 2010 measure ends if SECA becomes effective.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Main Engines - 3-Year Maximum Scenario Costs

Fuel = IFO 2.7% S to IFO 1.5% S

Units = U.S. Dollars 3-Year Max Premium: $65

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$2,425,079	$5,395,801	$5,719,145	$8,528,195
Cruise	$0	$665,995	$1,481,839	$1,570,638	$2,342,082
Tanker	$0	$232,121	$516,468	$547,418	$816,291
Other	$0	$407,202	$906,025	$960,319	$1,431,995
	$0	**$3,730,397**	**$8,300,133**	**$8,797,520**	**$13,118,563**

Main Engine 3-Year Maximum Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

Main Engines - 1stQ 2005 Scenario Costs

Fuel = IFO 2.7% S to IFO 1.5% S

Units = U.S. Dollars 1stQ05 Cost Premium: $59

Ship Type	2005	2006	2007	2008	2009
Containership	$0	$0	$0	$2,201,226	$3,549,476
Cruise	$0	$0	$0	$604,519	$974,786
Tanker	$0	$0	$0	$210,694	$339,744
Other	$0	$0	$0	$369,614	$596,003
Totals (operating costs)	**$0**	**$0**	**$0**	**$3,386,053**	**$5,460,010**

Ship Type	2012	2013	2014	2015	2016
Containership	$5,191,224	$4,791,899	$4,392,574	$3,993,249	$3,593,924
Cruise	$1,425,656	$1,315,990	$1,206,324	$1,096,659	$986,993
Tanker	$496,887	$458,665	$420,443	$382,221	$343,999
Other	$871,674	$804,622	$737,570	$670,518	$603,467
Totals (operating costs)	**$7,985,441**	**$7,371,176**	**$6,756,911**	**$6,142,647**	**$5,528,382**

No Net Increase/Air Quality Task Force

OGV9 - Main Engine Fuel Improvement Program

Cost Worksheet

DRAFT

Brief Measure Description:

Main engines switch from using IFO (2.7% S) to IFO (1.5%S) from 2006 to 2010.
After 2010 measure ends if SECA becomes effective.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Ship Type	2019	2020	2021	2022	2023
Containership	$2,395,949	$1,996,625	$1,597,300	$1,197,975	$798,650
Cruise	$657,995	$548,329	$438,663	$328,998	$219,332
Tanker	$229,332	$191,110	$152,888	$114,666	$76,444
Other	$402,311	$335,259	$268,207	$201,156	$134,104
Totals (operating costs)	**$3,685,588**	**$3,071,323**	**$2,457,059**	**$1,842,794**	**$1,228,529**

Main Engine 1stQ 2005 Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV10 - Sulfur Oxide Emission Control Area (SECA)

Cost Worksheet

DRAFT

Brief Measure Description:

Main engines switch from using IFO (2.7% S) to IFO (1.5%S) after 2010, if SECA is established.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Participation Rates

2005	2008	2010	2012	2025
0%	0%	100%	100%	100%

Estimated Fuel Price

	3-Year Avg	3-Year Max	1st Q 2005
IFO (2.7%)	$171	$283	$201
IFO (1.5%)	$191	$348	$260

Note: At this time, the feasibility of using lower sulfur distillate fuels in main engines is unknown. Demonstration projects would need to be considered and the cost for these are not included in the estimate. The program runs through 2010, therefore fuel costs are estimated up to 2010.

Main Engines - 3-Year Average Scenario Costs

Fuel = IFO 2.7% S to IFO 1.5% S

Units = U.S. Dollars 3-yr Avg Cost Premium: $20

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$0	$1,700,978	$1,802,909	$2,688,436
Cruise	$0	$0	$467,136	$495,129	$738,320
Tanker	$0	$0	$146,348	$172,568	$257,328
Other	$0	$0	$285,616	$302,732	$451,423
	$0	**$0**	**$2,600,078**	**$2,773,339**	**$4,135,508**

Main Engine 3-Year Average Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

No Net Increase/Air Quality Task Force

OGV10 - Sulfur Oxide Emission Control Area (SECA)
Cost Worksheet
DRAFT
Brief Measure Description:
Main engines switch from using IFO (2.7% S) to IFO (1.5%S) after 2010, if SECA is established.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Main Engines - 3-Year Maximum Scenario Costs
Fuel = IFO 2.7% S to IFO 1.5% S
Units = U.S. Dollars 3-yr Max Premium: $65

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$0	$5,395,801	$5,719,145	$8,528,195
Cruise	$0	$0	$1,481,839	$1,570,638	$2,342,082
Tanker	$0	$0	$464,241	$547,418	$816,291
Other	$0	$0	$906,025	$960,319	$1,431,995
	$0	**$0**	**$8,247,906**	**$8,797,520**	**$13,118,563**

Main Engine Cost Effectiveness ($/ton reduced)

NO_x
PM

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

Main Engines - 1stQ 2005 Scenario Costs
Fuel = IFO 2.7% S to IFO 1.5% S
Units = U.S. Dollars 1stQ05 Cost Premium: $59

Ship Type	2005	2006	2007	2008	2009	2010	2011
Containership	$0	$0	$0	$0	$0	$4,897,727	$5,044,476
Cruise	$0	$0	$0	$0	$0	$1,345,054	$1,385,355
Tanker	$0	$0	$0	$0	$0	$421,388	$459,137
Other	$0	$0	$0	$0	$0	$822,392	$847,033
	$0	**$0**	**$0**	**$0**	**$0**	**$7,486,561**	**$7,736,001**

Ship Type	2012	2013	2014	2015	2016	2017	2018
Containership	$5,191,224	$5,387,359	$5,583,494	$5,779,628	$5,975,763	$6,171,898	$6,368,033
Cruise	$1,425,656	$1,479,520	$1,533,385	$1,587,249	$1,641,113	$1,694,977	$1,748,841
Tanker	$496,887	$515,660	$534,434	$553,207	$571,980	$590,754	$609,527
Other	$871,674	$904,608	$937,541	$970,475	$1,003,408	$1,036,342	$1,069,275
	$7,985,441	**$8,287,147**	**$8,588,853**	**$8,890,559**	**$9,192,265**	**$9,493,971**	**$9,795,677**

Ship Type	2019	2020	2021	2022	2023	2024	2025
Containership	$6,564,168	$6,760,303	$6,956,438	$7,152,572	$7,348,707	$7,544,842	$7,740,977
Cruise	$1,802,705	$1,856,569	$1,910,434	$1,964,298	$2,018,162	$2,072,026	$2,125,890
Tanker	$628,300	$647,074	$665,847	$684,621	$703,394	$722,167	$740,941
Other	$1,102,209	$1,135,143	$1,168,076	$1,201,010	$1,233,943	$1,266,877	$1,299,811
	$10,097,383	**$10,399,089**	**$10,700,795**	**$11,002,501**	**$11,304,206**	**$11,605,912**	**$11,907,618**

No Net Increase/Air Quality Task Force

OGV11 - Expanded Auxiliary Fuel Improvement Program
Cost Worksheet
DRAFT
Brief Measure Description:
Expansion of OGV4, fuel switched from typical MDO 0.6% to MGO <0.2% (assumes OGV 8 is Active)
It is assumed that MGO 0.1% will be similar in price and sulfur content as MGO<0.2%.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Participation Rates

	2005	2008	2010	2012	2025
Transitting	0%	100%	100%	100%	100%
Hotelling	0%	100%	100%	100%	100%

Estimated Fuel Price

	3-Year Avg	3-Year Max	1st Q 2005
IFO (2.7%)	$171	$283	$201
MDO (0.6%)	$273	$520	$403
MGO (0.2%)	$280	$526	$421

For NNI, max MGO price from Bunkerworld is assumed for MGO <0.2% price.
Subsidy would be end in 2008, but participation would continue.

Auxiliary Engines - Transit - 3-Year Average Scenario Costs
Fuel MDO 0.6% S to MGO 0.2% Cost Premium $7
Units = U.S. Dollars

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$28,051	$31,207	$33,077	$49,324
Cruise	$0	$51,557	$57,357	$60,794	$90,654
Tanker	$0	$380	$423	$449	$669
Other	$0	$2,952	$3,285	$3,481	$5,191
	$0	$82,941	$92,272	$97,801	$145,837

Auxiliary Engines - Hotelling - 3-Year Average Scenario Costs
Fuel MDO 0.6% S to MGO 0.2% Cost Premium $7
Units = U.S. Dollars

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$151,023	$168,014	$178,082	$265,549
Cruise	$0	$77,616	$86,348	$91,522	$136,475
Tanker	$0	$32,349	$35,988	$38,145	$56,880
Other	$0	$16,138	$17,954	$19,030	$28,376
	$0	$277,126	$308,303	$326,778	$487,280

No Net Increase/Air Quality Task Force

OGV11 - Expanded Auxiliary Fuel Improvement Program

Cost Worksheet

DRAFT

Brief Measure Description:

Expansion of OGV4, fuel switched from typical MDO 0.6% to MGO <0.2% (assumes OGV 8 is Active)
It is assumed that MGO 0.1% will be similar in price and sulfur content as MGO<0.2%.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Combined 3-Year Average Scenario Costs

	2005	2008	2010	2012	2025
	$0	**$360,067**	**$400,575**	**$424,579**	**$633,118**

Auxiliary Engines - Transit - 3-Year Maximum Scenario Costs

Fuel MDO 0.6% S to MGO 0.2% Cost Premium $6

Units = U.S. Dollars

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$24,044	$26,749	$28,352	$42,277
Cruise	$0	$44,191	$49,163	$52,109	$77,703
Tanker	$0	$326	$363	$384	$573
Other	$0	$2,531	$2,815	$2,984	$4,450
	$0	$71,092	$79,090	$83,829	$125,004

Auxiliary Engines - Hotelling - 3-Year Maximum Scenario Costs

Fuel MDO 0.6% S to MGO 0.2% Cost Premium $6

Units = U.S. Dollars

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$129,449	$144,012	$152,642	$227,614
Cruise	$0	$66,528	$74,012	$78,447	$116,978
Tanker	$0	$27,728	$30,847	$32,695	$48,754
Other	$0	$13,833	$15,389	$16,311	$24,323
	$0	$237,537	$264,260	$280,095	$417,669

Combined 3-Year Maximum Scenario Costs

	2005	2008	2010	2012	2025
	$0	**$308,629**	**$343,350**	**$363,925**	**$542,672**

No Net Increase/Air Quality Task Force

OGV11 - Expanded Auxiliary Fuel Improvement Program

Cost Worksheet

DRAFT

Brief Measure Description:

Expansion of OGV4, fuel switched from typical MDO 0.6% to MGO <0.2% (assumes OGV 8 is Active)
It is assumed that MGO 0.1% will be similar in price and sulfur content as MGO<0.2%.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Auxiliary Engines - Transit - 1stQ 2005 Scenario Costs

Fuel MDO 0.6% S to MGO 0. | Cost Premium | $18

Units = U.S. Dollars

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$72,132	$80,247	$85,055	$126,832
Cruise	$0	$132,574	$147,489	$156,327	$233,110
Tanker	$0	$978	$1,088	$1,153	$1,720
Other	$0	$7,592	$8,446	$8,952	$13,349
	$0	$213,276	$237,270	$251,488	$375,011

Auxiliary Engines - Hotelling - 1stQ 2005 Scenario Costs

Fuel MDO 0.6% S to MGO 0. | Cost Premium | $18

Units = U.S. Dollars

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$388,346	$432,035	$457,925	$682,841
Cruise	$0	$199,584	$222,037	$235,342	$350,935
Tanker	$0	$83,183	$92,541	$98,086	$146,263
Other	$0	$41,498	$46,167	$48,933	$72,968
	$0	$712,610	$792,779	$840,286	$1,253,007

Combined 1stQ 2005 Scenario Costs

2005	2006	2007	2008	2009	2010	2011
$0	**$0**	**$0**	**$925,887**	**$977,968**	**$1,030,049**	**$1,060,912**

2012	2013	2014	2015	2016	2017	2018
$1,091,775	**$1,133,024**	**$1,174,273**	**$1,215,523**	**$1,256,772**	**$1,298,022**	**$1,339,271**

2019	2020	2021	2022	2023	2024	2025
$1,380,521	**$1,421,770**	**$1,463,019**	**$1,504,269**	**$1,545,518**	**$1,586,768**	**$1,628,017**

Auxiliary Engines Cost Effectiveness ($/ton reduced)

NO_x	
PM	

No Net Increase/Air Quality Task Force

OGV12 - Expanded Main Engine Fuel Improvement Program

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Switch main engine fuel to fuel containing less than 0.2% S. (In addition to OGV9 & 10)
Demostration project costs are not part of cost estimate, but may be required to ensure feasibility.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Participation Rates

	2005	2008	2010	2012	2025
Containership	0%	50%	90%	90%	90%
Cruise Ship	0%	50%	90%	90%	90%
Tanker	0%	50%	90%	90%	90%
Other	0%	50%	90%	90%	90%

Estimated Fuel Price

	3-Year Avg	3-Year Max	1st Q 2005
IFO (2.7%)	$171	$283	$201
IFO180 (1.5%)	$191	$348	$260
MDO (0.6%)	$273	$520	$403
MGO (0.2%)	$280	$526	$421

Main Engines - 3-Year Average Scenario Costs

Fuel = IFO 2.7% S to MGO 0.2% S

Units = U.S. Dollars Cost Premium $89

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$3,320,493	$6,649,287	$7,047,746	$10,509,360
Cruise	$0	$771,316	$1,826,081	$1,935,510	$2,886,166
Tanker	$0	$317,827	$636,448	$674,587	$1,005,921
Other	$0	$557,554	$1,116,502	$1,183,408	$1,764,658
	$0	**$4,967,190**	**$10,228,318**	**$10,841,251**	**$16,166,106**

No Net Increase/Air Quality Task Force

OGV12 - Expanded Main Engine Fuel Improvement Program

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Switch main engine fuel to fuel containing less than 0.2% S. (In addition to OGV9 & 10)

Demostration project costs are not part of cost estimate, but may be required to ensure feasibility.

Main Engines - 3-Year Maximum Scenario Costs

Fuel = IFO 2.7% S to MGO 0.2% S

Units = U.S. Dollars Cost Premium $178

Ship Type	2005	2008	2010	2012	2025
Containership	$0	$6,640,986	$13,298,574	$14,095,493	$21,018,721
Cruise	$0	$1,542,632	$3,652,163	$3,871,019	$5,772,332
Tanker	$0	$635,653	$1,272,895	$1,349,174	$2,011,842
Other	$0	$1,115,108	$2,233,003	$2,366,816	$3,529,316
	$0	**$9,934,379**	**$20,456,636**	**$21,682,502**	**$32,332,211**

Main Engines - 1stQ 2005 Scenario Costs

Fuel = IFO 1.5% S to MGO 0.2% S

Units = U.S. Dollars Cost Premium $161

Ship Type	2005	2006	2007	2008	2009	2010	2011
Containership	$0	$0	$0	$6,006,734	$9,017,610	$12,028,486	$12,388,890
Cruise	$0	$0	$0	$1,395,302	$2,349,332	$3,303,361	$3,402,338
Tanker	$0	$0	$0	$574,945	$863,136	$1,151,327	$1,185,823
Other	$0	$0	$0	$1,008,609	$1,514,174	$2,019,739	$2,080,256
	$0	**$0**	**$0**	**$8,985,590**	**$13,744,251**	**$18,502,912**	**$19,057,307**

Ship Type	2012	2013	2014	2015	2016	2017	2018
Containership	$12,749,294	$13,230,988	$13,712,682	$14,194,376	$14,676,070	$15,157,763	$15,639,457
Cruise	$3,501,315	$3,633,602	$3,765,888	$3,898,175	$4,030,462	$4,162,749	$4,295,035
Tanker	$1,220,320	$1,266,426	$1,312,532	$1,358,639	$1,404,745	$1,450,851	$1,496,957
Other	$2,140,772	$2,221,655	$2,302,537	$2,383,420	$2,464,303	$2,545,185	$2,626,068
	$19,611,701	**$20,352,671**	**$21,093,640**	**$21,834,609**	**$22,575,579**	**$23,316,548**	**$24,057,518**

Ship Type	2019	2020	2021	2022	2023	2024	2025
Containership	$16,121,151	$16,602,845	$17,084,539	$17,566,233	$18,047,927	$18,529,621	$19,011,315
Cruise	$4,427,322	$4,559,609	$4,691,895	$4,824,182	$4,956,469	$5,088,755	$5,221,042
Tanker	$1,543,063	$1,589,169	$1,635,275	$1,681,382	$1,727,488	$1,773,594	$1,819,700
Other	$2,706,951	$2,787,833	$2,868,716	$2,949,599	$3,030,481	$3,111,364	$3,192,247
	$24,798,487	**$25,539,456**	**$26,280,426**	**$27,021,395**	**$27,762,365**	**$28,503,334**	**$29,244,304**

Main Engine Cost Effectiveness ($/ton reduced)

NO_x	
PM	

No Net Increase/Air Quality Task Force

OGV14 - Retrofit/Repower Requirements for Infrequent Callers
Cost Worksheet
DRAFT
Brief Measure Description:
Repower auxiliary engines on infrequent callers (2-4 visits/yr)
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Description	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Annual O/M Cost per Unit	Total Capital Cost
Repower auxiliary engines on	260	2010	20	New Engine	$2,000,000		$520,000,000
infrequent callers (2-4 visits/yr)	352	2015	20	New Engine	$2,000,000		$704,000,000

These estimates provided by SCAQMD staff

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital Costs	$0	$0	$0	$0	$0	$520,000,000	$0
Operating Costs	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital Costs	$0	$0	$0	$704,000,000	$0	$0	$0
Operating Costs	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital Costs	$0	$0	$0	$0	$0	$0	$0
Operating Costs	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

OGV15 - Expanded VSR Program
Cost Worksheet
DRAFT **DRAFT**

Brief Measure Description:
Vessels reduce speed to 12 knots at 40 nm.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Costs

Vessels	$3,000	Per vessel per hour cost estimate given by one shipping line
Port	$8,500	Annual cost to Port for MarEx monthly reports & Lloyd's annual fee

OGV15 VSR Participation Rate

	2005	2008	2010	2012	2025
Increase Over OGV2 (first 20 nm)	0%	37%	37%	37%	37%
Participation Rate full 40 nm	0%	85%	85%	85%	85%

Participation Rate: Currently, as modeled, the participation rate only takes into account those vessels that reach the target speed of 12 knots. However, the POLA VSR program takes into account the reductions associated w/all vessels that reduce speed over their baseline corrected speed. This difference will be incorporated into the next version of this control measure worksheet.
Also include 20-40 miles for the original AMP OGV2.

VSR Hour Delayed

	2001	2005	2008	2010	2012	2025
First 20 miles	2,944	0	2,614	2,908	3,083	4,597
Additional 20 miles	3,335	0	6,803	7,569	8,022	11,963
Total Hours Delayed		**0**	**9,418**	**10,477**	**11,105**	**16,559**

Note: Hours delayed for 2001 were estimated from 2001 PWBAEI data. The delay differs between the first (closer) 20 miles and the outer 20 miles because of different route distances within the 20 and 40 mile zones. The OGV growth index was factored into estimated hours delayed for future years along with participation in the 40-mile reduction as well as the increase in participation in the first 20 miles over OGV2 rates.

Cost by Year

	2005	2006	2007	2008	2009	2010	2011
Operating - Delay	$0	$9,417,672	$9,417,672	$28,253,016	$1,589,232	$31,431,480	$941,767
Operating - Port	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500
Captial Cost*	$0	$40,000,000	$0	$0	$0	$0	$0

*New radar system

	2012	2013	2014	2015	2016	2017	2018
Operating - Delay	$33,315,015	$34,573,723	$35,832,431	$37,091,139	$38,349,847	$39,608,555	$40,867,263
Operating - Port	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500
Captial Cost*	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Operating - Delay	$42,125,971	$43,384,679	$44,643,387	$45,902,096	$47,160,804	$48,419,512	$49,678,220
Operating - Port	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500	$8,500
Captial Cost*	$0	$0	$0	$0	$0	$0	$0

Cost Effectiveness ($/ton reduced)

NO_x	
PM	

No Net Increase/Air Quality Task Force

OGV16 - Expanded Alternative Maritime Power (AMP)

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Expanded shore power electrification for frequent callers starting in 2007.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Port Infrastructure (Capital) Costs

Outlets	$1,500,000	Per plug Port infrastructure cost
Outlets	34	Assumed Future Plugs/Outlets
Outlet Cost	$51,000,000	

	2005	2006	2007	2008	2009	2010
# of plugs	0	7	7	7	7	6
Cost of plugs	$0	$10,500,000	$10,500,000	$10,500,000	$10,500,000	$9,000,000

Ship Infrastructure Costs

Assumes that the ship must call for 20 years after being retrofitted

	2005	2008	2010	2012	2025
Containership	0%	25%	50%	100%	100%
Cruise Ship	0%	25%	50%	100%	100%
Tanker	0%	50%	100%	100%	100%
Other	0%	25%	50%	100%	100%

Ships (5+ trips) that need to be retrofit assuming 5% more retrofits every 5 years

	2001	2005	2008	2010	2012	2025
Containership	139	0	83	93	98	0
Cruise Ship	6	0	4	4	4	0
Tanker	5	0	6	7	0	0
Other	14	0	8	9	10	0

Vessel Infrastructure Costs

Vessels	$500,000	Per vessel ship infrastructure cost (average)

	2005	2008	2010	2012	2025
Containership	$0	$41,700,000	$46,391,250	$49,171,250	$0
Cruise Ship	$0	$1,800,000	$2,002,500	$2,122,500	$0
Tanker	$0	$3,000,000	$3,337,500	$0	$0
Other	$0	$4,200,000	$4,672,500	$4,952,500	$0
Totals (vessel capital costs)	**$0**	**$50,700,000**	**$56,403,750**	**$56,246,250**	**$0**

No Net Increase/Air Quality Task Force

OGV16 - Expanded Alternative Maritime Power (AMP)

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Expanded shore power electrification for frequent callers starting in 2007.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Connection/Disconnection Costs

Laborers	4	
Rate	$100	per hour
Hours	8	hours per shift
Shifts per Call	2	1 shift connect/1 shift disconnect
Connect/Disconnect Costs	$6,400	per call

Power Supplemental Costs

Total Calls to be AMP'd

Calls	2001	2005	2006	2007	2008	2009	2010	2011
Containership	1584	0	0	0	950	1,533	2,115	3,299
Cruise Ship	320	0	0	0	192	310	427	666
Tanker	276	0	0	0	331	534	737	759
Other	537	0	0	0	322	520	717	1,118
Totals	2,717	0	0	0	1,796	2,896	3,996	5,842

$7,358 per call (from OGV3)

Calls	2012	2013	2014	2015	2016	2017	2018
Containership	4,483	4,652	4,821	4,991	5,160	5,330	5,499
Cruise Ship	906	940	974	1,008	1,042	1,077	1,111
Tanker	781	811	840	870	899	929	958
Other	1,520	1,577	1,635	1,692	1,749	1,807	1,864
	7,689	7,980	8,270	8,561	8,851	9,142	9,432

Calls	2019	2020	2021	2022	2023	2024	2025
Containership	5,668	5,838	6,007	6,176	6,346	6,515	6,684
Cruise Ship	1,145	1,179	1,214	1,248	1,282	1,316	1,350
Tanker	988	1,017	1,047	1,076	1,106	1,135	1,165
Other	1,922	1,979	2,036	2,094	2,151	2,209	2,266
	9,723	10,013	10,304	10,594	10,885	11,175	11,466

No Net Increase/Air Quality Task Force

OGV16 - Expanded Alternative Maritime Power (AMP)

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Expanded shore power electrification for frequent callers starting in 2007.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Op. Costs	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Containership	$0	$0	$0	$6,992,893	$11,276,040	$15,559,187	$24,271,167
Cruise Ship	$0	$0	$0	$2,542,870	$4,100,378	$5,657,886	$8,825,879
Tanker	$0	$0	$0	$2,436,917	$3,929,529	$5,422,141	$5,584,602
Other	$0	$0	$0	$1,185,348	$1,911,374	$2,637,400	$4,114,147
Totals	**$0**	**$0**	**$0**	**$24,651,149**	**$39,749,978**	**$54,848,807**	**$80,187,042**

Op. Costs	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Containership	$32,983,146	$34,229,315	$35,475,485	$36,721,654	$37,967,824	$39,213,993	$40,460,162
Cruise Ship	$11,993,871	$12,447,024	$12,900,176	$13,353,329	$13,806,481	$14,259,634	$14,712,786
Tanker	$5,747,063	$5,964,199	$6,181,334	$6,398,470	$6,615,606	$6,832,741	$7,049,877
Other	$5,590,893	$5,802,128	$6,013,363	$6,224,599	$6,435,834	$6,647,069	$6,858,304
Totals	**$105,525,278**	**$109,512,234**	**$113,499,191**	**$117,486,148**	**$121,473,104**	**$125,460,061**	**$129,447,018**

Op. Costs	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Containership	$41,706,332	$42,952,501	$44,198,671	$45,444,840	$46,691,010	$47,937,179	$49,183,348
Cruise Ship	$15,165,939	$15,619,091	$16,072,244	$16,525,396	$16,978,549	$17,431,701	$17,884,854
Tanker	$7,267,012	$7,484,148	$7,701,284	$7,918,419	$8,135,555	$8,352,690	$8,569,826
Other	$7,069,539	$7,280,774	$7,492,010	$7,703,245	$7,914,480	$8,125,715	$8,336,950
Totals	**$133,433,974**	**$137,420,931**	**$141,407,888**	**$145,394,844**	**$149,381,801**	**$153,368,758**	**$157,355,714**

No Net Increase/Air Quality Task Force

OGV16 - Expanded Alternative Maritime Power (AMP)

Cost Worksheet

DRAFT **DRAFT**

Brief Measure Description:

Expanded shore power electrification for frequent callers starting in 2007.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Vessel type adjustment factors

Based on the following average characteristics:

	kW hotelling load	Avg. hrs/call	Power use kW-hrs/call	adj factor*
Containership	977	42.8	41,816	1.0
Cruise Ship	7,040	10.5	73,920	1.8
Tanker	1,330	30.2	40,166	1.0
Other	500	40.0	20,000	0.5

* Power use per call in relation to containership power use. Base data is from containership experience.

Info source: draft PWBAEI, 2004

No Net Increase/Air Quality Task Force

Harbor craft - No cost estimate summary
DRAFT

The following measures do not have cost estimates:

HC1 - New Engine Standards for Harbor Craft
Brief Description:
On December 1999, EPA promulgated final exhaust emission standards for new diesel engines over 37 kW.
Explanation for no Cost Estimate:
Emission reductions were based on ARB estimate. Cannot do a cost estimate for existing regulation.

HC4 - Dredging Activities
Brief Description:
Portable diesel engines must be certified to EPA/ARB nonroad engine standards by 2005/2010 and are subject to fleet emission standards in 2014, 2017 and 2020.
Explanation for no Cost Estimate:
Emission reductions were based on ARB estimate. Cannot do a cost estimate for existing regulation.

HC6 - New Engine Standards for Category 1 and 2 Marine Engines
Brief Description:
Under an Advance Notice of Proposed Rulemaking, EPA is considering standards for new marine diesel engines.
Explanation for no Cost Estimate:
Cannot do a cost estimate for a future regulation that has not been adopted.
It is not possible to predict what standards may be set.

HC8 - In-Use Harbor Craft Emission Reduction Measure/ATCM
Brief Description:
ARB is proposing to reduce emissions by using a number of options.
Explanation for no Cost Estimate:
Until regulation is adopted, it is not possible to predict which options will be applied.

No Net Increase/Air Quality Task Force

HC2 - Clean Fuels for Harbor Craft
Cost Worksheet
DRAFT
Brief Measure Description:

Diesel fuel sold or supplied to harbor vessels is required to meet vehicular diesel fuel specifications.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Clean Fuel Program Estimated Cost & Cost Effectiveness

$0.03	estimated fuel premium cost for diesel fuel meeting vehicular diesel fuel spec (based on OPIS March 2005 prices)
14.3	million gallons (MM gal) estimated 2001 total harbor craft annual fuel consumption (based on 2001 baseline EI data)

	2005	2008	2010	2012	2025
Participation	0%	100%	100%	100%	100%
Est. MM gal	0.0	14.5	14.4	14.4	15.1
Est cost ($)	$0	$435,000	$432,000	$432,000	$453,000

Fuel demand estimates assume 2% growth in assist tug activity and no growth of other harbor vessel types, consistent with NNI activity/emission growth scenarios.

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$435,000	$435,000	$433,500	$432,000	$432,000

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$432,000	$433,615	$435,231	$436,846	$438,462	$440,077	$441,692

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$443,308	$444,923	$446,538	$448,154	$449,769	$451,385	$453,000

Note: Fuel cost incurred by harbor vessel companies, not subsized by the Port.

No Net Increase/Air Quality Task Force

HC3 - Early Implementation of ULSD

Cost Worksheet

DRAFT

Brief Measure Description:

Port provide subsidy for early implementation of ULSD fuel to harbor craft at the Port.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

ULSD Fuel Improvement Programs Estimated Cost & Cost Effectiveness

$0.07 subsidy cost per gallon

14.3 gallons estimated total harbor craft annual fuel consumption (based on 2001 baseline EI data)

	2005	2008	2010	2012	2025
Participation	20%	0%	0%	0%	0%
Est. MM gal	2.9	0.0	0.0	0.0	0.0
Est cost ($)	$203,000	$0	$0	$0	$0

Fuel demand estimates assume 2% growth in assist tug activity and no growth of other harbor vessel types, consistent with NNI activity/emission growth scenarios.

Cost Effectiveness ($/ton reduced)

	2005	2008	2010	2012	2025
NO_x	$8,145	na	na	na	na
PM	$65,329	na	na	na	na

Note: "na" indicates that there is no emission reduction associated with the measure for this year. For example, the measure may not be active under current NNI scenarios.

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$203,000	$101,500	$0	$0	$0	$0	$0

2006 cost assumes subsidy paid Jan-Jun until ULSD becomes mandatory

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

HC5 - Technical Advisory Committee (TAC) Harbor Craft Measures

Cost Worksheet

DRAFT

Brief Measure Description:

Port's TAC emission reduction strategies include repower or retrofit HC main and/or auxiliary engines.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

$2,721,846 Cost for TAC harbor craft measures[1]

TAC Costs may have been incurred by the Port prior to 2005.

No Net Increase/Air Quality Task Force

Harbor Craft Measures
HC7 - Emulsified Fuels
HC9 - Repower Existing Harbor Craft
Cost Estimate
DRAFT

Overview

Description	# of Units	Equipment Life (years)	Total Capital Cost	Annual O/M Cost	Notes	Data Sources
HC7 - Emulsified Fuels Use emulsified CARB diesel in harbor craft	N/A	N/A	N/A	2006: $0.61 million/yr (total) 2008: $2.2 million/yr (total)	Flatline all harbor craft at 2001 baseline.	Chevron Starcrest AQMD ARB
HC9 - Repower Existing Harbor Craft Repower existing POLA harbor craft with new diesel engines	2005: 50 2006: 50 2007: 50 2008: 50 2009: 50	20 years	2005: $8 MM 2006: $8 MM 2007: $8 MM 2008: $8 MM 2009: $8 MM	N/A	Flatline all harbor craft at 2001 baseline. Grow assist tugs @ 2%/yr Repower both main and auxiliary engines	AQMD

Details by Year

Description	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost
HC7 Emulsfied Fuels	2,776,000	2006				Fuel Cost Differnetial per Gallon	$ 0.22
	10,024,000	2008				Fuel Cost Differnetial per Gallon	$ 0.22
HC9 Repower Existing Harbor Craft	50	2005	20	Repower	$ 160,000		
	50	2006	20	Repower	$ 160,000		
	50	2007	20	Repower	$ 160,000		
	50	2008	20	Repower	$ 160,000		
	50	2009	20	Repower	$ 160,000		

Total Costs (HC7)

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$610,720	$610,720	$2,205,280	$2,205,280	$2,205,280	$2,205,280

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$2,205,280	$2,205,280	$2,205,280	$2,205,280	$2,205,280	$2,205,280	$2,205,280

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$2,205,280	$2,205,280	$2,205,280	$2,205,280	$2,205,280	$2,205,280	$2,205,280

Total Costs (HC9)

	2005	2006	2007	2008	2009	2010	2011
Capital	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

HC10 - Harbor Craft Retrofits

Cost Worksheet

DRAFT

Brief Measure Description:

Retrofit existing harbor craft engines with add-on control systems (DPF, DOC, SCR, lean NO_X catalyst).

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Retrofit Data

Retrofit device:	SCR	DOC	DPF	Lean NO_X Catalyst
No. of candidate engines:	10	100	100	100
Average cost per engine:	$300,000	$2,000	$10,000	$50,000
Estimated cost:	**$3,000,000**	**$200,000**	**$1,000,000**	**$5,000,000**

$9,200,000 Total estimated retrofit program costs

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$1,840,000	$1,840,000	$1,840,000	$1,840,000
Operational	$0	$0	$0	$0	$0	$0	$0

Note: Program starts in 2008 and assumes equal participation rate for next 5 years.

	2012	2013	2014	2015	2016	2017	2018
Capital	$1,840,000	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force
HC11 - AMP-Ready Staging Areas
Cost Worksheet
DRAFT
Brief Measure Description:
Develop AMP-ready staging areas for vessel assist tugs.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Port Infrastructure Costs

Port infrastructure cost	$50,000	Per area/berth with numerous plugs (does not include structural modifiactions to the berths that may be necessary but cannot be determined at this time.
Shore Power Areas	3	Assumed number of staging areas throughout Port
Port Cost	**$150,000**	Cost per area x number of areas
Cost to tugs		
Tug infrastructure cost	$1,000	Per assist tug (average)
Number of tugs	15	Estimated number of tugs that need 1 time accessories
Total Cost	**$15,000**	Assist Tug cost

Electricity $0.20 Per kw-hr during hotelling (average)

	Aux Eng Hotelling kW-hr	Power Cost $
Assist Tug	417,702	$83,540
Tugboats	248,348	$49,670

Auxiliary engine hotelling was estimated to be 60% of tug working time for 1 auxiliary engine.
Power cost ($) = hotelling (kW-hrs) x power cost ($/kW-hr)

Particpation Rates

Vessel Type	2005	2008	2010	2012	2025
Assist Tug	0%	20%	40%	60%	100%
Tugboat (Unit Tows)	0%	20%	40%	60%	80%

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital - port infrastructure	$0	$0	$0	$150,000	$0	$0	$0
Capital - tug modifications	$0	$0	$0	$3,000	$0	$3,000	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Note: Assumes the 3 berth infrastructure will be completed in 2008 and that the tug implementation will follow particpation rate.
Due to the relatively low cost of modifying tugs to accept shore power, schedule could be accelerated at low cost to the Port.

	2012	2013	2014	2015	2016	2017	2018
Capital - port infrastructure	$0	$0	$0	$0	$0	$0	$0
Capital - tug modifications	$3,000	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital - port infrastructure	$0	$0	$0	$0	$0	$0	$0
Capital - tug modifications	$0	$0	$0	$0	$0	$0	$3,000
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

Cargo Handling Equipment - Summary of measures for which no cost estimates have been developed
DRAFT

The following measures do not have cost estimates:

CHE1 - Emission Standards for Heavy-Duty Nonroad Diesel Engines
Brief Description:
EPA and ARB standards for heavy-duty nonroad diesel engines.
Explanation for no Cost Estimate:
Anticipated reductions are included in the adjusted out-year emissions growth. It is difficult to estimate number of CHE various that will be impacted by Tier 4 standardas.

CHE4 - Alternative Fuel Yard Tractor Resolution
Brief Description:
Port resolution stipulates that for new leases, terminal operators will be required to use alternative fuel yard tractors. For existing leases, terminal operator shall retrofit its yard tractor fleet or purchase other CHE with ARB verified technology or use hybrid electric equipment, or use other emission reducing technololgy.
Explanation for no Cost Estimate:
It is too difficult to estimate number of pieces and which technology will be chosen to do a cost estimate.

CHE9 - Cargo Handling Equipment at Ports and Intermodal Rail Yards
Brief Description:
ARB proposed regulation for Diesel-Fueld Mobile CHE at Ports and Intermodal Rail Yards will reduce emissions using Best Available Control Technology (BACT).
Explanation for no Cost Estimate:
ARB does not have cost estimate for this proposed regulation at this time.

No Net Increase/Air Quality Task Force

CHE2 - Yard Tractor Modernization and ULSD Programs

Cost Worksheet

DRAFT

Brief Measure Description:

Voluntary program to replace yard tractors with cleanest engines available and use ULSD.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

ULSD Subsidy (2005-2006) - Yard tractors using USLD early - 1yr.

Fuel Consumption Assumptions & Estimates for yard tractors

796	yard tractors	8	gph	3,000	hours/year
19,104,000	annual gallons for yard tractors				
$0.07	subsidy per gallon				
75%	fleet fuel penetration				
$1,002,960	**annual ULSD subsidy for yard tractors**				

Phase 1 Subsidy (2005) - Replace unregulated yard tractors (pre-1995 models)

138	number of yard tractors
$65,000	new yard tractor purchase cost
20%	subsidy of new purchase cost
$2,000	per OEM DOC/truck
$2,070,000	**total modernization Phase 1 subsidy**

Phase 2 Subsidy (2006) - Replace 50% of Tier 1 (1996-2002 models) yard tractors

211	number of yard tractors
$65,000	new yard tractor purchase cost
30%	subsidy of new purchase cost
$2,000	per OEM DOC/truck
$4,536,500	**total modernization Phase 2 subsidy**

$6,606,500	**total modernization (Phase 1 & 2) subsidy**
$1,002,960	**one year ULSD subsidy for yard tractors**

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$2,070,000	$4,536,500	$0	$0	$0	$0	$0
Operational	$1,002,960	$501,480	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Note: The Port subsidizes capital costs for this measure in 2005 and 2006 only.
It is assumed that the incremental fuel cost will be subsized for the full year in 2005 and half a year in 2006.

No Net Increase/Air Quality Task Force

CHE3 - Early Implementation of ULSD for CHE (Other than Yard Tractors)
Cost Worksheet
DRAFT
Brief Measure Description:
Port subsidize early implementation of ULSD for CHE fleet (other than yard tractors).
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Fuel Consumption Assumptions & Estimates (other than yard tractors)

		Equip. Use	Fuel Use	
Equip. Type	**No. Units**	**hrs/yr**	**gph**	**gal/yr**
Top loaders	73	1,732	8	1,011,488
Fork lifts	311	1,173	6	2,188,818
Side handlers	37	1,407	8	416,472
Cranes	39	2,080	8	648,960
Other	71	900	6	383,400
Total				**4,649,138**

Phase I Subsidies (50% ULSD Conversion in 2005)

$0.07	subsidy per gallon
50%	fleet fuel penetration
4,649,138	annual gallons
$162,720	**total Phase 1 subsidy**

Phase II Subsidies (100% ULSD Conversion in 2006)

$0.07	subsidy per gallon
100%	fleet fuel penetration
4,649,138	annual gallons
0.83	years of phase
$325,440	annual program cost
$271,200	**total Phase 2 subsidy (2006 cost)**

Total Costs

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$162,720	$271,200	$0	$0	$0	$0	$0

	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Note: The Port subsidizes costs for this measure in 2005 and 2006 only.

No Net Increase/Air Quality Task Force

CHE5 - Emulsified Fuels

Cost Worksheet

DRAFT

Brief Measure Description:

Port subsidy for equipment using emulsified fuels.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Fuel Consumption Assumptions & Estimates for CHE

Equip. Type	No. Units	Equip. Use hrs/yr	Emulsified Fuel Use* gph	gal/yr
CHE	100	1,500	9.36	1,404,000

* Emulsified fuel use is 17% higher than normal diesel fuel use

$0.22 subsidy per gallon

$308,880 annual emulsified fuel subsidy for yard tractors

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$308,880	$308,880	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Note: The 17 March 2005 Draft POLA NNI Narratives states the meausure
"will continue as long as the demand for the product among Port terminal remains."
However, at this tme only 2005 and 2006 costs are shown, as it is impossible to predict the continuing demand.

No Net Increase/Air Quality Task Force

CHE6 - Technical Advisory Committee (TAC) CHE Measures
Cost Worksheet
DRAFT
Brief Measure Description:
Various emission reduction strategies implemented as determined by TAC.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

$1,748,087 Cost for TAC CHE measures estimated by the Port

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

TAC Costs are part of the China Shipping Settle Agreement

No Net Increase/Air Quality Task Force

CHE7 - Expanded Yard Tractor Modernization
Cost Worksheet
DRAFT
Brief Measure Description:
Voluntary program to continue modernization of yard tractors in a phased approach.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process. Measure affects 765 yard tractors as surveyed in the 2001 baseline.

A) Phase 1 Subsidy (2007) - Replace remaining 50% of Tier 1 (1996-2002 models) Yard Tractors

number of yard tractors	210
new yard tractor purchase cost	$65,000
subsidy of new purchase cost	30%
per OEM DOC	$2,000
total Phase 1 subsidy	**$4,515,000**

B) Phase 2 Subsidy (2008) - Replace Tier 2 (2003-2004) Yard Tractors

number of yard tractors	237
new yard tractor purchase cost	$65,000
subsidy of new purchase cost	40%
per OEM DOC	$2,000
total Phase 2 subsidy	**$6,636,000**

C) Phase 3 Subsidy (2009) - Replace Yard Tractors originally procured in 2005

number of yard tractors	138
new yard tractor purchase cost	$65,000
subsidy of new purchase cost	30%
per OEM DOC	$2,000
total Phase 3 subsidy	**$2,967,000**

D) Phase 4 Subsidy (2010) - Replace Yard Tractors originally procured in 2006

number of yard tractors	211
new yard tractor purchase cost	$65,000
subsidy of new purchase cost	30%
per OEM DOC	$2,000
total Phase 4 subsidy	**$4,536,500**

E) Phase 5 Subsidy (2011) - Replace Yard Tractors originally procured in 2007

number of yard tractors	210
new yard tractor purchase cost	$65,000
subsidy of new purchase cost	40%
per OEM DOC	$2,000
total Phase 5 subsidy	**$5,880,000**

F) Phase 6 Subsidy (2012) - Replace Yard Tractors originally procured in 2008

number of yard tractors	237
new yard tractor purchase cost	$65,000
subsidy of new purchase cost	40%
per OEM DOC	$2,000
total Phase 6 subsidy	**$6,636,000**

Note: Cost of alternative fuel infrastructure, if needed, not included.

Total Program Costs

Phase 1 subsidy	$4,515,000
Phase 2 subsidy	$6,636,000
Phase 3 subsidy	$2,967,000
Phase 4 subsidy	$4,536,500
Phase 5 subsidy	$5,880,000
Phase 6 subsidy	$6,636,000
total program costs	**$31,170,500**

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital - Equipment	$0	$0	$4,515,000	$6,636,000	$2,967,000	$4,536,500	$5,880,000

	2012	2013	2014	2015	2016	2017	2018
Capital - Equipment	$6,636,000	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital - Equipment	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

CHE8 - Enhanced CHE Modernization
Cost Worksheet
DRAFT
Brief Measure Description:

This measure includes new purchases, and replacement or retrofit of existing equipment.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process. Changes over existing fleet as of end of 2004.

A) Replace 50% of pre-1996 model CHE

by 2006	#	Equip Cost	Subsidy	Cost
Rubber Tire Gantry (RTG)	19	$1,500,000	60%	$17,100,000
Top Pick	4	$450,000	60%	$270,000
Side Pick	14	$250,000	60%	$150,000
Forklift	84	$60,000	60%	$36,000
Equipment Cost				$17,556,000
per OEM DOC	121	$2,500		$302,500
Total Phase Subsidy				**$17,858,500**

B) Replace remaining 50% pre-1996

model CHE by 2007	#	Equip Cost	Subsidy	Cost
RTG	19	$1,500,000	60%	$17,100,000
Top Pick	4	$450,000	60%	$270,000
Side Pick	14	$250,000	60%	$150,000
Forklift	84	$60,000	60%	$36,000
Equipment Cost				$17,556,000
per OEM DOC	121	$2,500		$302,500
Total Phase Subsidy				**$17,858,500**

C) Replace 50% of Tier 1 CHE

(1996-2002 models) by 2011	#	Equip Cost	Subsidy	Cost
RTG	27	$1,500,000	60%	$24,300,000
Top Pick	13	$450,000	60%	$270,000
Side Pick	19	$250,000	60%	$150,000
Forklift	17	$60,000	60%	$36,000
Equipment Cost				$24,756,000
per OEM DOC	76	$2,500		$190,000
Total Phase Subsidy				**$24,946,000**

D) Replace remaining 50% of Tier 1 (1996-2002)

	#	Equip Cost	Subsidy	Cost
RTG	27	$1,500,000	60%	$24,300,000
Top Pick	13	$450,000	60%	$270,000
Side Pick	18	$250,000	60%	$150,000
Forklift	17	$60,000	60%	$36,000
and 100% of 2003-2005 from 2011 - 2014				$24,756,000
RTG	24	$1,500,000	80%	$28,800,000
Top Pick	6	$450,000	80%	$360,000
Side Pick	14	$250,000	80%	$200,000
Forklift	3	$60,000	80%	$48,000
Equipment Cost				$24,756,000
per OEM DOC	122	$2,500		$305,000
Total Phase Subsidy				**$49,817,000**

Notes: Costs do not include alternative fuel infrastructur, additional costs associated with the maintenance, and additional fueling costs.

Total Program Costs		
2006 total subsidy	$17,858,500	
2007 total subsidy	$17,858,500	
2011 total subsidy	$74,763,000	(Cost equally spread from 2011 - 14)
total program costs	**$110,480,000**	

Total Costs

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Capital - Equipment	$0	$17,858,500	$17,858,500	$0	$0	$0	$18,690,750	$18,690,750	$18,690,750	$18,690,750

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Capital - Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

Locomotive Measures - Summary of measures for which no cost estimates have been developed
DRAFT

The following measures do not have cost estimates:

R1 - Tier 0, 1, and 2 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines
Brief Description:
EPA rule took effect in year 2000 for Tier 0, year 2002 for Tier 1, and year 2005 for Tier 2.
Explanation for no Cost Estimate:
Emission reductions were included in the adjusted out-year emissions. Cost effectiveness cannot be estimated for this measure.

R8 - Tier 3 Engine Standards for New and Remanufactured Locomotives and Locomotive Engines
Brief Description:
EPA is considering standards for new locomotive diesel engines and additional requirements for all current locomotives that may apply as early as 2011.
Explanation for no Cost Estimate:
Emission reductions were not modeled or credited for purposes of NNI attainment.
Until EPA issues final rule, it cannot be predicted what the standards may be set, when the standards might go into affect or what engine population will be affected.

R12 - Electrification of the Alameda Corridor
Brief Description:
The Alameda Corridor and Alameda Corridor East would be modified for the use of electric locomotives rather than diesel powered units.
Explanation for no Cost Estimate:
The electrification project would be a complex regional undertaking involvng railroads, power companies, and other entities. No recent study is available on which to base a reasonable cost estimate.

No Net Increase/Air Quality Task Force

R2 - ARB Diesel Fuel Used by Intrastate Locomotives
Cost Worksheet
DRAFT

Brief Description:
Beginning in 2007, diesel fuel sold or supplied to intrastate locomotive operarators in California must meet the specifications for vehicular diesel fuel, commonly known are ARB diesel fuel.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Fuel consumption estimate (gallons)

	2001
Near-port switching	304,000
On-port switching	424,000
Totals	**728,000**

Fuel consumption estimates based on data collected for the baseline EI.
Line haul locomotives (which are not intrastate locomotives) were not included in this measure.

	2005	2008	2010	2012	2025
Growth estimates over 2001 baseline:	23%	99%	153%	178%	379%

Growth estimate based on evaluation of Alameda Corridor throughput growth.

Fuel consumption (gallons) for all years

	2005	2006	2007	2008	2009	2010	2011
Totals	895,440	1,079,867	1,264,293	1,448,720	1,645,280	1,841,840	1,932,840

Fuel consumption estimates based on the growth estimates shown above, using linear interpolation for years between the identified years.

	2012	2013	2014	2015	2016	2017	2018
Totals	2,023,840	2,136,400	2,248,960	2,361,520	2,474,080	2,586,640	2,699,200

	2019	2020	2021	2022	2023	2024	2025
Totals	2,811,760	2,924,320	3,036,880	3,149,440	3,262,000	3,374,560	3,487,120

Cost estimates
Based on: $0.05 per gallon cost differential for 500 ppm and 15 ppm CARB diesel
Not included is any investment made by fuel producers in fuelstock desulfurization.

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$53,993	$63,215	$72,436	$82,264	$92,092	$96,642

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$101,192	$106,820	$112,448	$118,076	$123,704	$129,332	$134,960

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$140,588	$146,216	$151,844	$157,472	$163,100	$168,728	$174,356

Note: Incremental fuel costs will be incurred by railroad companies due to CA regulation and not by the Port.

No Net Increase/Air Quality Task Force

R3 - Federal Standards for Nonroad Diesel Fuel
Cost Worksheet
DRAFT

Brief Description:
Beginning in 2007, nonroad diesel fuel must meet maximum sulfur level of 500 ppm.
In 2012, nonroad diesel fuel used in locomotives must meet 15 ppm ULSD standard.
Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Fuel consumption estimate (gallons)

	2001
Off-port line haul	6,379,000
Near-port switching	304,000
On-port switching	424,000
On-port line haul	964,000
Totals	**8,071,000**

Fuel consumption estimate based on data collected for the baseline EI.

	2005	2008	2010	2012	2025
Growth estimates over 2001 baseline:	23%	99%	153%	178%	379%

Growth estimate based on evaluation of Alameda Corridor throughput growth.

Fuel consumption (gallons) for all years estimated using linear growth

	2005	2006	2007	2008	2009	2010	2011
Totals	9,927,330	11,971,983	14,016,637	16,061,290	18,240,460	20,419,630	21,428,505

	2012	2013	2014	2015	2016	2017	2018
Totals	22,437,380	23,685,281	24,933,182	26,181,082	27,428,983	28,676,884	29,924,785

	2019	2020	2021	2022	2023	2024	2025
Totals	31,172,685	32,420,586	33,668,487	34,916,388	36,164,288	37,412,189	38,660,090

Cost estimates
Based on: $0.08 per gallon cost differential for EPA nonroad diesel and ULSD
Cost estimate assumes no cost difference for current nonroad diesel fuel and the 500 ppm diesel fuel that will become mandatory in 2007. Therefore, there is no cost shown for this measure until the 15 ppm fuel comes into use in 2012. Not included is any investment made by fuel producers in fuelstock desulfurization.

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$1,794,990	$1,894,822	$1,994,655	$2,094,487	$2,194,319	$2,294,151	$2,393,983

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$2,493,815	$2,593,647	$2,693,479	$2,793,311	$2,893,143	$2,992,975	$3,092,807

Note: Incremental fuel costs will be incurred by railroad companies due to federal regulation and not by the Port.

No Net Increase/Air Quality Task Force

R5 - Locomotive Modernization and ULSD Fuel Improvement Program

Cost Worksheet

DRAFT **DRAFT**

Locomotive Modernization Cost Estimate

16	switching locomotives
$1,200,000	per locomotive
$19,200,000	total estimated program cost
$9,600,000	**Port of Los Angeles share of total estimated project cost**

Based on Port paying 50% of cost of new locomotives under this measure

ULSD Program Cost Estimate

20	switching locomotives[1]
45,000	gallons diesel/year per engine[2]
900,000	annual diesel consumption
$0.07	cost differential ULSD/diesel per gallon[3]
$63,000	**annual estimated program cost**

Notes:

1 - Current number of switch engines; cost estimate assumes no growth

2 - Fuel consumption as provided by PHL during the development of the 2001 baseline EI

3 - Cost differential could change frequently during the life of the program

Total Costs

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Capital	$4,800,000	$4,800,000	$0	$0	$0	$0	$0
Operational	$63,000	$63,000	$0	$0	$0	$0	$0

	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Note: Capital costs shown are the costs incurred by the Port, which are half of the total project costs.

No Net Increase/Air Quality Task Force

R6 - Ultra-Low Emission Switch Locomotives
Cost Estimate
DRAFT

Overview

Description	# of Units	Equipment Life (years)	Capital Cost per Unit	Annual O/M Cost	Notes	Data Sources
Replace with new Multi-Engine diesel switch locomotive	2	25-40 years	$1.07M each per 3-genset 2000-HP switch locomotive	- $60K (fuel savings) $5.4K incl genset overhauls, repl Longviews @ 8 yrs	Cost of Cleaire Longview (DPF & Lean-NOx catalyst) at $25K per engine - Usable as road switcher -Incl idle control	National Railway Equipment Cleaire
Replace with new Battery-Hybrid diesel switch locomotive	2	25-40 years	$783K each with 275 HP genset, 2000-HP switch locomotive	$64K (fuel savings) $19.6K incl genset overhaul, repl batteries, and Longview @ 8 yrs	Cost of Cleaire Longview DPF and Lean-NOx catalyst at $25K per genset '- Uncertain use as road switcher -Incl idle control	RailPower Cleaire

Details by Year

Description	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost
Replace with new Multi-Engine diesel switch locomotive	1	2007	30	3-engine genset 2000 HP switch locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	1	2007	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	1	2008	30	3-engine genset 2000 HP switch locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	1	2008	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	1	2015	8	Catalyst replacement	$ 25,000		
	1	2016	8	Catalyst replacement	$ 25,000		
	1	2023	8	Catalyst replacement	$ 25,000		
	1	2024	8	Catalyst replacement	$ 25,000		
Replace with new Battery-Hybrid diesel switch locomotive	1	2009	30	275 HP genset 2000 HP switch locomotive	$ 783,000	Fuel Savings per Unit	$ (64,000)
	1	2009	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	1	2010	30	275 HP genset 2000 HP switch locomotive	$ 783,000	Fuel Savings /Unit	$ (64,000)
	1	2010	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	1	2017	8	Catalyst replacement	$ 25,000		
	1	2018	8	Catalyst replacement	$ 25,000		
	1	2025	8	Catalyst replacement	$ 25,000		

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital - engines	$0	$0	$1,070,000	$1,070,000	$783,000	$783,000	$0
Capital - DPF/catalyst	$0	$0	$25,000	$25,000	$25,000	$25,000	$0
Operational (fuel savings)	$0	$0	-$60,000	-$60,000	-$64,000	-$64,000	-$64,000

	2012	2013	2014	2015	2016	2017	2018
Capital - engines	$0	$0	$0	$0	$0	$0	$0
Capital - DPF/catalyst	$0	$0	$0	$25,000	$25,000	$25,000	$25,000
Operational (fuel savings)	-$64,000	-$64,000	-$64,000	-$64,000	-$64,000	-$64,000	-$64,000

	2019	2020	2021	2022	2023	2024	2025
Capital - engines	$0	$0	$0	$0	$0	$0	$0
Capital - DPF/catalyst	$0	$0	$0	$0	$25,000	$25,000	$25,000
Operational (fuel savings)	-$64,000	-$64,000	-$64,000	-$64,000	-$64,000	-$64,000	-$64,000

No Net Increase/Air Quality Task Force

R7 - Ultra-Low Emission Line-Haul and Switch Locomotives
Cost Estimate prepared by AQMD staff
DRAFT

Overview

Description	# of Units	Equipment Life (years)	Capital Cost per Unit	Annual O/M Cost	Notes	Data Sources
Replace with rebuilt Liquefied Natural Gas (LNG) Line-Haul Locomotives	250* Locomotives	25-40 years	$1.7M each for 4400-HP line-haul locomotive	$116K (extra fuel) $28K repl OC @8 yrs	Incl oxidation catalyst (OC) to control formaldehyde ($200K, 8 yr life) -Incl idle control	MotivePower, Inc.
	4 LNG Refueling Stations	20 years	$4M each for 64,000-gal LNG station	$100K each (2.5%)	Assumes 75 dedicated line-haul locomotives & 2 LNG sta. per Class-1 railroad (BNSF, UPRR) Need to develop sources for high volume of LNG fuel	Energy Conversions, Inc. USA Pro
Replace with new Multi-Engine Diesel Switch Locomotive	120	25-40 years	$1.07M each per 3-genset	- $60K (fuel savings)	-Cost of Cleaire Longview (DPF & Lean-NOx catalyst) at $25K per genset	National Railway Equipment
			2000-HP switch locomotive	$5.4K incl genset overhauls, repl Longviews @ 8 yrs	Usable as road switcher -Incl idle control	Cleaire

***NOTE:** The railroads have commented that the most feasible means of achieving this measure would be to replace a substantial portion of their nation-wide fleet (approx. 1,430 locomotives), to ensure that compliant locomotives are available to service the South Coast Air Basin.

Details by Year

Description	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost
Replace with rebuilt Liquefied Natural Gas	66	2010	30	LNG 4400 HP line-haul locomotive	$ 1,700,000	Fuel Penalty per Unit	$ 116,000
(LNG) Line-Haul Locomotives	66	2010	8	Retrofit with Oxidation Catalyst	$ 200,000		
	4	2010	20	LNG Refueling Stattion	$ 4,000,000	O & M	$ 100,000
	80	2012	30	LNG 4400 HP line-haul locomotive	$ 1,700,000	Fuel Penalty per Unit	$ 116,000
	80	2012	8	Retrofit with Oxidation Catalyst	$ 200,000		
	62	2020	30	LNG 4400 HP line-haul locomotive	$ 1,700,000	Fuel Penalty per Unit	$ 116,000
	62	2020	8	Retrofit with Oxidation Catalyst	$ 200,000		
	42	2025	30	LNG 4400 HP line-haul locomotive	$ 1,700,000	Fuel Penalty per Unit	$ 116,000
	42	2025	8	Retrofit with Oxidation Catalyst	$ 200,000		
	66	2018	8	Catalyst replacement	$ 28,000		
	80	2020	8	Catalyst replacement	$ 28,000		

No Net Increase/Air Quality Task Force

R7 - Ultra-Low Emission Line-Haul and Switch Locomotives

Cost Estimate prepared by AQMD staff

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Replace with new Multi-Engine Diesel Switch Locomotive	24	2008	30	Multi-engine Diesel Switch Locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	24	2008	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	24	2009	30	Multi-engine Diesel Switch Locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	24	2009	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	24	2010	30	Multi-engine Diesel Switch Locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	24	2010	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	24	2011	30	Multi-engine Diesel Switch Locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	24	2011	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	24	2012	30	Multi-engine Diesel Switch Locomotive	$ 1,070,000	Fuel Savings per Unit	$ (60,000)
	24	2012	8	Retrofit with Cleaire Longview DPF and Lean NOx Catalyst	$ 25,000		
	24	2016	8	Catalyst replacement	$ 28,000		
	24	2017	8	Catalyst replacement	$ 28,000		
	24	2018	8	Catalyst replacement	$ 28,000		
	24	2019	8	Catalyst replacement	$ 28,000		
	24	2020	8	Catalyst replacement	$ 28,000		
	24	2024	8	Catalyst replacement	$ 28,000		
	24	2025	8	Catalyst replacement	$ 28,000		

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital - engines	$0	$0	$0	$25,680,000	$25,680,000	$137,880,000	$25,680,000
Capital - DPF/catalyst	$0	$0	$0	$600,000	$600,000	$13,800,000	$600,000
Capital - refueling stations	$0	$0	$0	$0	$0	$16,000,000	$0
Op. (net fuel penalty/savings)	$0	$0	$0	-$1,440,000	-$1,440,000	$6,216,000	$6,216,000
Op. - refueling stations	$0	$0	$0	$0	$0	$100,000	$100,000
Op. - labor	$0	$0	$0	$2,628,000	$2,628,000	$16,768,000	$2,628,000

	2012	2013	2014	2015	2016	2017	2018
Capital - engines	$161,680,000	$0	$0	$0	$0	$0	$0
Capital - DPF/catalyst	$16,600,000	$0	$0	$0	$672,000	$672,000	$2,520,000
Capital - refueling stations	$0	$0	$0	$0	$0	$0	$0
Op. (net fuel penalty/savings)	$7,840,000	$7,840,000	$7,840,000	$7,840,000	$7,840,000	$7,840,000	$7,840,000
Op. - refueling stations	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Op. - labor	$17,828,000	$0	$0	$0	$67,200	$67,200	$252,000

	2019	2020	2021	2022	2023	2024	2025
Capital - engines	$0	$105,400,000	$0	$0	$0	$0	$0
Capital - DPF/catalyst	$672,000	$12,400,000	$0	$0	$0	$672,000	$672,000
Capital - refueling stations	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

R7 - Ultra-Low Emission Line-Haul and Switch Locomotives

Cost Estimate prepared by AQMD staff

DRAFT

Op. (net fuel penalty/savings)	$7,840,000	$15,032,000	$15,032,000	$15,032,000	$15,032,000	$15,032,000	$19,904,000
Op. - refueling stations	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Op. - labor	$67,200	$11,780,000	$0	$0	$0	$67,200	$67,200

Source: e-mail E. Eckerle, AQMD, 17 June 2005

We recommend the following changes to R7:

1. Growing the number of locomotives

   Based on the discussions of the FWG yesterday, we recommend increasing the number of line haul locomotives according to the increase in the number of trains from the ACTA projections.

	2010	2012	2020	2025
# of Trains[1]	66	73	104	125
# of Locomotives[2]	264	292	416	500
POLA Share[3]	132	146	208	250
# of LNG Locomotives[4]	66	80	62	42

1. Combined ports
2. Assumes 4 locomotives per train
3. POLA share is 50%
4. 2010 penetration @50%; 2012 penetration @ 100% minus 2010 number; 2020 penetration @100% minus 2010/2012 number; 2025 penetration @ 100% minus 2010/2012/2020 number

For switchers, we recommend using the Railroad number of 120 by 2025. For purposes of estimating the cost, 120 should be partitioned out (according to the participation rate) over the implementation years beginning in 2008.

2. Fuel Penalty/Savings

The fuel penalty (LNG vs. Diesel) for the line hauls accordingly as well as the fuel savings for the increased number of switchers, provided before, should still be considered.

3. Labor

We recommend adding a 10% labor charge (from the capital costs) for the additional change outs necessary from having a dedicated fleet.

No Net Increase/Air Quality Task Force

R7 - Ultra-Low Emission Line-Haul and Switch Locomotives
Cost Estimate prepared by railroad company representtives
DRAFT

Type of Unit	Number Required	Approx. Cost per Unit	Total Cost
Switchers	120	$1,000,000	$120,000,000
Helper/haulers	100	$1,300,000	$130,000,000
Tenders	1,430	$1,000,000	$1,430,000,000
Line Haul	1,430	$1,700,000	$2,431,000,000
Total	1,650		$4,111,000,000

Source: Table 2 of letter dated 13 June 2005, Option A for LNG locomotives. This option presented as a "high end" cost compared with the letter's Option B, "modified Tier 3 locomotives," which has an estimated cost of $1.68 million.

Capital Expenditures (Number required to meet 2005 traffic levels)

	2005	2006	2007	2008	2009	2010	2011
Acqusition of Line Haul Units		Feasibility test (per SCAQMD notes)					Comm.
Acquisition of fuel tenders							Period

	2012	2013	2014	2015	2016	2017	2018
Acqusition of Line Haul Units	Commercialization		100	325	325	325	325
Acquisition of fuel tenders	period for engine builders		100	325	325	325	325

	2019	2020	2021	2022	2023	2024	2025
Acqusition of Line Haul Units	250	0	0	0	0	0	0
Acquisition of fuel tenders	30	0	0	0	0	0	0

Capital Expenditures (Cost required to meet 2005 traffic levels)

	2005	2006	2007	2008	2009	2010	2011
Acqusition of Line Haul Units	$0	$0	$0	$0	$0	$0	$0
Acquisition of fuel tenders	$0	$0	$0	$0	$0	$0	$0
(Costs for feasibility testing and commercialization not estimated)				$0	$0	$0	$0

	2012	2013	2014 Cost	2015	2016	2017	2018
Acqusition of Line Haul Units			$170,000,000	$552,500,000	$552,500,000	$552,500,000	$552,500,000
Acquisition of fuel tenders			$100,000,000	$325,000,000	$325,000,000	$325,000,000	$325,000,000
Total			$270,000,000	$877,500,000	$877,500,000	$877,500,000	$877,500,000

	2019	2020	2021	2022	2023	2024	2025
Acqusition of Line Haul Units	$425,000,000	$0	$0	$0	$0	$0	$0
Acquisition of fuel tenders	$30,000,000	$0	$0	$0	$0	$0	$0
Total	$455,000,000	$0	$0	$0	$0	$0	$0

Important note:

The following additional costs are not factored into AAR cost estimate of $4.1 billion, Table 2, June 13, 2005 comments

LNG Fueling Stations **14**

Modifications at maintenance yards to handle new units

Training of crews and maintenance personnel on new technology

Operational and Maintenance Expenditures

Crew Change Costs: 240 changes per day

Fuel Cost Penalty

Incremental O&M to service new units

O&M for the fueling stations

Additional crew members salaries and benefits

These unit assumptions comport with the Option A scenario described in the June 13, 2005 AAR correspondence. ***Critical Assumption:*** *Costs reflect meeting today's traffic levels, not the traffic levels expected in the NNI report which for rail grow over 500%. 500% growth in rail traffic would require increasing rail equipment and O&M costs by roughly same proportion. Another critical assumption is fact that unit counts reflect meeting today's traffic levels assuming no engine derating occurs. In fact, LNG engines will not produce same amount of motive power, and this will increase number of units required.*

Source: Spreadsheet provided 6/19/2005 by Andrew Trump on behalf of railroad companies. Information reproduced as submitted, except annual costs as calculated. Reformatted to improve consistency with overall NNI report format.

No Net Increase/Air Quality Task Force

R9 - CARB Diesel Fuel for Class-1 Railroads
Cost Estimate prepared by AQMD staff
DRAFT

Overview

Description	# of Units	Equipment Life (years)	Capital Cost per Unit	Annual O/M Cost	Notes	Data Sources
Dedicated Line-Haul & Switcher Locomotives in Basin	150 Line Haul, 25 Switch locos for Class-1 railroad	N.A.	N.A.	$12.5K line haul fuel $2K switcher fuel Unknown $ for operational changes	Requires operational modifications for locomotive change-outs at "boundary rail yards." Assumes 75 dedicated line-haul & 13 switch locomotives per Class-1 railroad (BNSF, UPRR)	$0.05 cost differential between EPA and ULSD fuel

Details by Year

Description	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost
Dedicated Line-Haul & Switcher Locomotives in Basin	38,500,000	2007	N.A.			Fuel Cost Differnetial per Gallon	$ 0.05

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operating	$0	$0	$1,925,000	$2,134,105	$2,343,211	$2,552,316	$2,663,019

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operating	$2,773,722	$2,884,425	$2,995,128	$3,105,831	$3,228,834	$3,351,837	$3,474,840

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operating	$3,522,149	$3,720,847	$3,850,000	$3,979,153	$4,108,307	$4,237,460	$4,366,613

Activity growth estimate:

2001	2005	2007	2010	2015	2020	2025
100%	123%	157%	208%	253%	303%	355%

No Net Increase/Air Quality Task Force

R9 - CARB Diesel Fuel for Class-1 Railroads

Cost Estimate prepared by railroad company representtives

DRAFT

Compliance mechanism: Retrofitting baffles to locomotive fuel tanks to allow dual fuel capacity.

Estimated number of locomotives:	6,000	
Estimated cost per locomotive:	$100,000	
Potential tank retrofit schedule:	Estimate of 2 retrofits/day, 250 days/year (500 retrofits per year)	
	6,000/500 = 12 year retrofit period	

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$50,000,000	$50,000,000	$50,000,000	$50,000,000	$50,000,000
Operating	$0	$0	$1,925,000	$2,134,105	$2,343,211	$2,552,316	$2,663,019
Sum	$0	$0	$51,925,000	$52,134,105	$52,343,211	$52,552,316	$52,663,019

	2012	2013	2014	2015	2016	2017	2018
Capital	$50,000,000	$50,000,000	$50,000,000	$50,000,000	$50,000,000	$50,000,000	$50,000,000
Operating	$2,773,722	$2,884,425	$2,995,128	$3,105,831	$3,228,834	$3,351,837	$3,474,840
Sum	$52,773,722	$52,884,425	$52,995,128	$53,105,831	$53,228,834	$53,351,837	$53,474,840

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operating	$3,522,149	$3,720,847	$3,850,000	$3,979,153	$4,108,307	$4,237,460	$4,366,613
Sum	$3,522,149	$3,720,847	$3,850,000	$3,979,153	$4,108,307	$4,237,460	$4,366,613

Source of capital cost information: Letter dated 13 June 2005, and A. Trump e-mail of 19 June 2005

(Operating costs from AQMD estimate, which is an estimate of operating costs for port-related activity)

No Net Increase/Air Quality Task Force

R10 - Idling Controls for Line-Haul and Switch Locomotives
Cost Estimate
DRAFT

Overview

Description	# of Units	Equipment Life (years)	Capital Cost per Unit	Annual O/M Cost	Notes	Data Sources
Replace transient line-haul locomotives with dedicated locomotives with OEM idle controls. Retrofit switch locomotives with idle controls	150 Line-Haul, 25 Switch locomotives for Class-1 railroad	25-40 years	$14-18K each	$28.7K Line-Haul (fuel savings) - $16K Switcher (fuel savings)	Idle time reduced 80%	BNSF UPRR

Details by Year

Description	# of Units	Implementation Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost
Replace transient line-haul locomotives with dedicated locomotives with OEM idle controls. Retrofit switch locomotives with idle controls	150	2006	30	Idling Control Cost	$ 16,000	Fuel Savings per	$ (28,700)
	25	2006	30	Idling Control Cost	$ 16,000	Fuel Savings per Unit	$ (16,000)

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$2,800,000	$0	$0	$0	$0	$0
Operating	$0	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operating	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operating	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700	-$44,700

No Net Increase/Air Quality Task Force

HDDV - Summary of measures for which no cost estimates have been developed
DRAFT

The following measures do not have cost estimates:

HDV1 - 2004 On-road Standards for Heavy-Duty Diesel Vehicles
HDV2 - 2007 On-road Standards for Heavy-Duty Diesel Vehicles
HDV4 - Engine Software Updgrade
HDV6 - Heavy-Duty Vehicle Inspection
HDV7 - Periodic Smoke Inspection Program
HDV8 - Augment Truck and Bus Highway Inspections with Community Based Inspections
HDV11 - California Heavy-Duty Diesel Vehicle Standards and Fleet Modernization for Mexican Trucks
HDV15 - PM In-Use Emission Control
HDV16 - On-Board Diagnostics for Heavy-Duty Trucks
HDV17 - Transportation Refrigeration Units
HDV18 - Electrified Truck Spaces

Explanation for no Cost Estimate:
For many of the HDDV measures, it is impossible to estimate the number of vehicles that will be impacted.

No Net Increase/Air Quality Task Force

HDV3 - Gateway Cities Truck Modernization Program (Existing)

Cost Estimate

DRAFT **DRAFT**

Brief Measure Description:

Commercial truck owners trade in older trucks for newer trucks with cleaner-burning engines. Program to run through 2006.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

To-Date Results

135	trucks replaced[1]
$28,000	per truck[1]
$3,780,000	**total cost to-date**

Port-Funded Program

400	trucks to be replaced under Port funding[2]
$28,000	per truck[1]
$11,200,000	total remaining project cost

Notes:

1 Information provided by Gateway Cities (includes reductions for activities not included in 2001 baseline)

2 17 March 2005 measure narrative description

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$5,600,000	$5,600,000	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Note: Program is funded through 2006. Assume total remaining project cost will be spent in 2005 and 2006.

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

HDV5 - ULSD Fuel

Cost Worksheet

DRAFT

Brief Measure Description:

Beginning in 2006, fuel sold in California must contain no more than 15 ppm sulfur.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

Fuel consumption estimate (gallons)

	2001
Off-port	20,472,462
POLB roads	1,548,923
POLA roads	3,511,077
On-terminal	677,692
Totals	**26,210,154**

Fuel consumption in 2001 based on mileage data developed for the baseline EI, as presented below.
Fuel consumption in later years based on ARB's estimated VMT growth.

2001 baseline HDV miles	
Off-port	133,071,000
POLB roads	10,068,000
POLA roads	22,822,000
On-terminal	4,405,000

Estimated fuel consumption rate:

6.5 miles/gallon

Growth estimates over 2001 baseline:	2005	2008	2010	2012	2025
	24%	47%	64%	83%	272%

Fuel consumption estimates based on the growth estimates shown above, using linear interpolation for years between the identified years.

Fuel consumption (gallons) for all years

	2005	2006	2007	2008	2009	2010	2011
Totals	32,500,591	34,510,036	36,519,481	38,528,926	40,756,789	42,984,652	45,474,617

	2012	2013	2014	2015	2016	2017	2018
Totals	47,964,582	51,775,135	55,585,688	59,396,241	63,206,794	67,017,347	70,827,900

	2019	2020	2021	2022	2023	2024	2025
Totals	74,638,453	78,449,007	82,259,560	86,070,113	89,880,666	93,691,219	97,501,772

Cost estimates

Based on: $0.06 per gallon current cost differential between CARB diesel and ULSD

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$2,070,602	$2,191,169	$2,311,736	$2,445,407	$2,579,079	$2,728,477

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$2,877,875	$3,106,508	$3,335,141	$3,563,774	$3,792,408	$4,021,041	$4,249,674

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$4,478,307	$4,706,940	$4,935,574	$5,164,207	$5,392,840	$5,621,473	$5,850,106

Note: Annual fuel incremental cost of ULSD due to CA regulation starting in 2006 will be incurred by truck fleet owners/operators, not by the Port.

No Net Increase/Air Quality Task Force

HDV12 - Early ULSD Implementation

Cost Estimate

DRAFT **DRAFT**

Brief Measure Description:

Port to subsidize early availability of ULSD to HDDV through June 2006.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

$0.07	subsidy cost per gallon
70,000,000	gallons estimated HDDV annual fuel consumption
5%	ULSD participation
3,500,000	annual estimated gallons
$245,000	annual early ULSD implementation subsidy costs

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$245,000	$122,500	$0	$0	$0	$0	$0

Note: Port will subsidize early implementation of ULSD in 2005 prior to regulation coming to effect.

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

HDV13 - Retrofit Heavy-Duty Diesel Vehicles with Diesel Oxidation Catalysts (DOC)

Cost Estimate

DRAFT

Brief Description:

Install DOCs on all Gateway Cities funded on-road trucks.

Important Note: These cost estimates have been prepared for comparative purposes only. They should be considered order-of-magnitude rather than definitive and should not be used for budgeting. More in-depth cost analyses will be prepared for each measure during the next phases of the NNI planning process.

535	trucks funded by Gateway Cities[1]
$2,500	DOC cost per truck
$1,337,500	**total cost expended/comitted**

Notes:

1 Information provided by Gateway Cities and 17 March 2005 measure narrative description

Total Costs

	2005	2006	2007	2008	2009	2010	2011
Capital	$668,750	$668,750	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

This cost split assumes that half of the targeted trucks would be retrofit in 2005, half in 2006.

	2012	2013	2014	2015	2016	2017	2018
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

No Net Increase/Air Quality Task Force

HDV10 - Expanded Truck Modernization Program
HDV14 - Retrofit heavy-duty trucks with DPFs.
Cost Estimate
DRAFT

Overview

Description	# of Units	Equipment Life (years)	Total Capital Cost	Annual O/M Cost	Notes	Data Sources
HDV10 - Expanded Truck Modernization Program - Replace pre-1986 trucks with 1999 trucks and install DPFs. 50% by 2006, 100% by 2007	2006: 411 2007: 456	10 years trucks 5 years DPFs	2006: $13.8 million (total) 2007: $15.3 million (total)	N/A	Similar to Gateway Cities program approach. Grow trucks at 4.3%/yr.	TIAX, Gateway Cities, AQMD, Starcrest
HDV10 - Expanded Truck Modernization Program - Replace 1987-1993 trucks with 1999 trucks and install DPFs. 50% by 2008, 100% by 2009	2008: 1171 2009: 1272	10 years trucks 5 years DPFs	2008: $39.2 million (total) 2009: $42.6 million (total)	N/A	Similar to Gateway Cities program approach. Grow trucks at 4.3%/yr.	TIAX, Gateway Cities, AQMD, Starcrest
HDV10 - Expanded Truck Modernization Program - Replace 1994-2003 trucks with 1999 trucks No DPFs; covered by HDV 14. 50% by 2009, 100% by 2012	2009: 701 2012: 890	10 years trucks 5 years DPFs	2009: $32.4 million (total) 2012: $41.2 million (total)	N/A	Similar to Gateway Cities program approach. Grow trucks at 4.3%/yr.	TIAX, Gateway Cities, AQMD, Starcrest
HDV14 - Retrofit heavy-duty trucks with DPFs. Model years 1994-2003.	2006: 741 2007: 311 2008: 872	5 years	2006: $6.3 million (total) 2007: $2.6 million (total) 2008: $7.4 million (total)	N/A	Grow trucks at 4.3%/yr.	TIAX, Gateway Cities, AQMD, Starcrest

Details by Year

NNI Measure	# of Units	Implement. Date	Equipment Life (years)	Type of Capital Cost	Capital Cost per Unit	Type of Annual O/M Cost per Unit	Annual O/M Cost
HDV10 Expanded Truck Modernization Program	411	2006	10	Truck Replacement	$ 25,000		
	411	2006	5	DPF	$ 8,500		
	456	2007	10	Truck Replacement	$ 25,000		
	456	2007	5	DPF	$ 8,500		
	1,171	2008	10	Truck Replacement	$ 25,000		
	1,171	2008	5	DPF	$ 8,500		
	1,272	2009	10	Truck Replacement	$ 25,000		
	1,272	2009	5	DPF	$ 8,500		
	701	2009	10	Truck Replacement	$ 46,250		
	890	2012	10	Truck Replacement	$ 46,250		
HDV14 Retrofit Heavy-Duty Trucks with DPFs	741	2006	5	DPF	$ 8,500		
	311	2007	5	DPF	$ 8,500		
	872	2008	5	DPF	$ 8,500		

No Net Increase/Air Quality Task Force

HDV10 - Expanded Truck Modernization Program
HDV14 - Retrofit heavy-duty trucks with DPFs.
Cost Estimate
DRAFT

Total Costs (HDV10)

	2005	2006	2007	2008	2009	2010	2011
Capital - trucks	$0	$10,275,000	$11,400,000	$29,275,000	$64,221,250	$0	$0
Capital - DPF	$0	$3,493,500	$3,876,000	$9,953,500	$10,812,000	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital - trucks	$41,162,500	$0	$0	$0	$0	$0	$0
Capital - DPF	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital - trucks	$0	$0	$0	$0	$0	$0	$0
Capital - DPF	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

Total Costs (HDV14)

	2005	2006	2007	2008	2009	2010	2011
Capital - DPF	$0	$6,298,500	$2,643,500	$7,412,000	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2012	2013	2014	2015	2016	2017	2018
Capital - DPF	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

	2019	2020	2021	2022	2023	2024	2025
Capital - DPF	$0	$0	$0	$0	$0	$0	$0
Operational	$0	$0	$0	$0	$0	$0	$0

APPENDIX E

HEALTH EFFECTS OF DIESEL EXHAUST AIR POLLUTION

HEALTH EFFECTS OF DIESEL EXHAUST AIR POLLUTION

August 28, 2003

Document prepared by the Environmental Subcommittee/Air Quality Group to be forwarded to the Board of Harbor Commissioners (BOHC) via PCAC

Subject: Committees Findings Regarding Health Effects of Diesel Exhaust Air Pollution; with Concern for Port Activity Related Sources

BACKGROUND: Since its inception the Environmental Subcommittee has been considering the issue of the multiple health effects that have been associated with diesel exhaust air pollution. Experts hired by the Committee, including Professor Avol, Mr. Howekamp, and experts from ARB and AQMD have frequently provided input. These experts also found data for the committee's review from sources they had available. Dr. John G. Miller, an Environmental Sub-committee member and PCAC member cited and provided multiple references from the medical, epidemiologic and scientific literature on this topic. Members of the public have expressed concerns at many committee meetings.

The committee has learned that the Health Risk Assessment Study (HRA) to be completed by consultants hired by the POLA, as one of the Seven Studies mandated by the BOHC, is not scheduled to begin until possibly January 2004, depending on when the (as yet incomplete) Air Emissions Inventory is finished. The completion date for the HRA is currently estimated to be late 2004/early 2005.

Environmental Sub-committee members have heard extensive input from the public requesting no further delay in conveying what it has found to date to the BOHC. This input came both at meetings and in the community. The committee finds no reason for further delay in revealing its findings to date.

The committee notes that Port-related activities, including those that occur off Port property but as a result of Port operations, have been identified by the South Coast AQMD as the largest single unregulated contributor to area-wide air pollution.

Port operations (shipping, loading/unloading, and transport of product) require the use of significant amounts of fuel. Currently most of the trucking, locomotive, and off-road yard operations in and supporting the Port use diesel fuel. The combustion of diesel fuel creates high concentrations of very small particles (numerically, over 90% are less than 1 micron in diameter) and nitrogen oxides. Regional air studies have demonstrated that Port-related emissions are transported widely in the air across the South Coast Air Basin, from the harbor area to Riverside/San Bernardino and beyond. These pollutants have been associated directly (through direct exposure by breathing these pollutants from the air) and indirectly (through participation in photochemical reactions in the air, and breathing the products of these reactions, such as ozone) with a number of health effects.

The Sub-committee has learned that some of these health effects occur even when concentrations of particulates are just one quarter of the Federal limit for outdoor air.

Summary of Health Effects that have been related to Diesel Exhaust Air Pollution as identified and brought to the committee's attention:

1. Prenatal and Perinatal effects
    A. Intrauterine growth retardation
    B. Elevated incidence of low birth weight infants
    C. Increased incidence of spontaneous miscarriage
    D. Increased incidence of respiratory cause of deaths in newborns
    E. Elevated incidence of serious birth defects
    F. Increases in sudden infant death syndrome (SIDS)

2. Childhood effects
    A. Diminished lung growth in children (with unknown long term effects on the individual)
    B. Development of asthma in children involved in active sports
    C. Exacerbations of existing asthma
    D. Elevation of incidence of asthma in children and teenagers. (an ongoing worldwide phenomenon)
    E. Increases in incidence of bronchitic symptoms
    F. Loss of days from school attendance due to respiratory symptoms
    G. Potentiation (enhancement) of allergic effects of known allergens such as ragweed pollen when individual is exposed to diesel particles and the allergen concomitantly.

3. Adulthood
    A. Elevated incidence of lung cancer in a linear relationship with progressive increases in fine particle (Pm 2.5) air pollution (The category Pm 2.5 includes the particles less than 1 micron in size.)
    B. Elevated incidence of myocardial infarctions (heart attacks)
    C. Elevated incidence of mortality from cardiovascular causes (heart attacks and strokes)
    D Triggering of myocardial infarctions associated with spikes in Pm 2.5
    E Elevation of cardiopulmonary deaths in a linear relationship with increases in Pm 2.5
    F. Significant elevations in "all cause mortality" associated with increases in Pm2.5
    G. Increased incidence of bronchitic symptoms
    H. Chronic obstructive pulmonary disease (COPD): increased incidence, prevalence, and exacerbations of existing disease.
    I. Fatal exacerbations of COPD
    J. Exacerbations of asthma leading to time off work, emergency room visits and hospitalizations

K. Approximately 1.5 times elevation in the smoking adjusted incidence of lung cancer in workers occupationally exposed to diesel exhaust versus the smoking adjusted relative risk baseline incidence of lung cancer in similar non-exposed populations.
L. Chronic exposure to particulate pollution shortens lives by one to three years
M. Higher concentrations of particulate air pollution has been linked to low heart rate variability, a risk factor for heart attacks. Association is stronger for people with pre-existing cardiovascular conditions.
N. Mitochondrial damage in cells. (All age groups)
O. Airway inflammatory changes (all age groups)
P. Damage to and death of alveolar and airway macrophages,(all age groups)

This is a brief overview of an extensive and growing body of knowledge. These findings were developed through many avenues of research including but not limited to: epidemiologic studies, clinical studies-retrospective and prospective, autopsy studies, animal studies, cellular biology studies, and Government agency investigations. There has been worldwide scientific participation in research on the links between diesel exhaust air pollution and human health.

This body of knowledge is constantly evolving, with many new pieces of information having been published or brought to light since the inception of Environmental Committee Subcommittee/Air Quality Group. The committee notes that as this an evolving body of knowledge, in many areas further studies are needed.

The Committee finds sufficient evidence to warrant immediate aggressive action by POLA and its tenants to reduce the measurable levels of local and Air Basin wide diesel exhaust air pollution due to Port related activities.

Richard Havenick
Chairman, Air Quality Group

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July 25, 2003

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