FINAL 2006

San Pedro Bay Ports Clean Air Action Plan

TECHNICAL REPORT

THE PORT OF LOS ANGELES

THE PORT OF LONG BEACH

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

California Environmental Protection Agency
Air Resources Board

AQMD

Prepared with the participation and cooperation of the staff of the US Environmental Protection Agency, California Air Resources Board and the South Coast Air Quality Management District.

WHAT'S IN THE CLEAN AIR ACTION PLAN?

- ✓ Final 2006 San Pedro Bay Ports Clean Air Action Plan Overview
- ✓ **FINAL 2006 SAN PEDRO BAY PORTS CLEAN AIR ACTION PLAN TECHNICAL REPORT**
- ✓ Final 2006 San Pedro Bay Ports Clean Air Action Plan Comments Compendium

For additional information see:

Port of Los Angeles website: www.portoflosangeles.org
Port of Long Beach website: www.polb.com

STATEMENTS OF THE PRESIDENTS OF
THE LOS ANGELES BOARD OF HARBOR COMMISSIONERS
AND THE LONG BEACH BOARD OF HARBOR COMMISSIONERS

At the Joint Special Meetings of the Los Angeles Board of Harbor Commissioners and the Long Beach Board of Harbor Commissioners (the "Commissions") held on Monday, November 20, 2006, at 1:00 P.M. in the Long Beach City Council Chamber, 333 W. Ocean Blvd., Long Beach, California, the two Commissions unanimously adopted the San Pedro Bay Ports Clean Air Action Plan ("CAAP" or "Plan") as reflected in the minute record of the proceedings. At the meeting, the Presidents of the Commissions made the following statements, findings and proposed amendments which were incorporated into the Clean Air Action Plan that was approved by the Commissions:

First, we agree with the demand of many of those who commented on the Plan that there must be measurable goals so the public can have a yardstick to measure progress. So, we propose that we commit to a goal of reducing particulate emissions in 2008 by at least 15% from what it would be without the Plan, ratcheting up each year to at least a 45% reduction in 2011.

Second, we think we need to recognize that ultrafine particles are probably the most damaging of the fossil-fuel related air pollutants to human health. Accordingly, we propose that the staffs of the two Ports be directed to work with the USC Research Group on Ultrafine Particles to present the results and suggested next steps to the two Commissions no later than July 1, 2007. In addition, our new Technology Advancement Program must include ways to eliminate emissions of ultrafine particles, which in reality, in our view, means moving towards carbon-free fuels.

Third, we should recognize that the recently enacted California Global Warming Solutions Act of 2006 (AB32) requires carbon emissions be reduced back to 1990 levels by the year 2020. In light of the growth prospects of the two Ports, that means we must switch to carbon-free fuels (for example, green electricity) and other carbon-free technologies in every possible application as soon as possible. Toward that end, we propose that our respective staffs include such technology in our Technology Advancement Program. As part of that effort, the Ports pledge to contribute, and raise from other interested parties, the many millions needed to fund this vital effort.

Also, there is one technical amendment we offer to make clear that implementation of the individual Plan measures are subject to additional CEQA review, a fact that is beyond dispute and in the interest of all parties. We therefore move that on page 19 of the Overview and page 24 of the Technical Report the three words after "conducted" be stricken and replaced with "subject to CEQA statute, regulations and guidelines".

Both the environmental organizations and the business communities have expressed a desire for a continuous process for participation in the ongoing review and improvement of the Clean Air Action Plan in the months and years ahead. We welcome such participation. We therefore urge ALL groups to provide the Ports, within the next 30 days following adoption of the CAAP [by December 20, 2006], their ideas for how such public participation can best be conducted. We will promptly approve and implement that process within 30 days after receipt and review of their ideas.

A critical initiative in the Plan is a massive effort to deal with the well-recognized problem of heavily polluting trucks driven by under-paid drivers. These trucks produce 10% of the Port-related diesel particulate emissions and fully 25% of the NOx emissions. The Ports have identified over 16,000 individual vehicles that make 80%

of the trips to and from Port terminals, so cleaning up those vehicles would eliminate a significant portion of Port-related air pollution.

That will be a hugely expensive effort that will involve replacing many trucks and retrofitting others with pollution control devices. The Commissioners of both Ports believe that we can tackle the dirty truck problem in a manner consistent with the Clean Air Action Plan.

Accordingly, we direct our respective staffs to work expeditiously to bring forward a plan with the following elements for further future approval of these boards:

a. *The Ports undertake a 5-year, focused effort to replace or retrofit the entire fleet of over 16,000 trucks that regularly serve our Ports with trucks that at least meet the 2007 control standards and that are driven by people who at least earn the prevailing wage.*

b. *The Ports establish within their respective districts a program that restricts the operation of trucks that do not meet the clean standards established in the Plan. Further, that we impose a system of fees and transportation charges to raise the necessary funds to pay for the cleaner trucks. These fees would be imposed on "shippers", and not on the drivers.*

c. *The Ports will invite private enterprise trucking companies to hire the drivers on terms that offer the proper incentives and conditions to achieve the Clean Air Action Plan goals while resulting in adequately paid drivers.*

d. *The Ports begin this program with an infusion of cash to the Gateway Cities Program that would fund a 500-truck program that will demonstrate the applicability of new retrofit technologies. This demonstration program will be activated in the 1st quarter of 2007, and the full 16,800-truck program will be rolled out shortly thereafter.*

e. *The Ports develop requests for proposals that will encourage truck fleets of alternatively-fueled vehicles, for example, LNG.*

We believe that we can count on the support of our private industry and government partners in this effort.

We believe that this program would enable the Ports to achieve one of the major goals of the Clean Air Action Plan quickly and with minimum economic impact to the people who can least afford to absorb extra costs, namely the hard-working truck drivers who move so much of the cargo.

That leads to our second point, which is the issue of monetary incentives. Many people have commented that the Ports need to pay to clean up pollution from Port operations. Both Boards want to make it clear that the Ports cannot and will not subsidize the cost of cleaner transportation indefinitely. Those expenses are a legitimate cost of doing business, and we believe that our position will ensure that companies engaged in goods movement pay their fair share of the cost of cleaning up our air and protecting our citizens. Accordingly, it is our policy that monetary payments by the Ports for cleaner technologies and fuels will be granted to true pioneers in the industry, but only for short periods of time. After that, each entity must bear the costs of reducing pollution from its operations.

FINAL 2006
SAN PEDRO BAY PORTS CLEAN AIR ACTION PLAN
TECHNICAL REPORT

Prepared with the participation & cooperation of the staff of:

November 2006

FOREWORD

To effectively integrate common goals for air quality in the South Coast Air Basin, the Port of Los Angeles (POLA) and the Port of Long Beach (POLB) have worked together in close coordination with the staff of the South Coast Air Quality Management District (SCAQMD), the California Air Resources Board (CARB), and the United States Environmental Protection Agency Region 9 (EPA Region 9) to develop the San Pedro Bay Ports Clean Air Action Plan. This plan is the first of its kind in the country, linking the emissions reduction efforts and visions of the two largest ports in the United States with similar efforts and goals of the regulatory agencies in charge of ensuring compliance with air quality standards. The collaborative effort will continue in the years to come with the review and update of the Clean Air Action Plan on an annual basis.

The air agencies have extensively reviewed and commented on the draft plan, support the collaborative process that has been established, and support of the goals delineated in the plan. By participating in the development and annual review of this plan, these regulatory agencies do not waive or forfeit their rights or obligations to continue to regulate emissions sources under their control. Participation in this process is voluntary by all parties and does not in any way inhibit or preclude agencies from any legal authorities and responsibilities to meet federal, state, and local air quality standards. Participation does not mean that the agencies necessarily endorse each of the measures and concepts proposed in the plan.

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Acronyms & Abbreviations

AMP™	Alternative Maritime Power
ANPRM	Advance Notice of Proposed Rulemaking
APL	American Presidents Line
AQMP	Air Quality Management Plan
ATCM	Air Toxic Control Measure
AVL	Automatic Vehicle Locator
BACT	Best Available Control Technology
BCO	Beneficial Cargo Owner
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe Railway
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CHE	Cargo Handling Equipment
CNG	Compressed Natural Gas
CO	Carbon Monoxide
COG	Council of Governments
CS	China Shipping
DOC	Diesel Oxidation Catalyst
DPF	Diesel Particulate Filter
DPM	Diesel Particulate Matter
DWP	City of Los Angeles Department of Water and Power
EI	Emissions inventory
EIR	Environmental Impact Report
EMC	Environmental Mitigation Coordinator
EMD	Environmental Management Division
EPA	Environmental Protection Agency
FY	Fiscal Year
g/bhp-hr	grams per brake horsepower – hour
g/kw-hr	grams per kilowatt – hour
GHG	green house gases
GVW	Gross Vehicle Weight
HD	Heavy-Duty
HDV	Heavy-Duty Vehicle
HC	Harbor Craft
HFO	Heavy Fuel Oil
IFO	Intermediate Fuel Oil
IMO	International Maritime Organization
ITS	International Transportation Service
LNG	Liquefied Natural Gas

Acronyms & Abbreviations (cont'd)

LTT	Long Term Tenant
MATES	Multiple Air Toxics Exposure Study
MDO	Marine Diesel Oil
MGO	Marine Gas Oil
MOU	Memorandum of Understanding
MSRC	Mobile Source Air Pollution Reduction Review Committee
MY	Model year
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
nm	nautical miles
NNI	No Net Increase
NPRM	Notice of Proposed Rulemaking
NOx	Oxides of Nitrogen
NYK	Nippon Yusen Kaisha (NYK Line)
OBD	On-Board Diagnostics
OCR	Optical Character Recognition
OGV	Ocean-going vessels
PAQMIP	Port Air Quality Mitigation Incentive Program
PCAC	Port of Los Angeles Port Community Advisory Committee
PHL	Pacific Harbor Line
PM	Particulate Matter
PM_{10}	Particulate matter less than 10 micrometers in diameter
$PM_{2.5}$	Particulate matter less than 2.5 micrometers in diameter
PMSA	Pacific Merchant Shipping Association
POLA	Port of Los Angeles
POLB	Port of Long Beach
Port TAC	Port of Los Angeles Technical Advisory Committee
ppm	parts per million
RFID	Radio Frequency Identification
RFP	Request for Proposal
RL	Railroad Locomotives
rpm	revolutions per minute
S	Sulfur
SCAQMD	South Coast Air Quality Management District
SCR	Selective Catalytic Reduction

Acronyms & Abbreviations (cont'd)

SECA	Sulfur Emission Control Area
SIP	State Implementation Plan
SoCAB	South Coast Air Basin
SOx	Sulfur oxides
SPBP	San Pedro Bay Ports
tpd	tons per day
tpy	tons per year
ULSD	Ultra-low sulfur diesel (fuel)
UP	Union Pacific Railroad
USCG	United States Coast Guard
VOCs	Volatile organic compounds
VSR	Vessel Speed Reduction
YTI	Yusen Terminals, Inc.

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SECTION 1: INTRODUCTION

This document is the first San Pedro Bay Ports Clean Air Action Plan (Clean Air Action Plan). This joint Clean Air Action Plan describes the measures that the Ports of Los Angeles and Long Beach will take toward reducing emissions related to port operations. In March 2006, a groundbreaking meeting occurred at the highest level between the two Ports and the South Coast Air Quality Management District (SCAQMD) where all parties expressed the need to work jointly toward solutions. Shortly thereafter, the Ports engaged the California Air Resources Board (CARB) and the United States Environmental Protection Agency Region 9 (EPA Region 9) in the spirit of cooperation to help the Ports develop the Clean Air Action Plan for their respective Board of Harbor Commissioners' approval. It should be emphasized that these entities have committed to continuing their efforts associated with the development, review, implementation, update/revision of the Clean Air Action Plan on an annual basis.

The five-year Action Plan highlights the goals, emissions reductions, and budgetary needs for fiscal years (FY) 2006/2007 through 2010/2011. By the end of the five-year period, virtually all needed measures to meet the goals will be in place. Staff from both ports intend to regularly evaluate progress towards meeting the Clean Air Action Plan goals, review status of existing control measures, evaluate new measures, and jointly develop a revised Action Plan each year.

1.1 The Ports' Mandate

In the early 1900s, the State conveyed the Port tidelands to Los Angeles and Long Beach, as trustees for the people of the State of California, to accommodate and promote harbor commerce, navigation and fisheries. The Ports are landlord ports; they build terminal facilities and lease them to shipping lines and stevedoring companies. The Ports do not operate the terminals, ships, yard equipment, trucks or trains that move the cargo. However, the Ports are determined to accelerate the effort to reduce air pollution from "goods movement" activities using all the powers available to them.

The San Pedro Bay Ports (SPBP) comprise a huge regional and national economic engine. The Los Angeles Customs District accounts for approximately $300 billion in annual trade. More than 40% of all containerized trade in the nation flows through the San Pedro Bay Ports. Economic forecasts suggest that the demand for containerized cargo moving through the San Pedro Bay region will more than double by the year 2020.

The economic benefits of the Ports are felt throughout the nation; however, the environmental impacts of trade are more locally concentrated. Both Ports have adopted and are implementing a wide range of new environmental initiatives. These efforts include better documentation of environmental impacts and more detailed evaluation of effective mitigation measures. The Ports are cognizant of the view of environmental groups, local residents and regulatory agencies that not enough is being done to address port-related air quality issues. The Ports are also aware of the views of port users and operators that inconsistent or conflicting environmental measures could have unintended and even counterproductive effects.

The Ports recognize that their ability to accommodate the projected growth in trade will depend upon their ability to address adverse environmental impacts (and, in particular, air quality impacts) that result from such trade. The Clean Air Action Plan is designed to develop mitigation measures and incentive programs necessary to reduce air emissions and health risks while allowing port development to continue.

The Ports have several upcoming terminal redevelopment projects that could be approved and implemented in the next five years. There are significant opportunities to implement the measures defined by the Clean Air Action Plan to satisfy the twin goals of clean air and economic growth. The Ports also anticipate several new major leases and lease amendments in the next five years. In short, the Ports intend to serve as a catalyst for rapid change, recognizing the rights of all involved in, and affected by, Port operations.

1.2 South Coast Air Quality Background

The San Pedro Bay Ports are located in the South Coast Air Basin (SoCAB). This Basin has some of the worst air quality in the nation, which represents a major health concern for its residents. Much of this air quality problem is attributable to the fact that the SoCAB is the second largest urban area in the nation (with all its associated emissions sources) and to the existence of topographical and meteorological conditions that enhance the formation of air pollution. Currently, the SoCAB is designated by the United States Environmental Protection Agency (EPA) as being in nonattainment of the National Ambient Air Quality Standards (NAAQS) for ozone and for particulate matter less than 2.5 microns ($PM_{2.5}$). The ozone nonattainment level is rated "severe-17," with an attainment deadline year of 2021. The $PM_{2.5}$ attainment deadline is 2015.

In addition, CARB has designated the exhaust from diesel-fueled engines as a toxic air contaminant, with diesel particulate matter (DPM) as a surrogate for total emissions. The EPA also lists diesel exhaust as a mobile source air toxic. According to CARB, about 70 percent of the potential cancer risk from toxic air contaminants in California can be attributed to DPM. Therefore, the concentration of DPM in communities has become a major public health concern and the focus of CARB and SCAQMD regulations.

In 2000, the SCAQMD released results from its second Multiple Air Toxics Exposure Study (MATES II), which raised concerns about the impact of emissions from ships, trucks and trains in the vicinity of the Ports and major transportation corridors. Since then, both Ports have had terminal development plans challenged and delayed due to concerns about the adequacy of environmental mitigation. The SCAQMD is currently updating MATES III which is due for completion in 2007.

In order for the SoCAB to attain the NAAQS, and to protect public health, immediate action is necessary to significantly reduce emissions from all sectors, including "goods movement." Several port-related sources are subject to aggressive regulations, yet still fall short of the levels needed to accommodate growth while protecting public health. Recently, CARB undertook several actions targeted at reducing emissions from goods movement activities. These actions include:

- Ultra low sulfur diesel (ULSD) fuel requirements for on-road and off-road diesel engines fueled within the SoCAB
- Emissions standards for cargo handling equipment (CHE)
- Statewide Memorandum of Understanding (MOU) between CARB and line haul railroads

In addition to the focus on DPM, oxides of nitrogen (NOx), and oxides of sulfur (SOx), greenhouse gases (such as carbon dioxide, methane, etc.) are also an important consideration when evaluating emissions from mobile sources, since they potentially have a global effect. While the immediate purpose of this Clean Air Action Plan is to address emissions that affect public health risk on a local basis, it is important to note that none of the emissions mitigations measures proposed in this plan will cause an increase in greenhouse gas (GHG) and that some, in fact, will reduce GHGs. Further, state-wide greenhouse gas emission reductions are expected to be achieved through AB 32, which was signed into law in September 2006, requiring CARB to develop regulations and market mechanisms to implement a cap on greenhouse gas emissions from stationary sources that will reduce California's greenhouse gas emissions to 1990 levels by 2020. In addition, the Port of Los Angeles has joined the California Climate Registry which requires the Port to estimate Green House Gas Emissions from various port operations by 2007.

1.3 Regulatory Measures Addressing Port-Related Activities

Almost all of the emissions at the ports come from five diesel fueled source categories. In addition to ocean going vessels (OGVs), these are On-Road Heavy-Duty Vehicles (HDVs), Cargo Handling Equipment (CHE), Harbor Craft (HC) and Railroad Locomotives (RL). The responsibility for the emissions control of the majority of these sources falls under the

jurisdiction of local (SCAQMD), state (CARB) or federal (EPA) agencies. Below is a list of recently adopted and proposed regulatory measures that will reduce emissions from the Ports over the next five fiscal years and beyond. In formulating the San Pedro Bay Ports Clean Air Action Plan, the impacts of these measures were estimated and considered, to avoid duplication and to ensure both the effectiveness and cost efficiency of the Ports' proposed measures. Regulatory measures that have been announced in concept but for which no detailed information on approach has been released, such as future measures to be implemented under the CARB Goods Movement Plan, and the SCAQMD Air Quality Management Plan (AQMP) have not been included in the following discussion. Once developed, these regulations will be included in future revisions of this Plan.

1.3.1 On-Road Heavy-Duty Vehicles

Emission Standards for New 2007+ On-Road Heavy-Duty Vehicles

In 2001, CARB adopted EPA's stringent emission standards for 2007+ HDV, which will ultimately result in 90% reductions in emissions NOx and particulate matter (PM). Per this regulation, HDV engine manufacturers will be meeting a PM standard of 0.01 g/bhp-hr starting in 2007, which is 90% lower than the 2004 PM standard of 0.1 g/bhp-hr. The NOx standard requires a phase-in of the 0.2 g/bhp-hr NOx standards between 2007 and 2010. By 2010, all engines have to meet the 0.2 g/bhp-hr NOx standard, which is over 90% lower than the 2004 NOx standard of 2.4 g/bhp-hr. It is expected that between 2007 and 2010, on average, manufacturers will be producing HDV engines meeting the PM standard of 0.01 g/bhp-hr and a NOx standard of 1.2 g/bhp-hr. This latter standard is referred the 2007 interim standard.

Heavy-Duty Vehicle On-Board Diagnostics (OBD) Requirement

In 2005, CARB adopted a comprehensive HDV OBD regulation, which ensures that the increasingly stringent HDV emissions standards being phased in are maintained during each vehicle's useful life. The OBD regulation requires manufacturers to install a system in HDVs to monitor virtually every emissions related component of the vehicle.

Ultra-Low Sulfur Diesel (ULSD) Fuel Requirement

In 2003, CARB adopted a regulation requiring that diesel fuel produced or offered for sale in California for use in any on-road or non-road vehicular diesel engine (with the exception of locomotive and marine diesel engines) contain no more than 15 parts per million (ppm) of sulfur (S) by weight, beginning June 2006 statewide. This ULSD fuel is needed in order for retrofit technologies, such as diesel particulate filters, to work successfully.

Reducing Emissions from On-Road Heavy-Duty Diesel Trucks Dedicated to Goods Movement at California Ports

As a part of CARB's emissions reduction plan for ports and goods movement in California, staff of CARB is proposing a control measure to reduce emissions from on-road heavy-duty diesel trucks dedicated to goods movement at California ports. CARB staff is proposing three steps to reduce truck emissions: (1) replace older trucks with cleaner trucks; (2) install verified emissions control devices and; (3) establish emissions criteria for trucks entering the ports. Currently, CARB staff is conducting public meetings to obtain comments from stakeholders and expects to take the final regulation to their board's approval in late 2007.

1.3.2 Ocean Going Vessels

EPA Advance Notice of Proposed Rulemaking for Standards for Marine Diesel Engines Up to 30 liters/cylinder

EPA has published an Advance Notice of Proposed Rulemaking (ANPRM) regarding its plan to propose new emission standards for marine diesel engines up to 30 liters per cylinder displacement. According to the ANPRM, EPA is considering standards modeled after the 2007/2010 highway and Tier 4 non-road diesel engine programs, with an emphasis on achieving large PM emission reductions as early as possible through the use of advanced emission control technology starting as early as 2011. This technology, based on high-efficiency catalytic aftertreatment, is enabled by the availability of clean diesel fuel with sulfur content capped at 15 ppm. EPA is currently developing the Notice of Proposed Rulemaking (NPRM) for this program.

Emission Standards for Marine Diesel Engines Above 30 l/cyl (Category 3 Engines)

EPA is pursuing two parallel, related actions for emission standards for Category 3 marine diesel engines. (1) EPA is a member of the United States delegation that is participation in negotiations at the International Maritime Organization (IMO) with regard to amendments to Annex VI that consider additional NOx limits for new engines; additional sulfur content limits for marine fuel; methods to reduce PM emissions; potential NOx and PM limits for existing engines; and potential volatile organic compounds (VOCs) limits for tankers. The Sub-Committee on Bulk Liquids and Gases is expected to make recommendations to the Marine Environment Protection Committee by mid-2007. (2) EPA is planning to develop new national standards for Category 3 marine diesel engines over the next few years, taking into consideration the state of technology that may permit emission reductions and the status of international action for more stringent standards.

Emissions Standard for Marine Propulsion Engines

The IMO adopted limits for NOx in Annex VI to the International Convention for the Prevention of Pollution from Ships in 1997. These NOx limits apply to marine engines over 130 kilowatts (kW) installed on vessels built on or after 2000. The NOx standards are from 17.0 g/kW-hr (for < 130 rpm) to 9.8 g/kW-hr (for <2000 rpm), depending upon the engine speed in revolutions per minute (rpm). The required number of countries ratified the Annex in May 2004 and it went into force for those countries in May 2005. The Annex has not yet been ratified by the United States. Engine manufacturers have been certifying engines to the Annex VI NOx limits since 2000 as the standards are retroactive.

Vessel Speed Reduction (VSR) Program

In May of 2001, a MOU between the POLA, POLB, EPA Region 9, CARB, SCAQMD, the Pacific Merchant Shipping Association (PMSA), and the Marine Exchange of Southern California was signed. This MOU calls for OGVs to voluntarily reduce speed to 12 knots at a distance of 20 nautical miles (nm) from Point Fermin. Reduction in speed demands less power on the main engine, which in turn reduces NOx emissions and fuel usage.

Low Sulfur Fuel for Marine Auxiliary Engines

In December of 2005, CARB adopted low sulfur fuel requirements for marine auxiliary engines within 24 nm of the California coastline. Starting in January of 2007, it requires use of marine diesel oil (MDO) or marine gas oil (MGO) with sulfur content of equal or less than 0.5% S by weight, followed by use of marine gas oil with sulfur content of equal or less than 0.1 % S in 2010. The use of low sulfur fuel will reduce emissions of NOx, DPM and SOx.

1.3.3 Cargo Handling Equipment

Emissions Standards for Non-Road Diesel Powered Equipment

The EPA's and CARB's Tier 1, Tier 2, Tier 3, and Tier 4 (interim Tier 4 and final) emissions standards for non-road diesel engines require compliance with progressively more stringent standards for hydrocarbon, carbon monoxide (CO), DPM, and NOx. Tier 4 standards for non-road diesel powered equipment complement the latest 2007+ on-road heavy-duty engine standards requiring 90 percent reduction in DPM and NOx when compared against the current level. To meet these standards, engine manufacturers will produce new engines with advanced emissions control technologies similar to those already expected for on-road heavy-duty diesel vehicles. These standards for new engines will be phased in starting with smaller engines in 2008 until all but the very largest diesel engines meet NOx and PM standards in 2015. Currently, the interim Tier 4 standard includes 90% reduction for PM and a 60% reduction in NOx.

Cargo Handling Equipment Regulation

In December of 2005 CARB adopted a regulation to reduce emissions from CHE such as yard tractors and forklifts starting in 2007. The regulation calls for the replacement or retrofit of existing engines with engines that use Best Available Control Technology (BACT). Beginning January1, 2007 the regulation will require that newly purchased, leased, or rented CHE be equipped with either a 2007 or later on-road engine, a Tier 4 off-road engine or the cleanest verified diesel PM emissions control system which reduces DPM by 90% and NOx by at least 70% for yard tractors. For non-yard tractors cargo handling equipment currently verified technologies reduces PM by 85%.

1.3.4 Harbor Craft

Emission Standards for Harbor Craft Engines

EPA has established new engine standards for new "category 1 & 2" diesel engines – engines rated over 50 horsepower (hp) used for propulsion in most harbor craft. These standards are to be phased in between 2004 and 2007 and limit NOx, hydrocarbon, CO and DPM, but the emissions reductions achieved are modest in next five years. EPA expects 24% reduction in NOx and 12% reduction in DPM in 2030 when the harbor craft engine fleet is fully turned over to these new engines.

Low Sulfur Fuel Requirement for Harbor Craft

In 2004, CARB adopted a low sulfur fuel requirement for harbor craft. Starting January 1, 2006 (in SoCAB) harbor craft are required to use on-road diesel fuel (i.e., ULSD), which has sulfur content limit of 15 ppm sulfur and lower aromatic content. Use of lower sulfur and aromatic fuel will result in NOx and DPM reduction benefits. In addition, use of low sulfur fuel will facilitate retrofitting of harbor craft with emissions control devices such as diesel particulate filters (DPFs) that have potential to reduce PM by 85%.

DPM and NOx Emission Reductions from In-Use Harbor Craft

As a part of Diesel Risk Reduction Plan and Goods Movement Plan, CARB staff is proposing a regulation to reduce DPM and NOx from new and in-use commercial harbor crafts. Under CARB's definition, commercial harbor crafts include tug boats, tow boats, ferries, work boats, crew boats, military vessels and fishing vessels. The goal of this regulation is to achieve reduction in DPM and NOx by 25% in 2010, 30% in 2015 and 40% in 2020. Currently, CARB staff is soliciting public comments and updating the emissions inventory. This regulation is tentatively scheduled to be heard by CARB's board in February of 2007.

1.3.5 Railroad Locomotives

Emissions Standards for New and Remanufactured Locomotives and Locomotive Engines

In 1998, EPA adopted Tier 0 (1973-2001), Tier 1 (2002-2004), and Tier 2 (2005+) emissions standards applicable to newly manufactured and remanufactured railroad locomotives and locomotive engines. These standards require compliance with progressively more stringent standards for emissions of hydrocarbon, CO, NOx, and DPM. Although the most stringent standard, Tier 2, results in over 40% reduction in NOx and 60% reduction in DPM compared to Tier 0, full potential of these reductions will not be realized in the next five years because of the long life of diesel locomotive engines.

EPA Advance Notice of Proposed Rulemaking for Locomotives

EPA has published an ANPRM regarding its plan to propose new emission standards for locomotives. According to the ANPRM, EPA is considering standards modeled after the 2007/2010 highway and Tier 4 non-road diesel engine programs, with an emphasis on achieving large PM emission reductions as early as possible through the use of advanced emission control technology starting as early as 2011. This technology, based on high-efficiency catalytic aftertreatment, is enabled by the availability of clean diesel fuel with sulfur content capped at 15 parts per million. EPA is currently developing the NPRM for this program.

Low Sulfur Fuel Requirement for Intrastate Locomotives

In 2004, CARB adopted a low sulfur fuel requirement for intrastate locomotives. Intrastate locomotives are defined as those locomotives that operate at least 90 percent of time within borders of the state, based on hours of operation, miles traveled, or fuel consumption. Mostly applicable to switchers, starting January 1, 2006, statewide, intrastate locomotives are required to use CARB off-road diesel fuel which has sulfur content limit of 15 ppm S and lower aromatic content. Use of fuel with lower sulfur and lower aromatics will result in NOx and DPM reductions. In addition, use of low sulfur fuel will facilitate retrofitting of locomotives with emissions control devices such as DPFs that have potential to reduce DPM by 85 %.

Statewide 2005 Memorandum of Understanding

In order to accelerate the implementation of Tier 2 engines in SoCAB, CARB and EPA Region 9 entered into an enforceable MOU in 1998 with two major Class 1 freight railroads [Union Pacific (UP) and Burlington Northern Santa Fe (BNSF)] in California. This MOU requires UP and BNSF to concentrate introduction of the Tier 2 locomotives in the SoCAB which will achieve 65% reduction in NOx by 2010.

In 2005, CARB entered into another MOU with UP and BNSF whereby these two railroads have agreed to phase out non-essential idling and install idling reduction devices, identify and expeditiously repair locomotives that smoke excessively and maximize the use of 15 ppm S fuel.

As stated at the beginning of this section, in addition to these regulations, CARB is pursuing additional regulations that would reduce emissions from port-related equipment sources. These include equipment in the following categories:

- Port trucks (through a fleet rule and incentive program)
- Harbor craft
- Ship main engines (through fuel, engine emissions requirements, and mandatory speed reduction)
- Ship auxiliary engines at dock (through shore-powering, engine controls, or other effective technologies)
- Ship incinerators (banned within 3 miles of the shore)

CARB anticipates completing these rulemaking actions by the end of 2007. The recently adopted CARB regulations (listed in 1.3.1-1.3.5), anticipated CARB rulemakings, and the measures in the Clean Air Action Plan will provide a vital and complementary combination to the overall effort to meet both State and SPBP air quality improvement goals.

It is important to highlight that the Clean Air Action Plan works in conjunction with and relies upon existing and anticipated federal, state, and local regulations. The Clean Air Action Plan will continue to incorporate new regulations in future updates. Working together, both regulatory and Port efforts can produce combined emissions reductions that are greater than those achieved on an individual basis. The Port efforts can also expedite emissions reductions to be achieved by existing or proposed regulations and provide greater assurance that emissions reductions which may be achieved by future regulations or standards (e.g. potential EPA and IMO vessel standards) will actually occur. This combination will significantly reduce the health risks of the public and people working at the ports by significantly reducing emissions associated with port operations.

One non-regulatory program that is also helping to significantly reduce emissions from sources including those associated with ports is the Carl Moyer Program. This program is a CARB administered grant program implemented in partnership with local air districts to fund the replacement of older, "dirty" engines or to cover the incremental cost of purchasing cleaner-than-required engines and vehicles. Under this program, owners/operators of mobile emissions sources can apply for incremental funding to reduce emissions. The program is also being expanded to include a fleet modernization component. Emissions source categories at the Ports that have been successful in obtaining Carl Moyer funding includes: heavy-duty vehicles, cargo

handling equipment, harbor craft, and rail locomotives. It is important to note that only emission reductions that are surplus to regulatory requirements are eligible for Carl Moyer funding. As regulations are developed which require retrofit or replacement of specific equipment and/or vehicles, those projects will no longer be eligible for funding.

1.4 San Pedro Bay Ports Clean Air Action Plan Vision

The Ports recognize that their ability to accommodate the projected growth in trade will depend upon their ability to address adverse environmental impacts (and, in particular, air quality impacts) that result from such trade. The Clean Air Action Plan is designed to develop mitigation measures and incentive programs necessary to reduce air emissions and health risks while allowing port development to continue.

The Ports are determined to accelerate ongoing efforts to reduce air pollution from all modes of goods movement through the San Pedro Bay Ports. The Clean Air Action Plan is not only built upon the Ports' previous air quality mitigation efforts, but also on the efforts of the regulatory agencies, business stakeholders and concerned residents. This plan incorporates their concepts and control measures while establishing a new vision for port-related goods movement.

The Ports are pleased to note that from preliminary emissions inventory estimates for 2005, current emission levels from cargo handling equipment are lower than 2001/2002 levels. But having noted this encouraging progress, both Ports recognize that there is still a significant amount of work to be done.

The Ports share the goal of reducing air pollution from existing and future port operations to acceptable regulatory health risk thresholds. The Ports take responsibility to implement the measures in this Clean Air Action Plan. The generally accepted health risk threshold for individual proposed projects is a 10 in 1,000,000 additional cancer risk. It is recognized that the standardized modeling used to measure this risk is imperfect. Therefore, the Clean Air Action Plan is multi-faceted. The Clean Air Action Plan includes stringent San Pedro Bay-wide standards that achieve real emissions reductions; a nested set of implementation strategies; investment in the development and integration of new/cleaner technologies into port operations; and creation of a comprehensive monitoring and tracking program that will document progress on all of these elements.

The Ports also expect that the Clean Air Action Plan will be the basis of control measures incorporated into the State Implementation Plan (SIP) through the SCAQMD's AQMP. Due to the close coordination with SCAQMD and CARB, the Clean Air Action Plan will, it is hoped, represent the joint approach for reducing the "fair share" of emissions associated with port-related operations.

The Ports also acknowledge the reality that reducing pollution to near zero levels would require massive conversion to electric, fuel cell or hydrogen vehicles, which are not yet commercially available for all applications. However, there are low-emissions technologies commercially available that slash pollution up to 90% from the 2004 on-road heavy-duty exhaust emissions standards. The Ports also recognize that the extensive scope of emission reductions necessary to achieve the goals envisioned in this plan will require more than a 5-year period to fully implement. This highlights the need for the plan to be adopted in 2006, and for aggressive implementation to commence with strong commitments by both Ports.

1.5 San Pedro Bay Ports Clean Air Action Plan Background

This Clean Air Action Plan sets forth an array of approaches that can achieve the goals and implementation strategies that the Ports will use to reduce the public health risk from port operations.

The Clean Air Action Plan consists of the following seven elements:

- Standards and Goals
- Implementation Strategies
- Control Measures
- Technology Advancement Program
- Infrastructure & Operational Efficiency Improvements Initiative
- Estimated Emissions Reductions
- Estimated Budget Requirements

This Clean Air Action Plan is based on the following principles:

(1) The Ports will work cooperatively to implement these strategies.
(2) The Clean Air Action Plan, although built upon past efforts, will be continually updated and improved.
(3) The Ports will be open to new technologies and other advancements to accelerate meeting the vision expressed above.
(4) The Ports will achieve an appropriate "fair share" of necessary pollutant emission reductions.

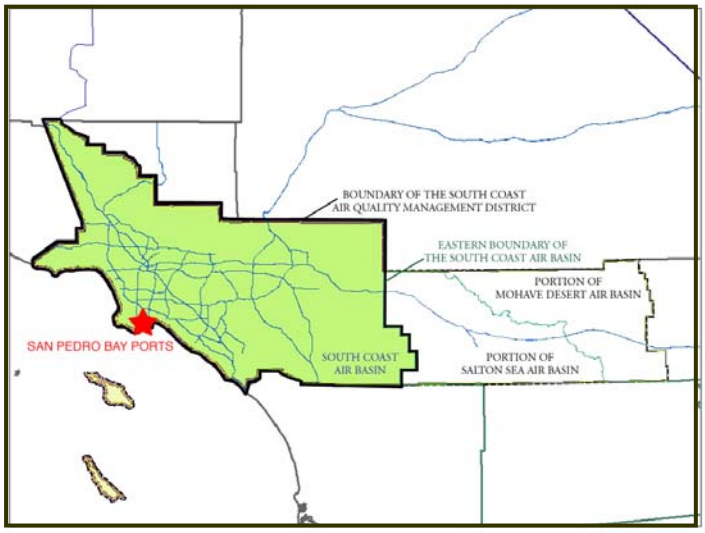
Tenants, railroads, and the trucking industry will be expected to "sign-on" and participate in the Clean Air Action Plan beginning January 1, 2007. The Ports will work with tenants and the railroads to assist them in developing their own programs to meet the Clean Air Action Plan standards. These groups will be asked for a written explanation as to how they intend to meet or surpass the goals of the Clean Air Action Plan. The Ports are committed to working with industry stakeholders to assure speedy action.

While many of the control measures are based in large part on the work of the No Net Increase (NNI) Task Force, the Green Port Policy, and other initiatives, the Ports will remain open to innovative ideas that will achieve the same or better results.

The movement of goods by heavy-duty trucks from the Ports through local communities is an extraordinary challenge because it involves thousands of truck owner/operators who do not have the financial resources to acquire cleaner trucks on their own. The Ports are adopting a goal that will eliminate "dirty" trucks from the San Pedro Bay terminals within 5 years from adoption of this Clean Air Action Plan. The Ports will therefore work with all concerned parties to establish new relationships and business paradigms that will help secure the necessary funding to make this important transition. The Ports will also pursue "green-container" transport systems that can transport containers with "green power" to inland destinations so that, over time, the Ports can move toward a pollution-free transport system for goods movement.

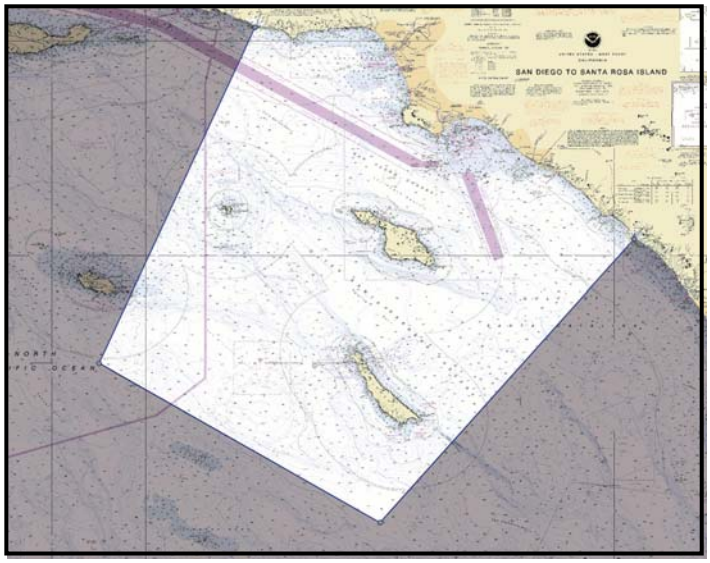
The Clean Air Action Plan targets the port-related sources that were identified in the emissions inventories prepared by the Ports of Long Beach and Los Angeles. The geographical boundaries of the emissions inventories include the SoCAB and its associated over-water boundary (and which is consistent with the boundaries established for the SCAQMD's AQMP). The landside boundary is presented in Figure 1.1 and the over-water boundary is presented in Figure 1.2. As in the emissions inventory, HDV operations are considered to be Port-related only within the SoCAB boundary and between the Ports and the first time the cargo is off-loaded from the truck (such as at a distribution center). Locomotive emissions are considered to be Port-related between the port terminals and the edge of the SoCAB landside boundary.

Figure 1.1: Emissions Inventory Landside Boundary



The emissions inventory over-water area is bounded in the north by the Ventura County line and to the south by the San Diego County line and extends perpendicularly out over water to the California Coastal Water designated coordinates. An outstanding issue to be resolved is the actual extent of the over-water boundary with regard to the SCAQMD's Air Quality Management Plan and CARB's State Implementation Plan (SIP), which has a direct impact on how far out the OGV and HC measures extend. For directly emitted DPM, 24 nm may be the extent at which it remains a health issue, while NOx and SOx are of regional concern within the over-water boundary and possibly beyond.

Figure 1.2: Emissions Inventory Over-Water Boundary



Both Ports are currently updating their 2005 emissions inventory by source category. Based on the baseline year emissions inventories for both Ports (Port of Los Angeles 2001, Port of Long Beach 2002)[1], the contribution of emissions by the five port-related source categories, and their percentage share compared to the SoCAB are presented in Figures 1.3, 1.4, and 1.5., below.

Figure 1.3: Baseline Year DPM Emissions Contributions by Source Category

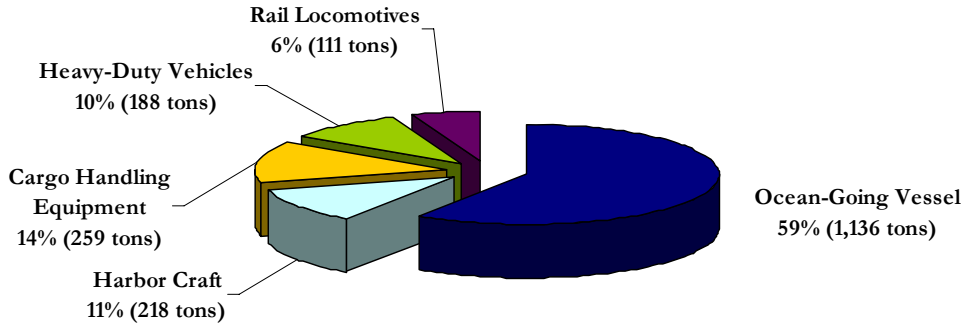


Figure 1.4: Baseline Year NOx Emissions Contributions by Source Category

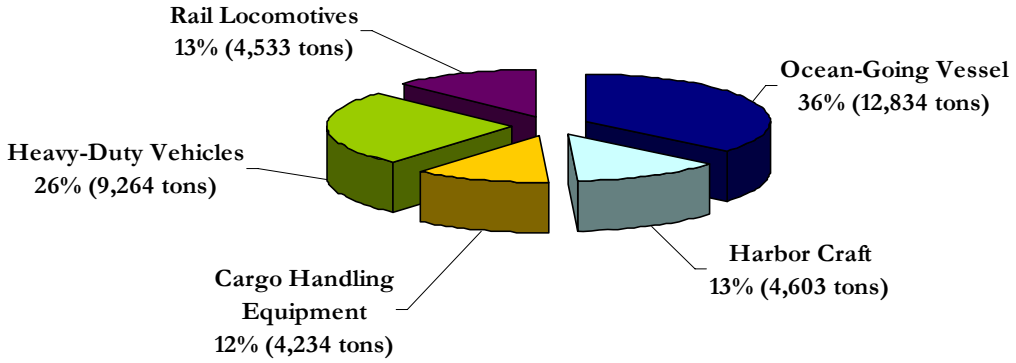
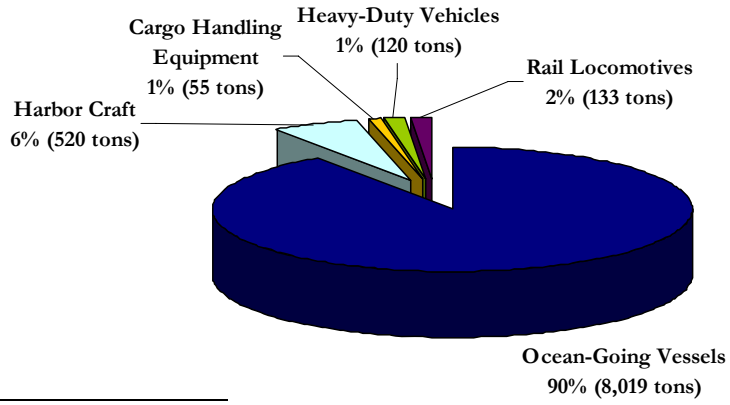


Figure 1.5: Baseline Year SOx Emissions Contributions by Source Category



[1] Draft 2005 cargo handling equipment emissions estimates included from 2005 Port of Los Angeles and Port of Long Beach Emissions Inventory Updates

The following figures compare the San Pedro Bay Port percentage contributions (as described above), with the contributions from all the emissions sources in the SoCAB for the baseline year 2002[2]. As existing and new regulations take effect on stationary, area, and domestic mobile sources, the port-related percentage contribution to the total SoCAB emissions for DPM, NOx, and SOx will increase significantly if these sources are not addressed. Further details are presented on the anticipated future percent contributions by port-related sources in Section 1.9.

Figure 1.6: Baseline Year SPBP vs. SoCAB DPM Emissions Contributions

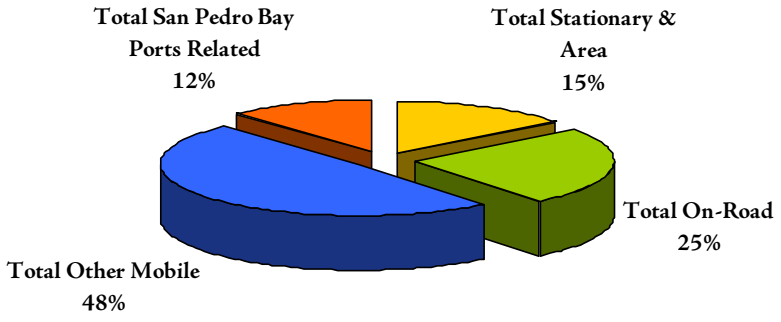


Figure 1.7: Baseline Year SPBP vs. SoCAB NOx Emissions Contributions

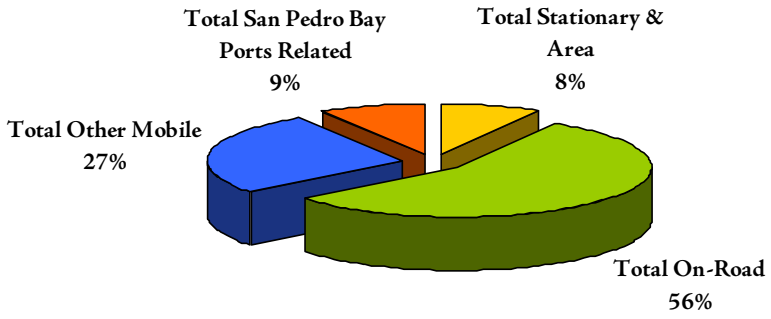
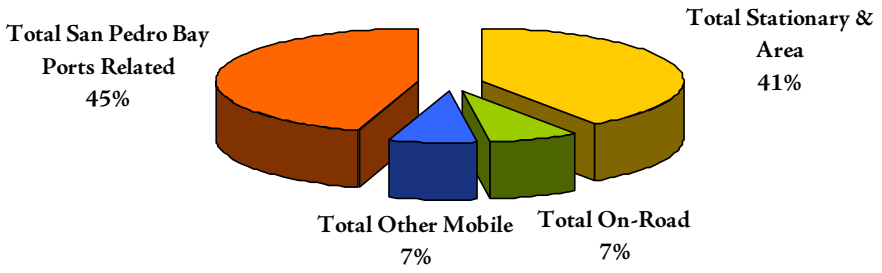


Figure 1.8: Baseline Year SPBP vs. SoCAB SOx Emissions Contributions



[2] From Draft 2007 Air Quality Management Plan, Table A-1 – 2002 Annual Average Emissions By Source Category in South Coast Air Basin (tons/day), Appendix III, SCAQMD, October, 2006

1.6 Control Measure Development

Various measures have been evaluated, demonstrated, and integrated into each Port's existing Air Quality Program. Common control measures that both Ports participate in jointly include the VSR program and the Pacific Harbor Line (PHL) Fleet Modernization MOU. There are several strategies that both Ports have in common; however implementation approaches have differed, such as the yard tractor modernization programs, shore-power for ships[3], and others. The goal of the Clean Air Action Plan is to bring together these and other control strategies and monitoring efforts into a single plan that will avoid duplication of resources and still provide room for each Port to implement each measure independently, as applicable.

For the Port of Los Angeles, control measures presented in this Clean Air Action Plan have been brought forward through various efforts including the development of Near-Term Measures and the City of Los Angeles' NNI Task Force, among others. The most significant effort in the recent past is the NNI Task Force Report. Section 4 discusses how the recommended 68 NNI Measures have been incorporated into this Clean Air Action Plan. Measures on the regulatory track are the responsibility of federal, state, or local regulators and are, therefore, not carried forward in this Clean Air Action Plan. The non-regulatory NNI Measures incorporated into the control measures in this Clean Air Action Plan for the next five fiscal years are identified, though a number of the NNI Measures have been modified for implementation. The specific incorporation of NNI measures into the Clean Air Action Plan is presented in Section 4, Table 4.2.

Air quality measures approved through the China Shipping (CS) Settlement Agreement have been incorporated as a separate element in the Clean Air Action Plan (see Section 4.5).

For the Port of Long Beach, strategies presented in this Clean Air Action Plan have been brought forward based upon current programs developed through the previous Healthy Harbor Program, and the existing Green Port Policy, which was adopted by the Board of Harbor Commissioners in January 2005. The Green Port Policy established an overall environmental ethic for the Port of Long Beach, placing environmental protection of the air, soil, sediment, and water quality programs under a single umbrella and establishing them as a top priority. Under the POLB Green Port Policy, the Port's goal for the air quality component is to achieve measurable, long-term reductions in air pollutant emissions from Port operations. Specific strategies and programs have been developed and implemented in order to meet this goal. For example, the Port of Long Beach successfully negotiated "green leases" with two of its container terminals in 2006, which include control measures that have been brought forward in this Clean Air Action Plan.

[3] Referred to as alternative maritime power (AMP™) by the Port of Los Angeles and cold ironing by the Port of Long Beach.

In addition to these existing control measures, additional measures have been added along with new aspects of those previously developed. It is anticipated that as new technologies become available, they will be added to future versions of the Clean Air Action Plan.

1.7 Clean Air Action Plan Development

The Port of Los Angeles, Port of Long Beach, SCAQMD, CARB, and EPA Region 9 have worked together to develop the scope and breadth of the San Pedro Bay Ports Clean Air Action Plan. This plan was built upon earlier work, including the public efforts of the No Net Increase Task Force. The Ports and the agencies agreed that a draft Clean Air Action Plan should be released for public comment and to seek consensus regarding the contents of the final Clean Air Action Plan.

Upon adoption, this Clean Air Action Plan will offer several opportunities for continued collaboration with these agencies, including evaluations, demonstrations, funding, studies, emissions inventories, lessons learned during implementation, and future Plan updates.

One of the most valuable aspects of this Clean Air Action Plan is that both Ports will combine resources and expertise to supplement the actions of federal, state, and local regulators as necessary to implement cleaner technologies for various source categories. The synergy of this group will also lead to additional options that can be implemented to reduce emissions and eliminate the associated Public Health Risk. This will be achieved through the Technology Advancement Program presented in Section 4.3.

1.8 Clean Air Action Plan Review and Adoption

The draft Clean Air Action Plan was released to the public on June 28, 2006 with an initial public review period of 30 days. The plan was made available at both Ports' offices, as well as at public libraries throughout the surrounding communities. In addition, the Plan was posted on both Ports' websites in six different languages: English, Spanish, Cambodian, Chinese, Korean, and Japanese. Further, hard copies and CDs containing electronic versions of the Clean Air Action Plan documents were made available upon request. During this public review period, both Ports conducted four public workshops in which they presented an overview of the Clean Air Action Plan and took comments from the public. The meetings were held at:

- Banning's Landing, Wilmington, July 6th at 6 pm
- Long Beach Council Chambers, Long Beach, July 12th at 7 pm
- Cesar Chavez Park, Long Beach, July 19th at 7 pm
- Peck Park, San Pedro, July 25th at 6 pm

Available at the public workshops were printed copies of the Clean Air Action Plan, compact disks with the plan, and live Spanish translation services. Staff from both Ports, SCAQMD, CARB, and EPA Region 9 participated in the presentation panel at all meetings. After the overview of the Clean Air Action Plan, speakers who filled out speaker cards were given 5 minutes each to make statements, and after the speakers were finished, written questions from the audience were read aloud and answered by the panel of Port and regulatory staff. Oral comments were recorded and several requests for extension to the public review period were made. Based upon formal requests from five organizations, the Board's of both Ports granted a 30 day extension to the public comment period which ended on August 28, 2006. All oral and written comments and the Ports' responses are provided in the San Pedro Bay Ports Clean Air Action Plan Comments Compendium. In addition to the public meetings, both Ports briefed the Boards of CARB (July 20, 2006) and SCAQMD (August 4, 2006) on the Clean Air Action Plan.

Public review of the progress and future annual updates to the Clean Air Action Plan will be conducted through the public Board meetings at each Port. The Port of Los Angeles has two Board meetings each month and the Port of Long Beach has weekly Board meetings. Prior to each meeting, the agendas are posted on the respective Port's websites and Clean Air Action Plan items will be clearly identified.

The Clean Air Action Plan will go before both Ports' Boards for adoption in November 2006.

Future updates to the Clean Air Action Plan will be completed on an annual basis, and will include opportunity for public input and comment.

1.9 The Greater Challenge

The Ports and regulatory agencies acknowledge that if port-related sources are not controlled by the Clean Air Action Plan to their "fair share" with respect to the other sources in the SoCAB, port-related contributions to the basin's total emissions (particularly with respect to OGVs) will increase significantly beyond the levels presented in Figures 1.6, 1.7, and 1.8 above. From the recently released draft 2007 AQMP from SCAQMD, Figures 1.9, 1.10, and 1.11 below show the estimates for 2020 of the port-related sources compared to all other emissions in the basin. It is important to note that all port source categories are regulated, however for some source categories emissions standards will not happen in time or to the degree needed for the basin attainment dates. OGVs represent the source category with the least stringent standards, followed by rail (until new stringent Tier III standards are adopted). In the recently released draft 2007 AQMP, the SCAQMD has projected the basin emissions for 2020, and these projections predict that port-related contributions will be significantly higher than the figures shown above. Therefore, action must be taken now in order to help the basin meet its air quality goals.

Figure 1.9: Estimated 2020 SPBP vs. SoCAB DPM Emissions Contributions

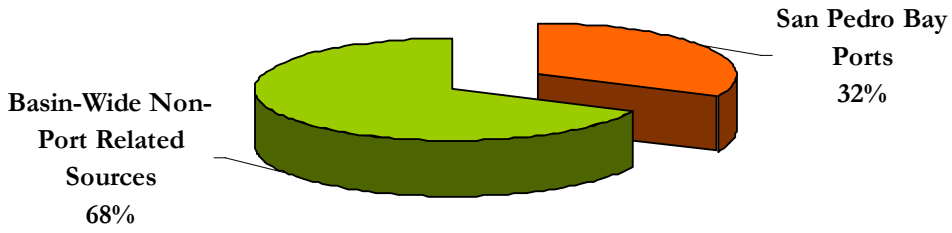


Figure 1.10: Estimated 2020 SPBP vs. SoCAB NOx Emissions Contributions

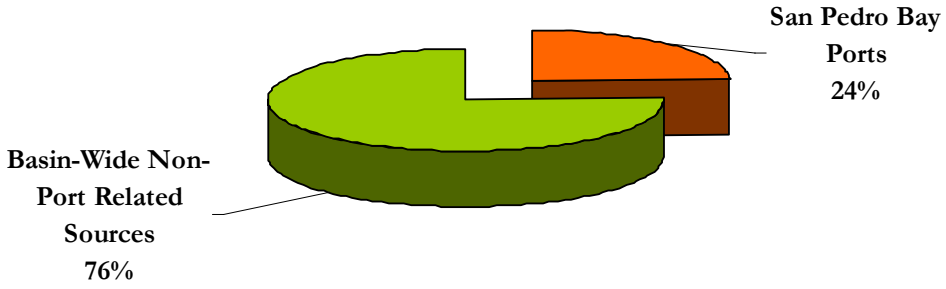
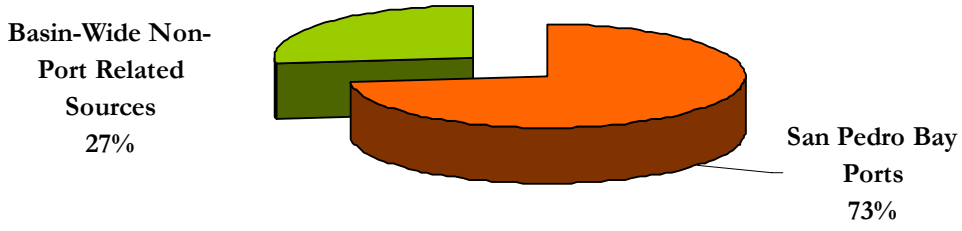


Figure 1.11: Estimated 2020 SPBP vs. SoCAB SOx Emissions Contributions



As stated earlier, this Clean Air Action Plan only outlines control strategies, measures, and costs for the next five fiscal years. It is important to understand that a significant amount of work will still be needed beyond the next five years to ensure that the goals are met and maintained. Due to the enormity of the challenges ahead, the Ports simply cannot fund these initiatives through their current operating budgets. Substantial additional funding must be secured. Efforts will need to be made at the legislative level to secure long-term funding, as there will be the need for incentives, coordination, evaluation, demonstration, implementation,

and planning well beyond the five-year horizon. These challenges are why the Clean Air Action Plan needs to be reevaluated, adjusted, and updated annually.

For the continued reduction of public health risk associated with port-related sources, the regulatory agencies will need to continue to apply tighter emissions reduction requirements in the future to ensure that growth does not reverse the desired trend of continual emissions reductions. Further, "green-container" transport systems need to be developed, demonstrated, and integrated such that they ultimately replace the current systems. These "green-container" transport systems ultimately should be near pollution-free and be powered by "green energy" sources and renewable fuels. Perfecting the technology for a truly clean tomorrow is a critical element of the Clean Air Action Plan, and unless we start demonstrating and implementing these technologies today, we cannot achieve the benefits of a better and cleaner tomorrow.

Both Ports are supportive of greater regulatory agency participation, action, and regulation as this creates a fair and level playing field for both industry and ports. As the San Pedro Bay Ports approve and implement the Clean Air Action Plan, it could put them at a competitive disadvantage with (in regard to cargo that is destined outside of the SoCAB) other California, west coast, and international ports. The Ports urge CARB to make the Clean Air Action Plan a standard that all California ports must meet, and further the Ports encourage EPA to make it a standard that all ports in United States must meet.

The standards being set forth in this plan will require significant funding beyond what the Ports can provide through their current operating budgets. Port funding will be focused on performing infrastructure improvements; assisting in the turnover of owner/operator- and fleet-owned trucks with alternative fueled/clean diesel trucks; and investing in a Technology Advancement Program. The SCAQMD has committed to provide funding in 2006, and has further proposed to continue to fund the plan through the next five fiscal years. The estimated range of funding for the Clean Air Action Plan (for the various scenarios) is $437 million to $2.94 billion.

Even with the significant commitment of funding from both Ports and the SCAQMD, a sizeable infusion of additional funding will be required to execute the Clean Air Action Plan just to ensure turnover of the frequent-caller truck fleet (trucks that call at the Ports seven or more times per week).

The California Legislature recently passed a long-awaited infrastructure bond package that includes monies for port infrastructure and trade related air quality improvements. If approved by California voters in November 2006, funds resulting from the bond measure could be used to supplement Port and SCAQMD funding. Both the regulatory agencies and the Ports will need to push for the required additional funding through legislative solutions and will need to educate the public regarding these issues.

1.10 San Pedro Bay Ports Clean Air Action Plan Report Organization

After this Introduction, the Clean Air Action Plan is organized into the following sections:

- Section 2: "San Pedro Bay Ports Clean Air Action Plan Goals" presents the goals associated with the Clean Air Action Plan over the next five fiscal years.

- Section 3: "Implementation Strategies" present the various strategies/options available to the Ports for implementation of the Clean Air Action Plan.

- Section 4: "Clean Air Action Plan Initiatives - Overview" presents the San Pedro Bay Ports Clean Air Action Plan recommended control measures that will be implemented in order to meet the goals.

- Section 5: "Clean Air Action Plan Initiatives - Details" presents details and estimated emissions reductions of each of the initiatives proposed in the Clean Air Action Plan that will need to be completed in order to realize successful implementation.

- Section 6: "Future Emissions Projections" presents the effect of growth on the emissions reductions that are estimated to result from the implementation of the measures discussed in the previous section.

- Section 7: "Budget Summary" presents and discusses the estimated capital and incentive costs associated with implementing the measures described in Section 5. Costs are presented in terms of fiscal year funding over the five-year Clean Air Action Plan.

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SECTION 2: SAN PEDRO BAY PORTS CLEAN AIR ACTION PLAN GOALS

The Clean Air Action Plan establishes the path by which the targeted control measures will be implemented in the short-term and provides for budget planning over a five fiscal-year period. The Clean Air Action Plan will be reviewed each year in light of progress made during the previous year, and implementation strategies will be adjusted to ensure that the goals for the Clean Air Action Plan are achieved. Additional measures may be specified in future Clean Air Action Plan updates to maintain progress towards a complete and timely achievement of the goals. Goals will be reviewed annually as part of the update cycle and new goals may be added.

2.1 Foundations

The following common foundations support the San Pedro Bay Ports Clean Air Action Plan.

- The San Pedro Bay Ports are committed to expeditiously and constantly reduce the public health risk associated with port-related mobile sources, and implement a program within five years that will achieve this goal.

- The San Pedro Bay Ports are committed to facilitate growth in trade while reducing air emissions.

- The San Pedro Bay Ports will focus on lease amendments/renewals and California Environmental Quality Act (CEQA) evaluations as mechanisms to establish provisions and requirements in leases consistent with meeting the Clean Air Action Plan goals.

- The San Pedro Bay Ports will affect tariff changes as needed to influence activity changes that will result in emissions reductions.

- The San Pedro Bay Ports are committed to monitor, document, and report on performance of their efforts under the Clean Air Action Plan and will update the plan on an annual basis.

2.2 Standards

The principles upon which this Clean Air Action Plan is based set forth extremely ambitious goals for port-related goods movement. From the vision of reducing port-related health risk and the principles stated previously, it is the Ports' goal to establish standards at the following three levels:

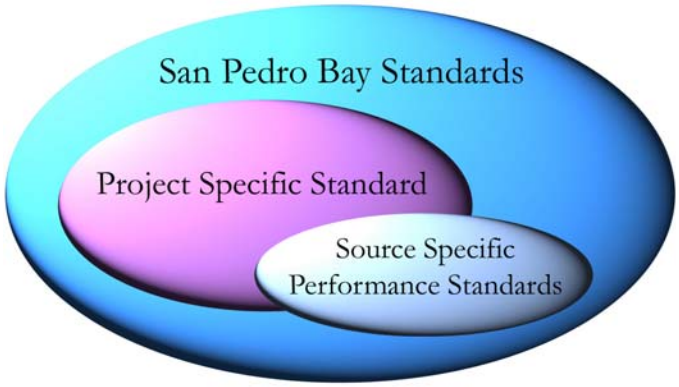
(1) **San Pedro Bay Standards –**
- Reduce public health risk from toxic air contaminants associated with port-related mobile sources to acceptable levels.
- Reduce criteria pollutant emissions to the levels that will assure that port-related sources decrease their "fair share" of regional emissions to enable the South Coast Air Basin to attain state and federal ambient air quality standards.
- Prevent port-related violations of the state and federal ambient air quality standards at air quality monitoring stations at both ports.

(2) **Project Specific Standards –**
- Projects must meet the 10 in 1,000,000 excess residential cancer risk threshold, as determined by health risk assessments conducted subject to CEQA statute, regulations and guidelines, and implemented through required CEQA mitigations associated with lease negotiations.
- Projects that exceed the SCAQMD CEQA significance thresholds for criteria pollutants must implement the maximum available controls and feasible mitigations for any emissions increases.
- The contribution of emissions from a particular project to the cumulative effects, in conjunction with Clean Air Action Plan and other adopted/implemented control measures, will allow for the timely achievement of the San Pedro Bay Standards.

(3) **Source Specific Performance Standards –**
- A series of standards that will be met through Port lease requirements, tariffs, incentives, and market-based mechanisms as outlined below.

The standards are inter-related. Compliance with the Project Specific Standards may require that an individual terminal go beyond the Source Specific Performance Standards or advance the date of compliance with those performance standards. In addition, projects that meet the Project Specific Standard associated with health risk, must also meet the criteria pollutant emissions reductions associated with their "fair share" of regional emissions, and health risk reductions, as stated in the San Pedro Bay Standard. The relationships between these three standards are illustrated below.

Figure 2.1: Relationships of Standards



Establishment of an appropriate San Pedro Bay Standard is a difficult task at this time, as no such standards currently exist. As currently written, there are three components to the San Pedro Bay Standards that are to be met: 1) reduction in health risk, 2) "fair share" of mass emission reductions of criteria pollutants and 3) compliance with standards at the port air monitoring stations. These three components are included to identify the direction of the Ports and the agencies in developing an appropriate San Pedro Bay standard.

Attainment of the NAAQS for the entire SoCAB is not appropriate as a San Pedro Bay Ports standard because they are national standards designated for broad areas and apply to concentrations resulting from all source categories' emissions, not just particular industries or source types (such as Port operations). In addition, developing plans to attain the NAAQS is solely the responsibility of the State of California as described in its SIP. However, setting the initial San Pedro Bay Standards to the concentrations in the NAAQS for port monitoring sites could be a good indication of the local impacts from port operations (it's important to note that concentrations at monitoring stations will include not only the port sources but all sources in the vicinity of the monitors).

With regard to bay-wide toxic air contaminant risk goals, the Ports have started to explore a potential health risk standard with the SCAQMD and CARB. To date, neither agency has established a toxic air contaminant health risk standard specifically for DPM associated with port mobile source operations. The SCAQMD has adopted rules establishing acceptable health risk limits for toxics emitted by stationary facilities. Those rules set limits of 25 in a million cancer risk, with authorization for the SCAQMD Board to approve risks up to 100 in a million in two-year increments based upon lack of technology and other factors. Regulatory agencies have not identified any environmental regulatory limit on cancer risk that allows risks in excess of this range for an individual facility.

CARB and SCAQMD haven't identified a "safe" level of exposure to DPM. As part of its Goods Movement Plan, CARB established a statewide goal for goods movement of reducing DPM health risk 85% below 2000 levels by 2020 with the near-term goal of establishing measures that achieve as much as possible within the first five years. Based upon the health risk assessment for the Ports of Los Angeles and Long Beach recently prepared by CARB, health risks caused in some locations by port-related sources would likely need to be reduced by that amount and possibly more. The Ports and the agencies are currently discussing development of a health risk reduction goal specifically for the port sector, and expect to set an appropriate standard by early next year.

With regard to criteria pollutants, CARB associated the emission reduction goals in its *Emission Reduction Plan for Ports and Goods Movement*[4] with preliminary estimates of the levels of reductions that will be needed to meet the Federal 8-hour ozone and PM 2.5 standards in the SoCAB. Subsequently, the 2007 draft AQMP for the SoCAB was released by SCAQMD on October 10, 2006 and will be finalized by early next year. The draft 2007 AQMP establishes emission reductions from all source categories which are necessary to attain the PM 2.5 and 8-hour ozone standards. In the draft AQMP, computer modeling by SCAQMD staff indicates that that the region needs a 62% reduction in NOx, a 65% reduction in SOx, and a 17% reduction in PM by 2014 (from 2002 levels) to timely attain the federal ambient air quality standard for PM 2.5. Initial estimates of the reductions of NOx, SOx and PM needed by 2020 to timely attain the federal 8-hour ozone standard are 74%, 63%, and 18%, respectively. These estimates will be subject to revision through the process of public and CARB review. In order to achieve these emission reductions, the draft 2007 AQMP proposes different and generally greater reductions from port-related sources, because they generally are less well controlled than other sources. The AQMP proposes reductions in NOx, SOx and PM emissions from port-related sources by 2014 that, respectively, are 58%, 93.3%, and 48.5% below 2002 levels. The 2007 AQMP is currently undergoing a public review process that is expected to result in adoption by the SCAQMD Board early in 2007. The plan will then be submitted to CARB, which will consider adoption of the State Element and the District's Element in Spring 2007 for submittal to EPA Region 9 as a SIP revision.

The Ports and the agencies anticipate building upon these modeled AQMP estimates for developing overall San Pedro Bay emissions targets for NOx, SOx and PM, with targets and milestones for 2014 and 2020. These targets will establish the San Pedro Bay Ports' "fair share" of regional emissions reductions. These targets will be a valuable tool for long-term air quality planning, aiding the Ports and the agencies with evaluating the long-term cumulative effects of future projects. The Ports and the agencies are currently discussing the appropriate emissions targets for the two Ports, and expect to set an appropriate standard by early next year.

[4] http://www.arb.ca.gov/planning/gmerp/gmerp.htm

As stated above, discussions between the Ports and the regulatory agencies to better define both a toxics health risk standard and the criteria emissions reduction standard ("fair share") for the San Pedro Bay have already begun. The goal of these discussions is to develop and present the agreed upon San Pedro Bay Standards to the Ports' Boards for their approval by Spring 2007. It is the goal of the Ports to establish these standards as soon as possible in order that they may be considered in the CEQA documents for a number of upcoming development projects. Due to the critical nature of these standards, the Ports and regulatory agencies will work together expeditiously to deliver sound proposals to the Boards as soon as possible.

As stated above, Project Specific Standards require all new projects to meet or be below acceptable health risk standards (10 in 1,000,000 excess residential cancer risk threshold) and for projects that exceed the SCAQMD CEQA significance thresholds for criteria pollutants to implement the maximum available controls and feasible mitigations for any emissions increases. The Project Specific Standards do not limit the types of impacts that will be considered or mitigated pursuant to CEQA. For example, while the 10 in a million project standard for cancer risks applies to residential risks, the ports will continue to evaluate and, if required by CEQA, mitigate all impacts. Additionally the Ports will evaluate and mitigate, where required, non-cancer health impacts.

There is precedent for establishing thresholds at these levels for any emissions increases associated with a new project. Both components of the Project Specific Standard are consistent with SCAQMD CEQA guidance. One challenge however is that the Ports do not wish to discourage early action by tenants to reduce emissions beyond regulatory requirements. Therefore, the ports will meet with SCAQMD and CARB to develop procedures by which early actions will be considered when evaluating projects under both the health risk and "fair share" criteria emissions reduction standards. It is against both the interest of the Clean Air Action Plan and the AQMP to discourage voluntary early action on emission reductions.

As also specified under the Project Specific Standards, the emissions from an individual project will be analyzed based upon its contribution to cumulative effects. The project contribution will be evaluated in conjunction with the Clean Air Action Plan and other federal, state and local adopted and/or implemented control measures to ensure that the contribution to cumulative effects will allow for the timely achievement of the San Pedro Bay Standards.

The Ports have established Source Specific Performance Standards to assist in Clean Air Action Plan implementation which lay out particular strategies to attain the ultimate goals. However, the Ports encourage innovation and will accept equivalent strategies once proven. The Source Specific Performance Standards proposed in the Clean Air Action Plan are:

Heavy-Duty Vehicles/Trucks

- ✓ By the end of 2011, all trucks calling at the ports frequently or semi-frequently will meet or be cleaner than the EPA 2007 on-road PM emissions standards (0.01 g/bhp-hr for PM) and be the cleanest available NOx at the time of replacement or retrofit.

Ocean-Going Vessels

- ✓ 100% compliance with the Vessel Speed Reduction Program [initially out to a distance of 20 nm from Point Fermin, and expanded to 40 nm].
- ✓ The use of ≤0.2% sulfur MGO fuel in vessel auxiliary and main engines at berth and during transit out to a distance of 20 nm from Point Fermin and expanded to 40 nm or equivalent reduction (starting 1st quarter 2008).
- ✓ The use of shore-power (or equivalent) for hotelling emissions implemented at all major container, selected liquid bulk, and cruise terminals in POLA within five years and at all container terminals and one crude oil terminal in POLB within five to ten years (the implementation time difference being due to the Port of Long Beach's more extensive infrastructure development schedule).
- ✓ The use of DPM and NOx control devices on auxiliary and main engines mandated on new vessel builds and existing frequent callers.

Cargo Handling Equipment

- ✓ Beginning 2007, all CHE purchases will meet one of the following performance standards:
  - Cleanest available NOx alternative-fueled engine, meeting 0.01 g/bhp-hr PM, available at time of purchase, or
  - Cleanest available NOx diesel-fueled engine, meeting 0.01 g/bhp-hr PM, available at time of purchase.
  - If there are no engines available that meet 0.01 g/bhp-hr PM, then must purchase cleanest available engine (either fuel type) and install cleanest Verified Diesel Emissions Controls (VDEC) available.
- ✓ By the end of 2010, all yard tractors operating at the San Pedro Bay Ports will meet at a minimum the EPA 2007 on-road or Tier IV engine standards.
- ✓ By the end of 2012, all pre-2007 on-road or pre-Tier IV top picks, forklifts, reach stackers, rubber tired gantries (RTG), and straddle carriers <750 hp will meet at a minimum the EPA 2007 on-road engine standards or Tier IV off-road engine standards.
- ✓ By end of 2014, all CHE with engines >750 hp will meet at a minimum the EPA Tier IV off-road engine standards. Starting 2007 (until equipment is replaced with Tier IV), all CHE with engines >750 hp will be equipped with the cleanest available VDEC verified by CARB.

HARBOR CRAFT

- ✓ By the second year of the plan, all Harbor Craft (HC) home-based at San Pedro Bay Ports will meet EPA Tier 2 for harbor craft or equivalent reductions.
- ✓ By the fifth year, all previously repowered HC home-based at San Pedro Bay Ports will be retrofitted with the most effective CARB verified NOx and/or PM emissions reduction technologies.
- ✓ When Tier 3 engines become available, within five years all HC home-based at San Pedro Bay Ports will be repowered with the new engines.

RAILROAD LOCOMOTIVES

- ✓ By 2008, all existing Pacific Harbor Lines switch engines in the Ports shall be replaced with Tier 2 engines equipped with 15-minute idling limit devices, retrofitted with either DOCs or DPFs, and shall use emulsified or other equivalently clean alternative diesel fuels available.
- ✓ Any new switch engine acquired after the initial Pacific Harbor Line replacement must meet EPA Tier 3 standards or equivalent to 3 grams NOx/bhp-hr and 0.023 g PM/bhp-hr.
- ✓ By 2011, all diesel-powered Class 1 switcher and helper locomotives entering Port facilities will be 90% controlled for PM and NOx, will use 15-minute idle restrictors, and after January 1, 2007 use ULSD fuels.
- ✓ Starting in 2012 and fully implemented by 2014, the fleet average for Class 1 long haul locomotives calling at Port properties will be Tier III equivalent (Tier 2 equipped with DPF and SCR or new locomotives meeting Tier 3) PM and NOx and will use 15-minute idle restrictors. Class 1 long haul locomotives will operate on USLD while on Port properties by the end of 2007. Technologies to get to these levels of reductions will be validated through the Technology Advancement Program.
- ✓ Any new rail yard developed or significantly redesigned at the San Pedro Bay Ports shall be required to operated the cleanest available technology for switcher, helper, and long haul locomotives, utilize idling shut-off devices and exhaust hoods, use only ULSD or alternative fuels, and have clean only CHE and HDVs consistent with the Clean Air Action Plan.

As stated above, Project Specific Standards require all new projects to meet or be below acceptable health risk standards (<10 in 1,000,000 excess residential cancer risk threshold) and for projects that exceed the SCAQMD CEQA significance thresholds for criteria pollutants must implement the maximum available controls and feasible mitigations for any emissions increases.

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SECTION 3: IMPLEMENTATION STRATEGIES

Given that most of the control measures go beyond existing regulatory requirements (none are mandated as part of regular port operations), the Ports must take steps to implement the measures. In order to maximize effectiveness of implementation, multiple strategies will be evaluated and developed.

The primary implementation methods that both Ports agree upon are incorporation of control measures into lease requirements and utilization of appropriate mitigation measures, which may be identified as part of the CEQA evaluation process. The advantage of these methods is that the control measures will be tied to the lease or permit and, from a compliance standpoint, failure to meet the control measures would mean a violation of the lease or permit. The limitation of this strategy is that the timing of implementation port-wide will depend on the timing of lease negotiations. To make up for this limitation, the ports will use, targeted incentive funding to "encourage" early emissions reduction measures and other strategies such as tariffs changes wherever possible.

As the Clean Air Action Plan is put into practice, several implementation strategies will be utilized to maximize the reduction of public health risk, criteria pollutant mass emissions reductions, and meet the stated goals. Implementation will adapt so that strategies may be added, changed, or abandoned based on the experience that will be built up as the Plan moves forward. Updates to each Port's Board will be made on how the various implementation strategies are progressing and any changes to the initial suite of strategies.

This chapter provides a general overview of both of these implementation strategies as well as several others. Specific implementation strategies by control measure are provided in Section 4 and are detailed in the measure narratives that can be found in Section 5.

3.1 Overview of Implementation Strategies

The Ports have evaluated numerous implementation strategies for the proposed standards, extensively reviewed options, and evaluated several scenarios. Strategies evaluated to date are:

- Lease Requirements
- Tariff Changes
- CEQA Mitigations
- Incentives
- Voluntary Measures
- Credit Trading
- Capital Lease Backs
- Government-Backed Loan Guarantees

- Third Party Discount Leasing/Purchasing
- Franchises
- Joint Powers Authority Trucking Entity
- Environmental Mitigation Fee
- Recognition Program

Each of the above strategies would require a sound monitoring, recordkeeping, and reporting mechanism. Procedures and recordkeeping requirements need to be developed and set in place to monitor and review participation levels at a frequent interval to determine the effectiveness of the implemented strategy.

3.1.1 Lease Requirements

Facilities Required by Lease to Meet Emissions Reduction Requirements

This strategy offers the opportunity for control measures to be negotiated and required in a terminal's lease that would reduce emissions, increase performance on voluntary or incentive-based measures, or require customers to implement specific emissions reduction measures. This opportunity exists for renegotiated, amended, and new leases. Renegotiations and amendments to a lease could be triggered, for example, by a terminal improvement that requires an Environmental Impact Report (EIR) in accordance with CEQA.

One benefit of the lease strategy is that placing a requirement in a lease provides a legally binding mechanism for ensuring that the desired action is achieved and provides remedies for noncompliance (because noncompliance would constitute a breach of the lease terms). Another benefit is that, since leases are negotiated on a terminal-by-terminal basis, the mix of requirements can be tailored to terminal-specific considerations. For example, break bulk terminals might be less able to employ shore-power (cold ironing) than a container terminal having vessels that call repeatedly throughout the year, so a break bulk terminal's lease may contain an alternative emission reduction requirement. A limitation of this strategy is that all leases have different renewal dates and terms, so the implementation is phased over time as leases come due or are renegotiated. However, all terminals will indeed be considered for renewal so this is a strategy that will reach far beyond the initial five-year Clean Air Action Plan.

Most facility leases are issued for long periods (e.g. 20 to 30 years). It is expected that new emission reduction technologies will emerge over the course of a lease. There will likely become a need to incorporate some of these new technologies into tenant operations in order to meet the San Pedro Bay Standards. Once a lease is issued, there may be limited opportunity to force require tenants to adopt new technologies. The ports will form a working group to identify mechanisms to ensure implementation of

needed control technologies that are identified through the Technology Advancement Program after execution of long-term leases. The working group will report to the harbor commissions as soon as possible in 2nd quarter 2007. In addition, all leases will require tenants to evaluate technologies identified through the Technology Advancement Program and report on use in their own operations.

3.1.2 Tariff Changes

Tariffs Changed to Influence Activity

A Port Tariff is the published set of rates, charges, rules and regulations for those doing business with a port. Each Port publishes its own tariff. A tariff is generally applicable to all tenants. However, individual operating leases may set requirements to a specific version of the tariff (i.e., later changes don't apply). All potential tariff changes will need to go through legal evaluation prior to being enacted.

This strategy could be used to implement uniform rules affecting most or all Port users. A potential scenario for this strategy could be a tariff item that sets discounted rates to activities that provide an air quality benefit (like discounted dockage for vessel speed reduction). Alternatively, a tariff item might prohibit certain kinds of activities (such as a prohibition from dumping into harbor waters). In general, a tariff could allow more uniform application of resources to customers of a Port. However, application of the tariff approach to implementation can only be used in selected instances and, as ordinances, must be developed following specific procedures.

At present, significant portions of the Clean Air Action Plan remain under-funded. As a result, the Ports are exploring various mechanisms to achieve the goals outlined in the Clean Air Action Plan. One mechanism that could alleviate the funding shortfall is the application of impact fees associated with the movement of cargo or sources (i.e., trucks, locomotives, vessels, etc.). Staff is committed to evaluate the use of fees to accelerate emission reductions from all source categories. However, for fees to achieve the desired results, they must be structured appropriately. Outlined below are principles that the Ports will consider when crafting any fee with the goal of reducing pollution.

1) The fee should target the source of pollution, not cargo in general, and the fee must be higher for those individual sources that cause the greatest impact, while bypassing those sources that meet clearly defined goals/standards. For instance, a truck that does not meet the goals of the Clean Air Action Plan could be assessed a fee based on how old and/or dirty that truck was; while a clean truck meeting the goals could assessed no fee or a small administrative fee necessary to cover the costs of monitoring compliance.
2) Fees collected should be used to clean up the source that generated the fee (i.e., fees assessed against a dirty truck should fund a retrofit or replacement truck).

3) Costs should ultimately be borne by those who benefit from goods movement. To the extent possible, fees should be shifted to the beneficial cargo owners (BCO). Programs similar to the successful PierPass program provide an example of how this can be done.
4) When a specific program achieves its goal, the fee must end. Broad-based fees that have no defined use may fail to garner sufficient support to be successful. In addition, they undermine the goals of the program by not rewarding those who achieve the goals.

These principles establish a framework for the successful use of fees. They ensure success in two ways. First, the program generates the funding necessary to achieve the emission reduction goals. Second, it holds the BCO accountable for their shipping decisions, making them pay the price for dirty modes of shipping and financially encouraging them to make more environmentally sound shipping decisions. While these principles are not absolute, adherence to them will more likely result in reduced emissions and increase the chances of broad-based support.

In order to evaluate the use of these fees, a working group comprised of the legal counsel and staff of the Ports and agencies will be formed, and will consider the legal and contractual implications and will report back to each Port Board by mid-2007.

3.1.3 CEQA Mitigations

New Projects or Changes to Existing Facilities Must Meet Health Risk Requirements

New development projects present a potential challenge to clean air and public health goals at the Ports. Port development projects often include increases in port-related diesel mobile sources and/or activity. New development projects present a vital opportunity with respect to the San Pedro Bay Ports emissions reduction efforts. All new significant development projects or modifications to existing facilities require a detailed CEQA and/or National Environmental Policy Act (NEPA) review prior to project approval. Along with these reviews comes an affirmative duty to mitigate significant environmental impacts.

Through the EIR process, air emissions and health risk levels will be assessed and applicable mitigations will be included in a project (on a project by project basis). These mitigations will be incorporated as provisions in any lease or permit for the project. Thus, this implementation strategy facilitates and complements the lease requirement strategy.

In addition, all CEQA air quality analyses will include a full analysis of construction emissions. Mitigation measures identified through the CEQA process will also provide

a mechanism to require construction equipment controls in order to ensure emissions at or below the applicable standards.

This implementation strategy focuses on furthering the aims of the Clean Air Action Plan via mitigation measures which may be identified through the CEQA process. A limitation of this strategy is that its effectiveness depends on new projects moving forward through the CEQA process.

3.1.4 Incentives

Incentive Funding Targeted Toward Specific Sources to Accelerate Emissions Reductions

Incentive-based measures provide a business incentive for the participant to reduce emissions beyond what is currently required by regulation or lease requirements. Incentive funding is targeted at "buying" emissions reductions ahead of regulation milestones or lease renewals. Incentive funding can come from several sources including the Ports, local and state regulatory programs, federal agency programs and grants, or an additional use fee that generates money to be used to incentivise emissions reductions. 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.

Several of the emissions reduction measures implemented within the San Pedro Bay Ports to date have been incentive-based and have utilized Port and local/state funds. The advantages of this strategy are that it can accelerate implementation of control measures that will become lease requirements or proposed regulations, and it avoids regulatory authority control issues. The disadvantage is that there is not adequate funding to support all measures, either in the Ports' operating targets or in regional, state, or federal grant programs.

Examples of successfully implemented incentive-based programs at the Ports include shore-power, yard tractor diesel oxidation catalyst (DOC) retrofits, harbor craft engine repowers, Gateway Cities Truck Modernization Program, and the air quality mitigation projects funded with China Shipping Settlement monies.

3.1.5 Voluntary Measures

Voluntarily Emission Reduction Actions Encouraged

Voluntary measures are non-compensated actions agreed to and undertaken by operators, and are used or implemented by the participants without legal obligation. 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. This strategy is generally specific to measures that provide win-win situations for

participants, which could include positive public relations press about the programs, regulatory agency or San Pedro Bay Ports recognition, environmental awards, etc. The existing VSR Program is an example of a successful voluntary program that has been implemented at the San Pedro Bay ports. As of March 2006, the San Pedro Bay VSR compliance rate was nearly 80% of vessels. Another notable example is the recent decision of Maersk Line to use low sulfur fuel in the engines of its vessels within 24 nm of California ports and while docked.

3.1.6 Market-Based Emission Reduction Program

Market Driven

An alternative market-driven strategy would reward participants for accepting emission reduction responsibility if they achieve emission reductions early or outperform program expectations. One example of such an approach is described in the Maritime Goods Movement Coalition proposal, which would establish near- and long-term emission performance standards to meet the region's air quality needs. Sources that commit to these standards would be able to generate valuable emission reduction credits for sale outside local impact zones and could obtain additional flexibility for implementing controls within their boundaries.

A market-driven approach can accelerate public health benefits by attracting additional investment in port areas. The program also can be designed to protect against any loss of local health benefits in high-risk areas by prohibiting a source from using emissions trading to avoid or defer controls (i.e., through the purchase and use of credits from other areas) until health-based targets are achieved. If a market driven strategy is used for any component of the Clean Air Action Plan, it would be designed to reduce risk from high-risk areas by allowing source owners/operators in high risk areas to generate credits but not purchase credits.

By offering the potential of greater regulatory certainty (through an integrated program) and economic value, such a program could provide sources with a strong incentive to enter into an early binding commitment to reduce emissions. A potential additional program benefit is the encouragement of private financing for many activities that often depend solely on public financing, thus potentially lessening the ports' financial burden.

As with traditional regulatory programs, a market approach would require strict monitoring and reporting of emitting activity and would impose appropriate penalties for any non-compliance.

3.1.7 Capital Lease-Backs or Lease to Own

Reimbursable Programs

This strategy would allow a Port to cover initial capital costs for equipment associated with a measure for a participant and then lease back or lease-to-own the cleaner equipment purchased. This could facilitate a measure's implementation with participants that could not cover the cost of buying newer/cleaner equipment. The participating Port or funding entity would be repaid partially or completely over time by the lease payments. This strategy would allow for a more rapid implementation of a control measure that is capital intensive (such as SPBP-HDV1) and avoid delays (and potential tax implications for participants versus tax associated with receiving a grant) associated with participants securing the appropriate capital funding or credit. The advantage of this strategy is that it can accelerate a participant's move towards implementing a measure. The disadvantage would be the administrative and legal requirements of Port leases (i.e., indemnification requirements of the Ports). An example of this strategy would be the purchase of cleaner diesel or liquefied natural gas (LNG) fueled trucks for fleet managers or owner-operators that would then lease back the equipment or lease-to-own the truck. This type of program is currently envisioned as being potentially applicable only to HDV measures.

3.1.8 Government-Backed Loan Guarantees

Loan Guarantees

A loan guarantee program is being considered by the Ports as a mechanism to find a solution for the significant tax burden recipients can have after receiving a subsidized replacement truck and the high interest rates available through traditional loan programs. Through this strategy, the Ports would secure and provide the loans to truck owners in the program, which would then lease back the truck in 8 to 12 years. Truck drivers that own their own equipment but might not have the ability to get loans for new, cleaner trucks would be covered by the Ports. Port call frequency requirements would be set as a condition of the loan. Further evaluation and review of the strategy is currently underway by the Port of Long Beach.

3.1.9 Third Party Discount Leasing/Purchasing

Loans Through a Third Party That Are Available for All Drivers/Owners

This approach is similar to Government Backed Loan Guarantees except a third party would provide the lease or purchase options to truck owners at substantial discounts. The third party would develop a program to charge the BCOs for their "dirty" truck calls which would offset the costs for replacement and retrofit as per the Clean Air Action Plan. The third party would be initially funded through Port agency grant funding which would be supplemented or replaced by impact fees associated with "dirty trucks." The third party would obtain master agreements with truck suppliers to get high volume discounts and pass the reduced price to the driver/owner as well as provide

"credits" equal to the fair market value of the existing truck to be replaced. These credits could then be used in towards the new lease or purchase. The third party would ensure that frequent and semi-frequent truck drivers/owners would be able to receive loans for new clean trucks which they may not be able obtain on their own. The third party entity would provide the Ports data associated with the program on a quarterly basis for review and auditing.

3.1.10 Franchises

Provides Trucking Companies Exclusive Rights to Operate on Port Property

In this strategy, the Ports would require that all trucks entering Port Property be franchised. In order for trucking companies to be franchised, they would have to meet "clean" truck requirements consistent with the Clean Air Action Plan and potentially other security related requirements. Companies becoming franchised would be given exclusive rights to operate on Port properties. It is envisioned that several companies would need to be franchised in order to meet demand. The Franchise strategy would work best if applied globally and simultaneously throughout both Ports.

3.1.11 Joint Powers Authority Trucking Entity

Ports Forming a Joint Powers Authority Trucking Entity

In this strategy, the Ports would setup a Joint Powers Authority Nonprofit Trucking Company that would be funded by each Port. The company would directly purchase trucks, hire drivers, provide employee benefits, and enter into contracts with beneficial cargo owners to transport their cargo. Drivers would be employees of the nonprofit trucking company. The company would have to compete in the existing market place. In order to be competitive the company would have to be heavily subsidized by the Ports to compensate for the higher operating costs as compared to existing trucking companies.

3.1.12 Recognition Program

Recognize Industry Efforts Under Clean Air Action Plan

This strategy will be implemented as part of the Clean Air Action Plan and will recognize the emissions reduction efforts and compliance with the Plan's goals. Both Ports believe it's important to recognize efforts that go beyond existing federal, state, and local regulations and that meet both Port's definition of a Green Terminal or operation. The recognition is currently being developed by both Ports and will set consistent standards recognition. Details of the recognition program will be sent to each Port's Executive Director before the end of 1st quarter 2007 for their approval.

3.2 Implementation

All control measures and implementation strategies are subject to further legal analysis by the City Attorneys of the two Ports. Encouragement of voluntary efforts and the recognition program strategy will be implemented as part of the Clean Air Action Plan independent of which additional strategies are ultimately used.

The most effective combination of implementation strategies identified at this time is a mix of lease requirements, tariff changes, CEQA mitigations, and incentives. This combination provides redundancy in implementing the Source Specific Performance Standards should any one of the other specific strategies fail to be applied.

The following flow diagram illustrates how the Source Specific Performance Standards and the Project Specific Standard will be implemented by the various strategies, and how the performance and project standards are related.

Figure 3.1: Implementation Strategies and Standards Relationships

Tariff changes offer an opportunity to affect a broader range of tenants but have potential implementation issues. Lease requirements may be able to go further than tariffs, but requirements can generally only be negotiated when the lease is reopened, such as when:

- ✓ A terminal change/modification triggers an EIR
- ✓ A new lease is sought
- ✓ An existing lease comes up for renewal

Therefore, these lease-reopening dates are a key component in determining potential emissions reduction magnitudes from control measures.

The following table presents the Port of Los Angeles' major leases, expiration dates, and currently anticipated upcoming Board action dates related to Environmental Impact Reports and/or lease actions.

Table 3.1: POLA Leases & Status

Land Use	Grantee	Term of Agreement	Date Expires	Anticipated Board Action
Container	POLA Container Terminal (berths 206-209)	Vacant	Vacant	Within 5 years
Container	Eagle Marine Services, Ltd.	30 Years	12/31/2026	1st Quarter 2008
Container	APM Terminals Pacific, Ltd	25 Years	7/31/2027	Not in 5 yr period
Container	China Shipping Holding Company, Ltd.	25 Years	New	1st Quarter 2007
Container	Evergreen Marine Corporation, LTD.	32 Years	12/31/2028	2nd Quarter 2008
Container	TraPac	15 Years	Holdover	2nd Quarter 2007
Container	Yang Ming Marine Transport Corporation, Ltd.	20 Years	10/10/2021	1st Quarter 2008
Container	Yusen Terminals Inc.	25 Years	9/30/2016	2nd Quarter 2008
Passengers/Sup Com.	Pacific Cruise Ship Terminals, LLC	18 Months	6/30/2005	Within 5 years
Automobile	Distribution & Auto Services, Inc.	N/A	N/A	N/A
General Cargo	Rio Doce Pasha Terminal, L.P. (berths 174-181)	15 Years	Holdover	1st Quarter 2008
General Cargo	Stevedoring Services of America (berths 54-55)	10 Years	10/31/2009	4th Quarter 2009
Dry Bulk	Hugo Neu-Proler Company	30 Years	8/30/2024	Not in 5 yr period
Dry Bulk	Los Angeles Export Terminal Corporation	35 Years	8/30/2032	N/A
Liquid Bulk	Equilon (berths 167-169)	35 Years	2/11/2023	Not in 5 yr period
Liquid Bulk	Exxon Mobil Corporation (berths 238-240)	25 Years	12/31/2015	Not in 5 yr period
Liquid Bulk	Pacific Energy Marine Oil (pier 400)	TBD	TBD	2nd Quarter 2007
Liquid Bulk	ConocoPhillips (berths 148-151)	TBD	Holdover	Not in 5 yr period
Liquid Bulk	Ultramar (berth 164)	25 Years	Holdover	3rd Quarter 2007
Liquid Bulk	Vopak (berths 187-191)	38 Years	8/29/2023	Not in 5 yr period
Liquid Bulk	Westway Terminal Company, Inc. (berths 70-71)	30 Years	3/23/2025	Not in 5 yr period
Liquid Bulk	GATX Tank Storage (berths 118-119)	25 Years	4/13/2013	Unknown
Liquid Bulk	Amerigas (berth 120)	TBD	Holdover	Not in 5 yr period
Liquid Bulk	Valero (berth 163)	20 Years	6/24/2014	Not in 5 yr period

The following table presents the Port of Long Beach's major leases, expiration dates, and currently anticipated upcoming Board action dates related to Environmental Impact Reports and/or lease actions.

Table 3.2: POLB Leases & Status

Land Use	Grantee	Term of Agreement	Date Expires	Anticipated Board Action
Container	PCT	20 Years	4/30/2022	Not in 5 yr period
Container	SSAT - Pier C	20 Years	4/30/2022	Complete
Container	SSAT Long Beach - Pier A	25 Years	10/21/2027	Not in 5 yr period
Container	TTI	25 Years	8/11/2027	Not in 5 yr period
Container	CUT	30 Years	6/30/2009	4th Quarter 2007
Container	LBCT	25 Years	6/30/2011	4th Quarter 2007
Container	Pier S	TBD	New Lease	3rd Quarter 2007
Container	ITS	20 Years	8/31/2026	Complete
Auto	Toyota	16 Years	12/31/2006	4th Quarter 2006
Break Bulk	Cooper/T. Smith	20 Years	12/31/2008	4th Quarter 2008
Break Bulk	Crescent Terminals	15 Years	6/30/2015	Not in 5 yr period
Break Bulk	Fremont	40 Years	4/30/2036	Not in 5 yr period
Break Bulk	Catalyst Paper (USA) Inc.	3 Years	8/31/2008	3rd Quarter 2008
Break Bulk	Pacific Coast Recycling	25 Years	11/13/2019	Not in 5 yr period
Break Bulk	Weyerhaeuser	36 Years	1/31/2011	1st Quarter 2011
Dry Bulk	BP West Coast Products	40 Years	12/31/2009	4th Quarter 2009
Dry Bulk	CEMEX Pacific Coast Cement	40 Years	8/31/2021	Not in 5 yr period
Dry Bulk	Koch Carbon	40 Years	12/31/2027	Not in 5 yr period
Dry Bulk	Marsulex	20 Years	5/31/2005	4th Quarter 2006
Dry Bulk	MCC (Mitsubishi)	33 Years	6/13/2022	Not in 5 yr period
Dry Bulk	Metropolitan Stevedore	35 Years	3/31/2016	Not in 5 yr period
Dry Bulk	Morton	15 Years	7/31/2005	1st Quarter 2007
Dry Bulk	NGC	60 Years	11/30/2024	Not in 5 yr period
Dry Bulk	G-P Gypsum	N/A (Private)	N/A (Private)	N/A (Private)
Dry Bulk	Oxbow (East)	20 Years	11/3/2019	Not in 5 yr period
Dry Bulk	Oxbow (Pad 14)	31 Years	6/30/2021	Not in 5 yr period
Dry Bulk	Oxbow (South)	32 Years	6/30/2021	Not in 5 yr period
Dry Bulk	Oxbow (West)	41 Years	12/31/2027	Not in 5 yr period
Other	Sea-Launch	10 Years	1/14/2013	Not in 5 yr period
Liquid Bulk	BP/ARCO	40 Years	5/30/2023	3rd Quarter 2007
Liquid Bulk	ATSC	20 Years	12/31/2014	Not in 5 yr period
Liquid Bulk	BP Terminal 3	N/A (Private)	N/A (Private)	N/A (Private)
Liquid Bulk	World Oil	N/A (Private)	N/A (Private)	N/A (Private)
Liquid Bulk	Baker Commodities	month-to-month 90 day notice	N/A	Not in 5 yr period
Liquid Bulk	Chemoil	36 Years	6/30/2010	4th Quarter 2007
Liquid Bulk	Equilon (Shell)	40 Years	10/31/2006	1st Quarter 2007
Liquid Bulk	Petro-Diamon	20 Years	9/30/2022	Not in 5 yr period
Liquid Bulk	VOPAK	N/A (Private)	N/A (Private)	N/A (Private)

3.3 Tracking and Monitoring

To track, monitor, and demonstrate the progress of the Clean Air Action Plan, both Ports will enhance existing monitoring programs to encompass the breadth of actions proposed in the Clean Air Action Plan. These include:

- Expand the Port-wide real-time air monitoring network to improve continued monitoring of actual air pollution concentrations in and around the San Pedro Bay Ports.
- Update Port-wide air emissions inventories annually to track control measure compliance and emissions benefits.
- Using CARB's latest health risk assessment estimates, the Port of Los Angeles will develop Port-wide health risk assessments (individual and joint) in coordination with CARB and SCAQMD.
- Track Clean Air Action Plan progress, expenditures, reductions, etc. in comprehensive databases for each Port.
- Report on overall progress of the San Pedro Bay Ports Clean Air Action Plan to each Port's Boards annually and additionally as required.
- Post progress reports prepared for each Port's Boards on the Clean Air Action Plan website.

Progress related to each of the source specific standards will be tracked and monitored to determine how the Clean Air Action Plan's implementation is progressing versus the goals of the plan. Regular updates to each Port's Board will be made on the various elements of the program. Upgrades to the emissions inventory and implementation databases are currently being conducted such that monitoring key elements of the Clean Air Action Plan can be presented to the Boards and public on a regular and routine basis. Currently, staff of each Port is planning to develop a San Pedro Bay Ports Clean Air Action Plan page on each of their websites to provide the public the status of the implementation progress, port emissions and reductions, and other key elements including what is happening in the Technology Advancement Program. This website will also be a clearinghouse for documents, fact sheets, schedules, and provide links to get Board meeting schedules and agendas.

For further specific details on monitoring and tracking on a per measure basis, is provided in Section 5.

3.4 Integration of New Technologies into Existing Operations

New emissions reduction technologies are constantly emerging. The Technology Advancement Program seeks to support development of these new technologies in the port environment. Technologies available today can be incorporated into terminal leases as they are renegotiated. However, most facility leases are issued for long periods (e.g. 20 to 30 years). Once a lease is

issued, there may be limited opportunity for the Ports to require tenants to adopt new technologies. However, there may be an opportunity to require or incentivise tenants to adopt these technologies through tariffs (i.e. requirements and/or fees), lease amendments, incentives or other mechanisms.

As was noted above, the ports will form a working group to identify mechanisms to ensure implementation of needed control technologies that are identified through the Technology Advancement Program after execution of long-term leases. The working group will report to each Ports' Boards as early in second quarter 2007 as possible. The working group will consider, among other tools, fee mechanisms under the framework identified in Section 3.1.2 above. Under this structure, operations which have already adopted the new technologies would be exempt from the fee. Other potential mechanisms for integrating the new technology, include:

- ✓ Lease Modifications
- ✓ Tariff Changes
- ✓ Incentives
- ✓ Agency Regulation
- ✓ Voluntary Adoption

Once Staff determines the appropriate mechanisms for advancing new technologies into existing operations, staff will take the proposal to their respective Boards for implementation. Through the Technology Advancement Program (see Section 5.7), the Technical Working Group would also develop and annually update technical fact sheets detailing the status of various emissions control technologies. These fact sheets will contain details such as verification status of various emissions control devices, availability of low emitting equipment, results of successful demonstration of alternatively fueled equipment or new technology aimed at reducing emissions and the names/contact info of vendors or engine manufacturers who offer these products. The fact sheets will be made available on a Clean Air Action Plan website.

New technologies identified through this process would be evaluated for integration into existing operations based on the mechanisms identified by the working group described above

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SECTION 4: CLEAN AIR ACTION PLAN INITATIVES - OVERVIEW

This section presents an overview of the Clean Air Action Plan, which consists of six primary elements:

1. Source category control measures for existing operations
2. Standards for new leases and lease renewals negotiations
3. Requirements for construction equipment
4. Comprehensive Technology Advancement Program initiative
5. Infrastructure and operational efficiency improvements initiative

For the Port of Los Angeles there is an additional element associated with the China Shipping Settlement.

4.1 Source Specific Control Measures

Specific source category control measures were developed from both existing Port air programs and the work completed by the City of Los Angeles' NNI Task Force report and the Port of Long Beach's Green Port Policy. Table 4.1 illustrates how both Ports are considering initial implementation strategies, at this time, for the various measures proposed in the Clean Air Action Plan. The recognition program and voluntary measures will be implemented across all measures. These initial implementation strategies identified in the table are thought by the Ports to be ready for use to initiate the control measures. Depending on the performance of these initial strategies, they will be adjusted, removed, enhanced, or other additional strategies will be utilized in order to maximize timely emissions reductions. In addition, the Ports are looking to what extent strategies like tariff changes can be effectively utilized to expedite emissions reductions.

Table 4.1: Control Measures & Initial Implementation Strategies

SPBP Measure Number	Control Measure	Initial Implementation Strategies
SPBP-HDV1	Performance Standards for On-Road Heavy-Duty Vehicles	Incentive/Lease Req/ Tariff/Impact fees/CEQA
SPBP-HDV2	Alternative Fuel Infrastructure for Heavy-Duty Natural Gas Vehicles	Incentives (Ports & SCAQMD Funding)
SPBP-OGV1	OGV Vessel Speed Reduction (VSR)	Tariff /Incentives Lease Requirements/CEQA
SPBP-OGV2	Reduction of At-Berth OGV Emissions	Lease Requirements CEQA
SPBP-OGV3	OGV Auxiliary Engine Fuel Standards	Lease Requirements Tariff (if applicable)/CEQA
SPBP-OGV4	OGV Main Engine Fuel Standards	Lease Requirements Tariff (if applicable)/CEQA
SPBP-OGV5	OGV Main & Auxiliary Engine Emissions Improvements	Lease Requirements Incentives/CEQA
SPBP-CHE1	Performance Standards for CHE	Lease Requirements CEQA
SPBP-HC1	Performance Standards for Harbor Craft	Incentives Lease Requirements/CEQA
SPBP-RL1	PHL Rail Switch Engine Modernization	Second Amendment to Operating Agreement
SPBP-RL2	Existing Class 1 Railroad Operations	MOU/Lease Req CEQA
SPBP-RL3	New and Redeveloped Rail Yards	MOU/Lease Req CEQA
	Construction Standards	CEQA
	Technology Advancement Program	Incentives
	Infrastructure & Operational Efficiency Improvements Initiative	Incentives
	POLA China Shipping Settlement	Settlement Agreement (Port of Los Angeles Only)

It should be noted that control measures SPBP-OGV1, OGV3, and OGV4 will be evaluated to determine solutions to various logistical issues to ensure effective measure implementation. These issues include: updating the existing radar range capabilities to 40 nm, working with the Marine Exchange and United States Coast Guard (USCG) to resolve issues associated with vessels outside the Coast Guard's administrative area, work with the Marine Exchange to track additional fuel compliance data elements for monitoring and reporting, determine effects of

changing VSR zone on areas inside California waters, but beyond 40 nm from Point Fermin, work to get work gang assignments moved to 40 nm, and to evaluate fuel availability and ship tankage availability associated with operating on cleaner fuels. The evaluations and upgrades to the radar system will be completed before the end of 2007.

4.1.1 Control Measures for Heavy-Duty Vehicles

- **SPBP-HDV1** – Performance Standards for On-Road Heavy Duty Vehicles. The control measure is focused on maximizing the reductions from frequent (7 or more calls per week) and semi-frequent (3.5 to less than 7 calls per week) caller trucks that service both Ports. This control measure sets forth the following "clean" truck definitions:

  - ✓ All frequent caller trucks, and semi-frequent caller container trucks model year (MY) 1992 and older, calling at the San Pedro Bay Ports will meet or be cleaner than the EPA 2007 on-road emissions standard (0.01 g/bhp-hr for PM) and the cleanest available NOx at time of replacement.
  - ✓ Semi-frequent caller container trucks MY1993-2003 will be equipped with the maximum CARB verified emissions reduction technologies currently available.

  The measure then sets target dates by which trucks will either be replaced or retrofitted to meet the above standards. In order to accommodate this massive transformation of the existing truck fleet, Port, SCAQMD, and other public funding will be required. The program also sets forth suggested strategies to maximize the use and emissions reductions of "clean" trucks calling at both ports.

- **SPBP-HDV2** – Alternative Fuel Infrastructure for Heavy-Duty Natural Gas Vehicles. Construct LNG or compressed natural gas (CNG) refueling stations preferably on jointly owned property, after resolution of logistical issues and site considerations. Funding to build at the recommended locations would come primarily from Port incentive funds (for on-port and near-port infrastructure), SCAQMD alternative fuel funds (for on-port, near-port, and basin-wide infrastructure), and potentially from grants from state and federal regulators or others.

4.1.2 Control Measures for Ocean-Going Vessels

- **SPBP-OGV1** – OGV Vessel Speed Reduction (VSR). Currently a voluntary program under which ships are slowed within the SoCAB over-water boundary out to 20 nm from Point Fermin, reducing NOx emissions. The program will be evaluated to determine solutions to various logistical issues to ensure effective

measure implementation. These issues include: updating the existing radar range capabilities to 40 nm, working with the Marine Exchange and USCG to resolve issues associated with vessels outside the Coast Guard's administrative area, determine effects of changing VSR zone on areas inside California waters, work to get work gang assignments moved, and other operational issues. The associated costs would be shared between the San Pedro Bay Ports.

- **SPBP-OGV2** – Reduction of At-Berth OGV Emissions. Under this initiative, each Port will develop the infrastructure required to provide shore-power capabilities to all container and cruise ship berths. On a case-by-case basis, other vessel types like specially outfitted tankers or refer terminals will be evaluated for the application of shore-power.

  In addition, this initiative includes the demonstration and implementation of alternative shore-side technologies that can be used on vessels unequipped for connecting to shore-power that could provide significant emissions benefits while at berth.

- **SPBP-OGV3** – OGV Auxiliary Engine Fuel Standards. As proposed, this measure would phase in the use of ≤0.2% S MGO fuels in auxiliary engines with initial implementation driven by lease requirements and potentially tariffs. This requirement would impact vessels calling at San Pedro Bay Ports, within the VSR boundary (as described in SPBP-OGV1). Initially, similar to SPBP-OGV1, the program would start out at 20 nm from Point Fermin and would be expanded to 40 nm from Point Fermin at the same time as SPBP-OGV1.

- **SPBP-OGV4**– OGV Main Engine Fuel Standards. As proposed, this measure would require ship's main engines to operate using MGO fuels with sulfur content ≤0.2% S in their main engines, while inside the VSR zone (described in SPBP-OGV1). Initially, similar to SPBP-OGV1, the program would start out at 20 nm from Point Fermin and would be expanded to 40 nm from Point Fermin at the same time as SPBP-OGV1. Similar to SPBP-OGV3, this measure would also be implemented through lease requirements and potentially tariffs.

- **SPBP-OGV5**– OGV Main and Auxiliary Engine Emissions Improvements. This measure focuses on reducing DPM, NOx, and SOx emissions from OGV main engines and auxiliary engines. OGV engine standards have not kept pace with other engine standards such as HDVs and CHE. IMO's MARPOL Annex VI is a very weak standard. This measure is coupled with the Technology Advancement Program by incorporating successfully demonstrated technologies or technologies

that have sufficient data that it can be agreed upon by regulatory agencies and the Ports as to what emissions reductions levels can be for a given technology.

4.1.3 Control Measures for Cargo-Handling Equipment

- **SPBP-CHE1** – Performance Standards for CHE. This measure sets fuel neutral purchase requirements for CHE, starting in 2007. The focus is moving the yard tractor fleet to either the cleanest available diesel or the cleanest available alternative fuel engines meeting EPA on-road 2007 or Tier IV PM and NOx standards and for other equipment for which these engines are not available, the installation of the cleanest CARB VDECs. It also requires that by 2010, all yard tractors operating at the ports will have the cleanest engines meeting EPA on-road 2007 or Tier IV engine standards for PM and NOx. All remaining CHE less than 750 hp will meet at a minimum the 2007 or Tier IV standards for PM and NOx by 2012. Finally, the measure calls for the all remaining CHE greater than 750 hp to meet Tier IV standards for PM and NOx by 2014 and prior to that, be equipped with the cleanest available VDEC.

4.1.4 Control Measures for Harbor Craft

- **SPBP-HC1** – Performance Standards for Harbor Craft (HC). This measure continues the various engine replacement programs led by both Ports, CARB/SCAQMD, and others. The focus will be on harbor craft that have not already been repowered/retrofitted (including construction related harbor craft like dredges and support vessels). When candidate vessels are identified, the Ports will assist/require the owner/operator to repower or retrofit propulsion and auxiliary engines. For non-construction related candidates, Ports staff will assist the owners in applying for Carl Moyer Program incentive funding for the cleanest available engine that meets the emissions and cost effectiveness requirements. This measure is fuel neutral. Potential vessel candidates will be identified through the annual emissions inventory process, and the program will be implemented through lease requirements. It should be noted, that several tugs operating at the Port of Long Beach are home-ported on private property (not Port property) and therefore will not be affected by this measure.

4.1.5 Control Measures for Railroad Locomotives

- **SPBP-RL1** – PHL Rail Switch Engine Modernization. A voluntary program initiated by the Ports of Los Angeles and Long Beach in conjunction with PHL to modernize switcher locomotives used in Port service to meet Tier 2 locomotive engine standards and initiate the use of fuel emulsion in those engines. The

program also includes evaluation of alternative-powered switch engines including LNG and hybrid locomotives. In addition, a locomotive DOC and DPF will be evaluated and based on a successful demonstration; DOC or DPF will be applied to all Tier 2 switcher locomotives. Finally, this measure restricts future purchases to the cleanest locomotives available.

- **SPBP-RL2** – Existing Class 1 Railroad Operations. This measure effects only existing Class 1 railroad operations on Port property (SPBP-RL3 effects all new or redeveloped rail yards). The goal of this measure is to secure an agreement (MOU) with the Class 1 railroads, and use other contractual mechanisms, to reduce emissions from their existing operations on Port properties that do not have a CEQA action pending in the next five years (i.e. new or redeveloped rail yard). This measure lays out stringent goals for switcher, helper, and long haul locomotives operating on Port properties. By 2011, all diesel-powered Class 1 switcher and helper locomotives entering Port facilities will be 90% controlled for PM and NOx, will use 15-minute idle restrictors, and after January 1, 2007, the use of ULSD fuels. Starting in 2012 and fully implemented by 2014, the fleet average for Class 1 long haul locomotives calling at Port properties will be Tier III equivalent (Tier 2 equipped with DPF and SCR or new locomotives meeting Tier 3) PM and NOx and will use 15-minute idle restrictors. Class 1 long haul locomotives will operate on USLD while on Port properties by the end of 2007. Technologies to get to these levels of reductions will be validated through the Technology Advancement Program.

- **SPBP-RL3** – New and Redeveloped Rail Yards. Rail facilities include many emission-producing activities, including the operation of switching and line-haul locomotives, idling of switching and line-haul locomotives, loading and unloading of railcars by CHE, and HDVs servicing the yards. New rail facilities, or modifications to existing rail facilities located on Port property, will incorporate the cleanest locomotive technologies, meet the requirements specified in SPBP-RL2, utilize "clean" CHE and HDV, and utilize available "green-container" transport systems. A list of these technologies will be provided for project proponents to consider in developing new facilities or redeveloping existing facilities, and the measures will be formalized in lease requirements.

4.1.6 Integration of Non-Regulatory NNI Measures

Many of the measures proposed in the Clean Air Action Plan advance the requirements and implementation of upcoming regulations, as did several of the NNI measures. Non-regulatory NNI Measures have been incorporated into the Clean Air Action Plan control measures. Regulatory NNI Measures are part of the on-going regulatory

programs implemented by the federal, state, and local agencies and are the responsibility of those agencies. Table 4-2 details how each San Pedro Bay Ports Clean Air Action Plan measure relates to the non-regulatory NNI control measures.

Table 4.2: Integration of NNI Measures

SPBP Measure #	New Control Measure/Program Name	Non Regulatory NNI Measures
SPBP-HDV1	Performance Standards for On-Road Heavy-Duty Vehicles	HDV3, HDV10 HDV12,
SPBP-HDV2	Alternative Fuel Infrastructure for Heavy-Duty Natural Gas Vehicles	HDV-4
SPBP-OGV1	OGV Vessel Speed Reduction (VSR)	OGV2, OGV15
SPBP-OGV2	Reduction of At-Berth OGV Emissions	OGV3, OGV16
SPBP-OGV3	OGV Auxiliary Engine Fuel Standards	OGV4, OGV11
SPBP-OGV4	OGV Main Engine Fuel Standards	OGV9, OGV12
SPBP-OGV5	OGV Main & Auxiliary Engine Emissions Improvements	OGV 7
SPBP-CHE1	Performance Standards for CHE	CHE2, CHE3, CHE4, CHE5, CHE7, CHE8
SPBP-HC1	Performance Standards for Harbor Craft	HC9, HC10
SPBP-RL1	Existing Class 1 Railroad Operations	R5, R6
SPBP-RL2	Operational Controls for Class 1 Railroads	R10, R11
SPBP-RL3	New and Redeveloped Rail Yards	No NNI Equivalent
	Technology Advancement Program	HDV13, HDV14, HDV18, HDV19, OGV7, OGV13, OGV14, HC3, HC7, R7, R9, R12
	Construction Activities	No NNI Equivalent
	POLA China Shipping Settlement	CHE6, HC5

Notes:

OGV 6 – This is already being done by shipping companies and will be documented in the upcoming 2005 emissions inventory update.

HC11 – "AMP™ Staging Areas" is being modified such that all customers that own/operate tugs will be required to AMP™ while they are at their homeport (the area being leased). This provision was not included in HC measures. Through preliminary analysis, staging areas (locations with the Ports where tugs would wait on shore-power between jobs rather than return to their homeports) are infeasible with current security requirements and wharf availability.

SPBP-RL3 – Goes beyond NNI requirements.

4.2 Construction Activity

Construction activity emissions will be assessed through the CEQA evaluation process and control strategies that may be required to meet CEQA mitigation requirements will be incorporated in bid packages for the actual construction work. Construction equipment includes marine sources (primarily dredges, tugs, crew boats, pile-drivers) and land (excavators, cranes, etc.) sources. Land- and marine-based construction equipment will be required to meet the control strategies that may be required as mitigations in the CEQA document.

The Ports, SCAQMD, and CARB will be developing a list of Best Management Practices (BMP) associated with construction activities by the end of 2007. These BMPs will be incorporated in construction contracts.

4.3 Technology Advancement Program

Another significant initiative of the Clean Air Action Plan is the Technology Advancement Program, which will evaluate, demonstrate, pilot, and incorporate new strategies into the suite of control measures that will ultimately result in significant reductions of DPM, NOx, and other criteria pollutants. This initiative builds on the success and synergies of the San Pedro Bay Ports, CARB, SCAQMD, EPA Region 9, tenants, and other stakeholders working together to find joint solutions. Several successful projects have occurred over the years between these entities, and this program would help to build on those early successes. A coordination committee will be established consisting of funding partners that includes both Ports, SCAQMD, CARB, and EPA Region 9. Other stakeholders may become involved in relation to specific projects, as approved by the Coordination Committee.

It is envisioned that the Technology Advancement Program would be the catalyst for identifying, evaluating, and demonstrating/piloting new and emerging emissions reduction technologies/strategies that could then be utilized in future updates to the Clean Air Action Plan as new control measures, alternatives to existing strategies, or as additional mitigation options for new projects. Below is a simplified illustration of how the process would work.

Existing/Emerging Technology → Technology Advancement Program → Implementation

There are four fundamental areas in which the program will focus its initial work:

- Specific control measure requirements (as identified in Section 5)
- "Green-Container" Transport Systems
- Emerging Technology Testing
- Emissions Inventory Improvements

The program will be primarily funded by both Ports and the participating agencies. Projects will be developed and implemented under each of the areas listed above. Successful demonstration projects will then be incorporated into the next annual update of the Clean Air Action Plan as control measures or additional emissions reduction strategies.

4.4 Infrastructure & Operational Efficiency Improvements Initiative

This initiative identifies projects at the San Pedro Bay Ports that improve infrastructure and operational efficiencies that have an added air quality benefit. The initiative includes, but is not limited to:

- Focus on on-dock vs. near-dock rail infrastructure
- Grade separations
- Optical character recognition (OCR) gates at terminals
- Terminal cargo handling/configuration efficiency improvements
- Radio Frequency Identification (RFID)
- Virtual Container Yards

The emissions reduced by these projects would be quantified and reported in emissions inventory updates.

4.5 Port of Los Angeles – China Shipping Settlement

Unique to POLA are the emission reductions associated with the China Shipping Settlement. In February 2003, the Port joined environmental and Harbor-area community groups in a settlement agreement that includes a series of environmental programs designed to improve the area's air quality and quality of life. As part of this settlement, the Port has committed over $20 million over five years to pay for air quality mitigation projects that reduce Port operation emissions that affect the communities of Wilmington and San Pedro. This program is known as the Port Air Quality Mitigation Incentive Program (PAQMIP). In accordance with the settlement agreement, the PAQMIP expends funds for projects and improvements that reduce emissions from Port operations that affect the communities of Wilmington and San Pedro. All emission reductions resulting from funded projects are retired by the Port of Los Angeles for the benefit of the environment, meaning that the reductions cannot be used as offsets or sold as credits.

The PAQMIP is in its third year[5], with the most recent Request for Proposals (RFP) planned for issuance in June/July 2006. The primary purpose of this program is to provide financial incentives to assist in the implementation of projects that will accomplish two objectives: (1)

[5] 3rd time an RFP is issued to solicit projects.

reduction of emissions associated with Port operations in the communities of San Pedro and Wilmington, and (2) research and development of specific technologies that can be applied in the San Pedro Bay Port area to achieve the first objective.

SECTION 5: CLEAN AIR ACTION PLAN INITIATIVES - DETAILS

This section presents the Clean Air Action Plan initiatives and control measures that the Port of Los Angeles and the Port of Long Beach will implement as part of the larger SPBP Clean Air Action Plan. These initiatives consist of:

5.1 Heavy-duty vehicles (trucks) control measures
5.2 Ocean-going vessels control measures
5.3 Cargo handling equipment control measures
5.4 Harbor craft control measures
5.5 Railroad locomotive control measures
5.6 Standards for new leases and lease renewals
5.7 Requirements for construction equipment
5.8 Comprehensive Technology Advancement Program initiative
5.9 Infrastructure and operational efficiency improvements
5.10 The Port of Los Angeles' China Shipping Settlement

Again it is important to note that this plan is a "living document" and that the control measures developed for the first San Pedro Bay Ports Clean Air Action Plan will most likely be adjusted over time in order to be most effective. New strategies will be added as more options to reduce emissions become available. Some strategies will be more successful than others, while some strategies may be dropped due to lack of reductions or authority to implement. The plan will be updated annually to maintain consistency with the Clean Air Action Plan's foundations, to maximize the reduction of public health risk, and to meet or exceed the goals presented in Section 2.

Staff is committed to evaluate the use of fees to accelerate emission reductions from all source categories as described in Section 3.1.2. In order to evaluate the use of these fees, a working group comprised of the legal counsel and staff of the Ports and agencies will be formed, and will consider the legal and contractual implications and will report back to each Ports' Board by mid-2007.

5.1 Heavy-Duty Vehicles (Trucks) Control Measures

HDVs represent one of the two primary source categories where emissions reduction efforts are focused in the San Pedro Bay Ports Clean Air Action Plan. This is due to their significant contribution of pollutant emissions, their proximity and health risk impact to surrounding communities, and the diffuse nature of ownership and control of the emission sources (many, if not most, trucks are owned and operated by individuals rather than by a centralized company). This source category is addressed through a combination of measures that include truck replacements, control device retrofits for trucks that will not be replaced, and a research and development initiative to help identify and demonstrate cleaner engines types and modes of transportation that can be used in the movement of containerized cargo.

5.1.1 Control Measure Number SPBP-HDV1

Measure Title: ***Performance Standards for On-Road Heavy-Duty Vehicles***

Financial incentives will be provided to expedite the fleet transformation to "clean" trucks by replacing and retrofitting all frequent and semi-frequent container caller "dirty" trucks servicing both ports by the end of 2011. This will maximize the associated emissions reductions and greatly reduce health risk concerns from trucks. The measure would be implemented through lease requirements, tariff changes, and/or incentives.

Initiation Year:	*FY2006/2007*
Implementation Schedule:	*Increasing throughout five year period (see Tables 5.3 & 5.4)*
Tonnage Reduced:	*Increasing throughout five year period (see Tables 5.3 - 5.5)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Lease Requirements, Tariffs, & Incentives

Background

On-road heavy-duty diesel vehicle (truck) travel is integral to moving containers from the Ports into the SoCAB and beyond. Almost all of these on-road trucks are rated with a gross vehicle weight (GVW) greater than 33,000 pounds.
"

Estimates of the number of unique trucks that are in service to the Ports is subject to debate, but for planning purposes they were used.

During the baseline emissions inventory process for both the Port of Los Angeles (2001 baseline) and the Port of Long Beach (2002 baseline) approximately 7,200 license plates of trucks visiting the ports were analyzed. This analysis determined that the average age of the port specific fleet was 12.9 years (MY 1990) compared to the 2001 statewide fleet age of 12.2 years (MY 1991) in the state of California's emissions inventory model EMFAC2002. From the baseline emissions inventory data set, it was found that MY 1958 to 2002 trucks serviced the ports.

Currently, both Ports are in the midst of updating their emissions inventory of port-related sources for 2005. As a part of this EI update, extensive truck visit/license plate information has been collected from seven container terminals (three from POLA and four from POLB). To date, over one million (1,003,024) OCR container truck visit data records have been received from the seven terminals and represent a time range of 45 to 208 days. From this preliminary data set, there were 35,291 unique California registered trucks identified, which had an average MY age of 1994. The trucks range in age from 1941 to 2006. Efforts are still under way to try to fill in the remaining container terminals data and collect the entire 2005 record of truck calls for both Ports. For now however, these data represent the best data set available to analyze the trucks servicing the San Pedro Bay Ports.

Out of the entire data set, there is a smaller data set covering five of the terminals over the same 37-day period. From this data set, it was found that nearly 2,000 unique frequent caller trucks visited the ports seven days per week or more (these trucks averaged ~12 calls per week), and accounted for ~50% of all truck calls. In addition, 3,000 semi-frequent trucks visited the ports from every other day to seven days per week representing 30% of all truck calls. Data analyses of this subset indicated that a total 15,700 unique California registered trucks made 256,000 trips over the 37-days duration. Further, gate count surveys of each of the container terminals at both of the San Pedro Ports indicated a total of 8.2 million annual gate counts.

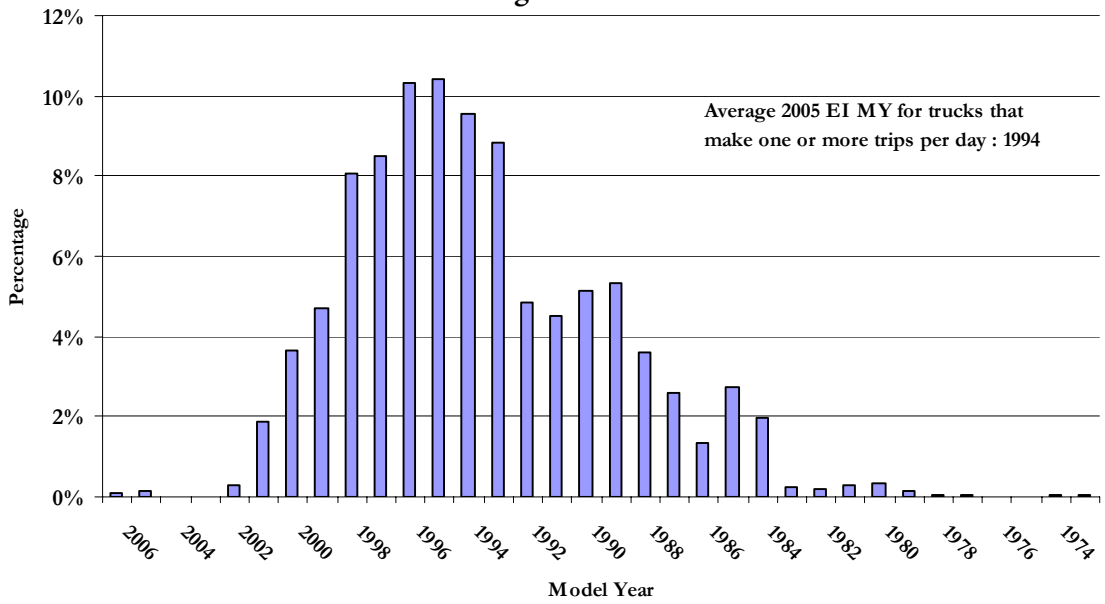
Utilizing the estimate of 8.2 million annual gate moves and the activity characteristics of trucks that service the ports (described above), the fleet characteristics of trucks for all terminals and for an entire year for both of the San Pedro Bay Ports were estimated in the following manner:

- ~41,000 individual (unique) trucks service both ports.
- ~7,000 individual frequent caller trucks make ~50% of all calls.
- ~9,800 semi-frequent caller trucks make ~30% of all calls.
- ~16,800 individual frequent and semi-frequent trucks account for ~80% of all calls.

Changing any of these assumptions could have a significant impact on the end result and therefore as better information is gathered, the number of trucks by category will be updated.

The following figure presents the model year distribution of all 15,700 trucks.

Figure 5.1: Model Year Truck Distribution of 2005 EI Update for 15,711 Unique Trucks Servicing POLA & POLB



Another potential source of information regarding truck population is the PierPass program, which has been designed to lessen near-port on-road congestion by extending terminal gate hours. Specific information on trucks is being gathered during gate transactions to assist with administration of this program. This information, when available, will be incorporated into the analysis.

The challenge of expediting emissions reductions from this source category is the numbers of owner/operator and fleet operators that service both ports. Complicating the issue are the costs associated with new trucks and financial ability of the owners/operators to acquire new trucks quickly.

Measure Description

This measure focuses on achieving significant emissions reductions related to improvements to the ~16,800 individual frequent and semi-frequent caller container trucks. The Ports envision tackling this measure using several approaches: incentives to replace trucks, lease requirements to require the use of "clean trucks," or other mechanisms such as a green lane program, an emblem program, tariff changes, etc. Two initial approaches include significant incentives to owner/operators to encourage accelerated turnover/retrofits, and on the terminal side to maximize the use of "clean" trucks through lease requirements and/or other mechanisms. It is important to note that the latter approach has not yet been developed. The Ports will develop, through discussions with CARB, SCAQMD, tenants, and other stakeholders, the details of how such an approach would be implemented.

"Clean" trucks are defined by this measure, as trucks meeting one of the following descriptions:

- All Frequent caller[6] container trucks that have been replaced or upgraded such that they meet or are cleaner than the EPA 2007 on-road emissions standard (this category represents ~7,000 trucks)
- Semi-frequent caller[7] container trucks currently MY1992 and older that have been replaced or upgraded such that they meet or are cleaner than the EPA 2007 on-road emissions standard (this category represents ~1,800 trucks).
- Semi-frequent caller container trucks MY 1993-2006 that have been equipped with the most effective CARB verified emissions reduction technologies (this category represents ~9,800 trucks).
- Trucks that have been replaced in the last four years through the Gateway Cities truck replacement program (this category represents over 500 trucks).

For the first approach, the Ports and SCAQMD would provide incentives for the replacement and retrofit of frequent and semi-frequent trucks such that the goals of the measure are met, however additional funding on a massive scale will be needed (further discussed in below in the Financial Costs section). Three sets of funding scenarios were developed: scenarios based on Port and SCAQMD funding only (Budget Scenarios 1 through 5), scenarios including unlimited and capped public bond funding (Budget Scenarios 6 through 11), and a scenario that evaluated the complete replacement of the ~16,800 frequent and semi-frequent caller trucks (Scenario 12). Detailed information on all budget scenarios is presented in Appendix A.

There were several scenarios developed and evaluated by the Ports for addressing port-related HDV emissions. The scenarios initially evaluate cleaner diesel, alternative fuel, and retrofit options for the short-term. Electric, hybrid, and several other "green-container" transport systems will be evaluated in the Technology Advancement Program and as these technologies are successfully demonstrated, they will be phased into the scenarios. Therefore, the proposed scenarios for HDV emissions reductions will be reviewed and can be modified to integrate these new cleaner options in future updates of the Clean Air Action Plan.

For all scenarios, alternative fueled and cleaner diesel trucks meet the proposed standards. The cost breakdown for incentive cost assumptions per unit replaced is:

[6] San Pedro Bay Ports frequent caller trucks call on average 7 or more times per week.
[7] San Pedro Bay Ports semi-frequent caller trucks call on average 3.5 to less than 7 times per week.

1.	Replacement Incentive8 for new LNG truck	$185,0009
2.	Automated Vehicle Locator (AVL) installation	$1,300
3.	Administration costs	$2,200
	Total Incentive Costs	$188,500/truck

AVL units will be installed on all trucks being replaced and will provide the Ports with better total miles traveled and times calling at the terminals of the San Pedro Bay Ports.

Similarly, the cost breakdown for the incentive cost for cleaner diesel truck replacements meeting the proposed standards were developed is:

1.	Replacement Incentive[10] for new cleaner diesel truck	$126,000
2.	AVL installation	$1,300
3.	Administration costs	$2,200
	Total Incentive Costs	$129,500/truck

The cost breakdown for retrofits for MY 1993 through 1997 including a DPF and lean NOx catalyst (CARB verified to 85% PM & 25% NOx reductions) and an engine control chip "flash" or resetting (CARB verified to 25% NOx reduction) is:

1.

1.	DPF+Lean NOx Catalyst w/installation	$15,500
2.	AVL Installation	$1,300
3.	Administration	$2,200
4.	Owner/operator incentive	$500
	Total Incentive Costs	$19,500/truck

It should be noted that the Carl Moyer Program guidelines allow for funds up to 80% of capital costs for a truck replacement with the condition that the maximum funding meet a cost effectiveness of $14,300/ton reduced (DPM, NOx, and VOCs). The cost assumptions used for this measure assumes 100% funding for replacements because of the need to turn over the large number of trucks described in the various budget scenarios. The Port's may provide the additional 20% to make up the entire cost of the replacement.

The first five scenarios evaluated several combinations of alternative fuel, cleaner diesel, and retrofits. These scenarios also assumed that only the Ports and SCAQMD monies were used to reduce HDV emissions. They focused only on frequent caller trucks and did not provide reductions for all ~7,000 trucks due to funding limitations. The resulting

[8] Replacement incentive is for the full purchase price of a new LNG truck, cost estimate based on April 18, 2006 meeting between Wesport, Port of Los Angeles, Port of Long Beach, and Starcrest.

[9] Carl Moyer limits incentive funding up to 80% and a maximum project cost effectiveness of $14,300 per ton of emissions reduced; the additional 20% will be paid by both Ports in order to increase participation in the program.

[10] Replacement incentive is for the full purchase price of a new cleaner diesel truck; cost estimate based on April 5, 2006 meeting between Gateway Cities, Port of Los Angeles, Port of Long Beach, and Starcrest.

estimated annual reductions at the end of the fifth year of implementation ranged from ~80 to ~250 per year (tpy) of DPM and ~480 to ~830 tpy NOx (budget scenario details are provided in Appendix A). These scenarios did not include any public/bond funds and after looking at the initial results, it was deemed that these reductions did not go far enough to meet the goals of the Clean Air Action Plan.

Seven additional scenarios were developed assuming different bond funding levels and targeted the ~16,800 frequent and semi-frequent caller trucks (~80% of all truck calls to the ports). Scenarios 6 through 8 assume that the bond funding is approved by the voters in November 2006 and that unlimited funds were available. Budget scenarios 9 through 11 assumed that $800 million were available for San Pedro Bay Ports. The final scenario assumes that all 16,800 frequent and semi-frequent trucks are replaced and was used to determine the upper end of emissions reduced and costs. Emissions reductions for these scenarios are presented in Table 5.1 below.

The scenarios were designed for comparison purposes. The budgets have been committed by each Port, however the actual breakdown on the percentage of funding going to alternative fuel/cleaner diesel/retrofits will be ultimately decided by each Port's Board.

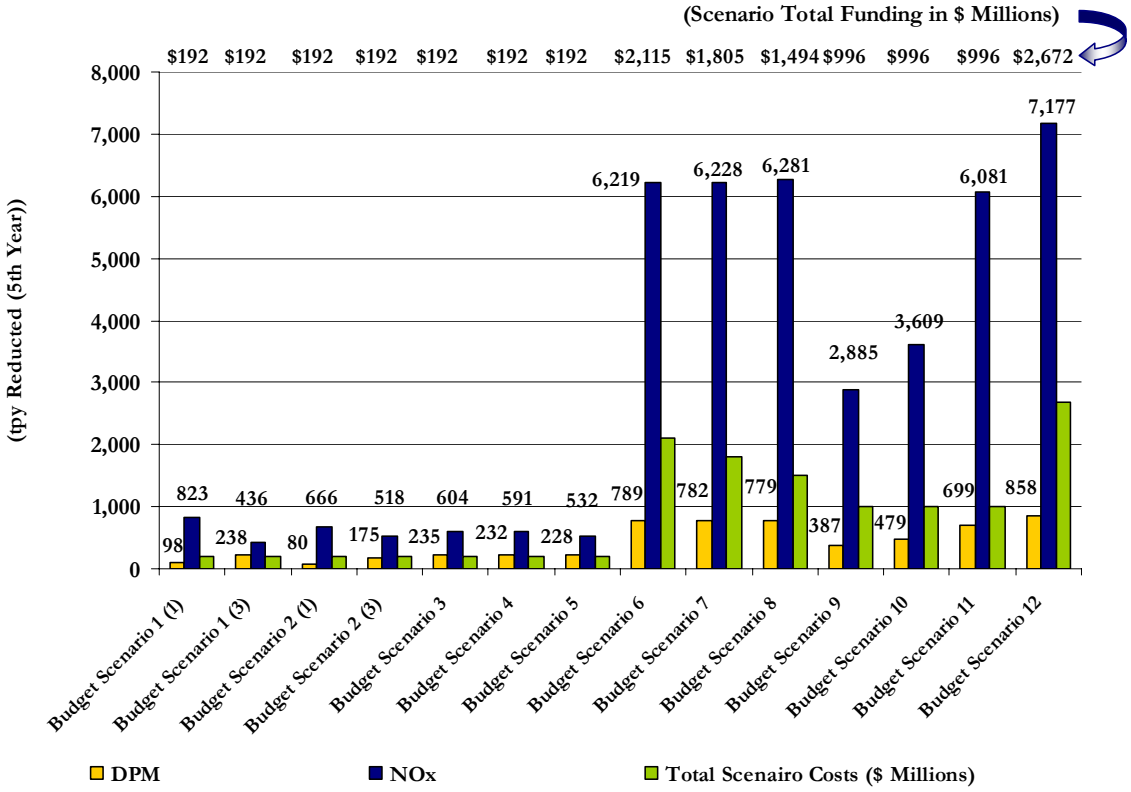
The following table provides the annual emissions reductions by the end of the fifth year of the plan and total scenario costs.

Table 5.1: Summary Results of Budget Scenarios

	Reductions (5th Year)		Total
	DPM (tpy)	NOx (tpy)	Scenairo Costs (US$)
Budget Scenario 1 (1)	98	823	$192,000,000
Budget Scenario 1 (3)	238	436	$192,000,000
Budget Scenario 2 (1)	80	666	$192,000,000
Budget Scenario 2 (3)	175	518	$192,000,000
Budget Scenario 3	235	604	$192,000,000
Budget Scenario 4	232	591	$192,000,000
Budget Scenario 5	228	532	$192,000,000
Budget Scenario 6	789	6,219	$2,115,200,000
Budget Scenario 7	782	6,228	$1,804,900,000
Budget Scenario 8	779	6,281	$1,494,100,000
Budget Scenario 9	387	2,885	$996,000,000
Budget Scenario 10	479	3,609	$996,000,000
Budget Scenario 11	699	6,081	$996,000,000
Budget Scenario 12	858	7,177	$2,671,600,000

Figure 5.2 presents the summary results for annual DPM and NOx emissions reductions in the fifth year of the plan and the total costs associated with each scenario.

Figure 5.2: Summary Results for Budget Scenarios



It should be noted that a State of California bond measure for air quality and infrastructure improvements is on the November 2006 ballot and that if passed, strong support should be provided by the Ports to ensure a "fair share" of funds are made available to the San Pedro Bay ports to address emission reductions from trucks.

The budget scenario currently under consideration is Budget Scenario 7, which is based on a 50/50 mix between alternative fueled and cleaner diesel truck replacements, as well as retrofits. The following replacements and retrofits are proposed for this specific scenario:

- 10,622 frequent and semi-frequent trucks replaced
  - ✓ 3,500 frequent caller trucks replaced w/alternative fueled trucks meeting the frequent "clean" truck standards
  - ✓ 3,500 frequent caller trucks replaced w/cleaner diesel trucks meeting the frequent "clean" truck standards

- ✓ 1,811 semi-frequent caller trucks replaced w/alternative fueled trucks meeting the semi-frequent pre-MY1993 "clean" truck standards
- ✓ 1,811 semi-frequent caller trucks replaced w/cleaner diesel trucks meeting the semi-frequent pre-MY1993 "clean" truck standards

- ➢ 9,800 semi-frequent trucks retrofitted
  - ✓ 5,112 MY1993-1997 semi-frequent caller trucks retrofitted (w/ DPFs, lean NOx catalyst, and chip re-flash) meeting the semi-frequent MY1993-1997 "clean" truck standards
  - ✓ 844 MY1998-2003 semi-frequent caller trucks retrofitted (w/ DPFs and lean NOx catalyst) meeting the semi-frequent MY1998-2003 "clean" truck standards

The total Budget Scenario 7 annual emissions reductions (after taking into account current regulations) are estimated at over 780 tpy (2.1 tpd[11]) DPM and over 6,200 tpy (17.1 tpd) NOx from port-related HDVs at a cost of just over $1.7 billion dollars. This scenario was selected for example because of its equal mix of cleaner diesel, retrofit, and alternative fuels. Changing to any of the other scenarios, changes the costs and the estimated emissions reductions by fiscal year and total emissions reductions. It should be noted that this budget estimate does not include a minimum of $15 million for the Technology Advancement Program funded through the Ports, SCAQMD, and other regulatory agencies.

The details of Budget Scenario 7 are presented in the following tables. Details on all scenarios are provided in Appendix A.

[11] tpd- ton per day; tpd = tons per year / 365 days per year

Table 5.2: Budget Scenario 7 Truck Replacements & Retrofits Assumptions

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
3,500	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,500	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
1,811	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
1,811	Semi-Freq Caller Trucks CD Replaced		LNOxC - Lean NOx Catalyst	
10,622	**Total Trucks Replaced**			

Table 5.3: Budget Scenario 7 Cleaner Diesel Replacements/Retrofits Details

SBP-HDV1	HDV Incentives (Cleaner Diesel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
		$22,000,000	$229,800,000	$213,500,000	$169,200,000	$169,200,000	$803,700,000
CD Option 1 - Clean Diesel Trucks MY2007+							
50%	**CD Funding**	$129,500	/truck ($126k O/Op, $1.3k AVL, $2.2k admin)				
	Number of total trucks/year	**85**	**1,306**	**1,306**	**1,306**	**1,306**	**5,311**
	Baseline DPM in tpy	6	92	178	264	350	**888**
	Total DPM Emis Red tpy	5	90	174	259	344	**873**
	Baseline NOx in tpy	54	884	1,714	2,544	3,373	**8,568**
	Total NOx Emis Red tpy	37	613	1,188	1,969	2,750	**6,557**
50%	**CD Funding**	$19,500	/truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)				
	# of LNOxC + Chip Units/year	**564**	**2,274**	**2,274**	**0**	**0**	**5,112**
	Baseline DPM in tpy	11	53	96	96	96	**352**
	Total DPM Emis Red tpy	9	45	82	82	82	**299**
	Baseline NOx in tpy	178	895	1,612	1,612	1,612	**5,908**
	Total NOx Emis Red tpy	78	392	705	705	705	**2,585**
	# of LNOxC	**0**	**844**	**0**	**0**	**0**	**844**
	Total DPM Emis Red tpy	0	7	7	7	7	**30**
	Total NOx Emis Red tpy	0	45	45	45	45	**182**

Table 5.4: Budget Scenario 7 Alternative Fuel Replacements Details

SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
		$22,000,000	$244,800,000	$244,800,000	$244,800,000	$244,800,000	$1,001,200,000
	Number of total trucks/year	**117**	**1,299**	**1,299**	**1,299**	**1,299**	**5,311**
	Baseline DPM in tpy	7.7	93.2	178.7	264.3	349.8	**894**
	Total DPM Emis Red tpy	7.7	93.2	178.7	264.3	349.8	**894**
	Baseline NOx in tpy	74	899	1724	2549	3373	**8,619**
	Total NOx Emis Red tpy	52	721	1390	2059	2728	**6,949**

Note: $2,200 admin charge is based on current Gateway Cities estimates, which includes all administrative costs associated with truck replacements, outreach efforts with truck drivers and dealers, and other associated accounting costs. This cost is expected to be less per unit in this larger program and any remaining funds in each fiscal year will be moved back into the purchase/retrofit program. In addition, upon Legal resolution between CARB and Engine Manufactures Association, if there turns out there will be a cost associated with a chip reflashing (estimated to be approximately $200/truck), it is anticipated that the administrative costs may cover the additional funds required for the semi-frequent caller trucks receiving retrofits and chip reflash (as presented in Table 5.2).

For the alternative fuel replacement trucks, the Ports and SCAQMD would initiate a demonstration or pilot project in the first fiscal year of over 115 LNG trucks to evaluate and demonstrate their use as a long-term replacement of diesel trucks. The demonstration would be focused on frequent caller trucks from both fleets and owner/operators. In addition, under SPBP-HDV2, the Ports would develop alternative fuel station infrastructure in or near the Ports necessary to make sure LNG fuel is available. During the second year (FY 2007/2008) of this program, fleet-owned trucks would be primarily sought as replacement candidates with LNG. From the third year of this program forward (FY 2008/2009 and later), interested independent owner-operators of trucks will also be sought through an RFP process to replace their older trucks with LNG powered trucks. Within this group, the Ports will first target the captive trucks that travel mainly near the ports, so that they have convenient alternative fuel infrastructure available to them (as discussed in SPBP-HDV2).

Three of the significant hurdles to be overcome in implementing this path of the program are the acceptability of alternatively fueled trucks by operators in terms of drivability, maintenance, and availability of fuel. For these reasons, trucks belonging to medium to large captive fleets will be especially important, although the focus will not be restricted to just fleets. As proposed, participating fleets will be able to provide drivers of LNG trucks a replacement vehicle in the event that their LNG truck requires maintenance in order to avoid delays due to a lack of repair facilities. Another challenge facing alternative fuels is that for the same amount of funding, generally one can "buy" more reductions of DPM with conventional fuels than with the costs associated with alternative fuels and their required infrastructure. The San Pedro Bay Ports, however, are moving forward with the short-term goal of significant emission reductions from control or replacement of diesel engines while laying the foundation to transition to even cleaner engines and methods to move cargo.

Annual tracking of truck activity would be done through OCR records or RFID tag records. Trucks that fall into the frequent or semi-frequent caller category would be identified and then targeted for truck replacement or installation of DPFs that also reduce NOx as well as chip re-flashing.

There are seven fundamental elements of this control measure:

1. Based on the OCR data being collected for the 2005 EI update (which is currently ongoing), the Ports will identify the oldest, highest emitting trucks that make frequent visits to their terminals. Once identified, the Ports will direct their resources toward replacing those trucks with lower emitting ones. The Ports will also identify the trucks owned by fleets and independent owner operators that visit the Ports. In addition, the Ports will evaluate the OCR data to develop clean visit frequency standards for the terminals, and negotiate the standards through lease terms.

2. The current Gateway Cities truck modernization program will be refocused (or a new program developed) to allow only the purchase of new cleaner diesel and alternative fueled trucks, as well as retrofits that meet the proposed frequent and semi-frequent standards proposed.

3. The Ports need to focus efforts to inform the public of the importance of bond funding to the emissions associated with port-related trucks and the necessity for the bond initiative to be approved by the voters.

4. The Ports will evaluate, pursue, and develop alternative options for funding the shortfall between the currently available funds and the total costs for the truck modernization and retrofit programs, if the bond funding is not available.

5. The Ports will build a fueling station on or near Port property (possibly on Terminal Island) for alternative fuel trucks, and ensure that LNG/CNG repair and maintenance facilities are readily available either through fleet operators or at the refueling locations. Details of this element of the program are discussed under measure SPBP-HDV2.

6. The Ports will work with SCAQMD, CARB, EPA Region 9, and industry to evaluate and demonstrate new engine technologies for the movement of containers such as electric, hybrid, fuel cell, and other clean modes of transportation for use in the SoCAB. This effort will be part of the Technology Advancement Program (Section 5.8).

7. The overall HDV program will be reevaluated on an annual basis to ensure that both short- and long-term goals are being met or exceeded. In addition, successfully demonstrated new technologies identified through the Technology Advancement Program will be assessed for integration into the program.

8. Develop mechanisms that maximize the use of "clean" trucks at San Pedro Bay Ports.

Implementation Plan

SPBP-HDV-1 represents the most far reaching and perhaps the most challenging measure in the Clean Air Action Plan. Staff from both Ports have met numerous times to discuss and evaluate the various options available to implement this broad and far-reaching measure. Implementation options discussed and evaluated include:

- Emblem Program
- Incentives/Impact Fees
- Franchise Approach
  - Global (Tariff-Based)
  - Terminal (Lease-Based)
- Joint Powers Authority Trucking Entity (Nonprofit)

- Port-Owned Leasing Company
- Employee Drivers

- Ports Buy Trucks w/City Employed Drivers

Following a meeting of members of the Boards of Harbor Commissioners and senior management, staff from both Ports evaluated not only the deployment of clean diesel and alternatively-fueled heavy-duty trucks, consistent with the draft Clean Air Action Plan, but also considered the issues associated with "wages/quality of life" for individuals serving the Ports through trucking. With this direction, each of the implementation options (list above) was evaluated as to meeting Clean Air Action Plan emissions reductions and addressing "wages/quality of life" issues associated with the drivers. Through an evaluation process of the above implementation options, staff from both Ports agreed that the most promising strategies were a combination of an emblem program and an incentive program with an impact fee component. Further details on these two strategies are provided below.

Emblem Program

The Ports could implement a program that would require all trucks calling at Port terminals to have a valid emblem, and could compel those trucks to meet certain standards. Each emblem would be uniquely numbered, would include truck information such as model year and miles, would allow for verification of frequency of calls, and what terminals are visited. Radio frequency identification devices (similar to what is being used for PierPass) or other technologies would be incorporated into the emblem. The emissions requirements for trucks to receive emblems would be ratcheted tighter such that the goals of the Clean Air Action Plan and truck fleet turnover and retrofit would be met. All trucks meeting the standards would be eligible for the emblem. This program would alleviate the concern of older, "dirty" trucks entering the port-service as the current fleet of trucks is cleaned up. Another option would be to have the emblem program integrated into existing industry programs such as PierPass or have a third party operate and support the program. An emblem program would need to be coupled with port and incentive funding to ensure that truckers get the trucks they need at a price they can afford.

Incentives/Impact Fees

In order to fund the potential shortfall for the truck fleet turnover and retrofit programs, one option that could be implemented is an impact fee at the gate charged for the use of "dirty" trucks. The fee would be charged as close to the BCOs as possible (which could include the licensed motor carrier), similar to PierPass, who ship goods with trucks that don't meet the Clean Air Action Plan standards. Incentives for "clean" trucks or impact fees for "dirty" trucks could encourage BCOs and licensed motor carriers to ship with cleaner trucks. Funding generated through an impact fee would be used to offset the costs associated with

the replacement and retrofit of trucks. "Clean" trucks meeting the Clean Air Action Plan standard would bypass the impact fee and BCOs shipping via "dirty" trucks would be charged an impact fee that would escalate for older trucks not meeting that year's standard. The Ports or a third party would then use the funds generated from the program to provide trucks at greater discount and terms then truckers or small firms could get on their own through fleet purchases and favorable loan rates. Initial funding for setup and administration would be provided by the Ports but the fee would generate the necessary funding for the program within the first year. It's important to note that all fees would be charged to the BCOs (or potentially to the licensed motor carrier) so that those buying the goods are assessed the true costs of bringing products to market. This program has the potential to be coupled with the emblem program. Matching the two programs could provide a mechanism for easily assessing the trucks calling at the gates, establish a revenue stream for funding the truck fleet replacement and retrofit, and could create the final push necessary to get all "dirty" trucks off the road.

Franchise Approach

This approach would provide companies with exclusive rights on port properties in return for meeting or exceeding the "clean" truck definitions provided in the Clean Air Action Plan. Franchises would be offered to established trucking companies that can document that their drivers are paid a "prevailing wage" and could be issued either exclusive rights for a particular terminal or broader access rights across both ports. The Ports would go through an RFP process to select franchisees.

Joint Powers Authority Trucking Entity (Nonprofit)

Under this scenario, the Ports would require "clean" trucks in accordance with the Clean Air Action Plan (through an emblem or other program), would form a Joint Powers Authority (JPA) trucking entity which would provide "clean" trucks and pay drivers "prevailing wage," and then compete against existing companies and independents in the marketplace. This entity would either need to be subsidized by the Ports or other mechanisms would need to be put in place so that the entity could compete on a per unit cost basis within the market. The truck drivers would be employees of the trucking entity and the entity would own and maintain a fleet of "clean trucks." It is estimated that subsidies for wages and benefits of drivers could reach over $900 million/year. In addition to this subsidy, the costs associated with the replacement and retrofit of trucks plus the costs of administering the program would need to be added on an annual basis.

Ports Buy Trucks w/City Drivers

Under this implementation option, the Ports would mandate through tariff changes that only City of Los Angeles and City of Long Beach drivers and trucks are allowed on port properties. The cities would buy the trucks and higher the drivers as city employees. This would insure "prevailing wages" for the drivers and would force out all existing operators and companies. Drivers displaced would be encouraged to apply for city positions. There are significant issues and costs associated with this approach.

Each of these implementation options have numerous aspects associated with them that need to be worked out within the first year of the Clean Air Action Plan, and then ramped significantly to meet the goals of the control measure.

The staff of both Ports recommends that that an emblem program in conjunction with an incentive program with an impact fee component be established and launched such that it meets the objectives of the Clean Air Action Plan. In addition, the emblem program could be expanded in phases to include key areas such as "wages/quality of life" issues and security. There are several action items that will need to be completed in the first year in order for the successful implementation of the combined program:

1) Develop program details and an implementation plan for Executive Directors review by end of 1st quarter 2007.
2) Develop an RFP for the purchase and pilot test of 120 alternative fueled trucks. This initial purchase will be for frequent caller trucks and funded through the Ports to start the program. In subsequent years other funding sources, such as state bond or a gate fee for "dirty" trucks, may be used to fund the truck modernization. The alternative fueled pilot project will be coordinated with SCAQMD.
3) Develop an RFP for a third entity to administer of the emblem and cargo fee programs. This will include the establishment of operating locations where truck drivers go through the facilitated application process, get registered, and receive their emblem. In addition, emblem reading devices will need to be purchased and installed at all terminal gates (entrance and exit).
4) Establish a program to provide incentive funding for purchase and retrofit of trucks consistent with the goals laid out in the Clean Air Action Plan. This plan will include an impact fee component to cover any short falls in funding.
5) Monitoring, tracking, and reporting requirements and the appropriate systems will need to be identified and implemented.

Air Quality Benefits

For this measure, the estimated reductions in DPM, NOx, and SOx, presented in Table 5.5, include on-terminal, from the terminal to the first drop, and from the last pick back to the Ports. Emission reductions in Table 5.5 do not include emissions reductions that will

occur from driving between first drop and last pickup, which will be a substantial benefit to the SoCAB.

Table 5.5: Estimated Emissions Reductions for SPBP-HDV1 by Fiscal Year

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	22	236	442	612	782	2,095
Total NOx Reduction (tpy)	167	1,771	3,329	4,778	6,228	16,273
Total SOx Reduction (tpy)	0.1	0.7	1.3	1.9	2.5	6

Detailed information for all budget scenarios evaluated is provided in Appendix A.

Financial Costs

The financial costs associated with the 12 budget scenarios evaluated assume the following general funding streams from Ports, regulatory agencies, and bond funding.

- Budget Scenarios 1 through 5:
  - ✓ Each Port would contribute at least $16 million per year (w/$1 million from each Port in the first fiscal year going to SPBP-HDV2)
  - ✓ SCAQMD's commitment to fund $12 million in the first fiscal year and then at least $6 million per year for the next four years

- Budget Scenarios 6 through 8 (detailed budget assumptions provided in Table 5.6):
  - ✓ Each Port would contribute at least $16 million per year (w/an additional $1 million from each Port in the first two fiscal years going to SPBP-HDV2)
  - ✓ SCAQMD's commitment to fund $12 million in the first fiscal year and then at least $6 million per year for the next four years
  - ✓ Bond/CMAQ[12]/other funding ranging from a total $745 million to $1.7 billion starting the second fiscal year through the end of the fifth

[12] Congestion Mitigation and Air Quality Funding (CMAQ) Improvement Program, funded and administered by the Federal Highway Administration; http://www.fhwa.dot.gov/environment/cmaqpgs/

- Budget Scenarios 9 through 11
  - ✓ Each Port would contribute at least $16 million per year (w/an additional $1 million from each Port in the first two fiscal years going to SPBP-HDV2)
  - ✓ SCAQMD's commitment to fund $12 million in the first fiscal year and then at least $6 million per year for the next four years
  - ✓ Bond/CMAQ/other funding held at a total of $800 million starting the second fiscal year through the end of the fifth

- Budget Scenario 12
  - ✓ Each Port would contribute at least $16 million per year (w/an additional $1 million from each Port in the first two fiscal years going to SPBP-HDV2)
  - ✓ SCAQMD's commitment to fund $12 million in the first fiscal year and then at least $6 million per year for the next four years
  - ✓ Bond/Congestion Mitigation Air Quality funding through the Federal Highways Administration/other funding held at a total of $2.7 billion starting the second fiscal year through the end of the fifth

The specific funding details of Budget Scenario 7 are presented in Table 5.6.

Table 5.6: Costs for SPBP-HDV1 Scenario #7, by Port, by Path, by Fiscal Year

SPBP-HDV1	HDV Incentives	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
	Clean Diesel - POLA	$8,000,000	$8,000,000	$9,000,000	$9,000,000	$9,000,000	**$43,000,000**
	Clean Diesel - POLB	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**
	Clean Diesel - Bond/Other Funding	$0	$213,800,000	$196,500,000	$152,200,000	$152,200,000	**$714,700,000**
		$22,000,000	**$229,800,000**	**$213,500,000**	**$169,200,000**	**$169,200,000**	**$803,700,000**
	HDV Incentives						
	LNG - POLA	$8,000,000	$8,000,000	$9,000,000	$9,000,000	$9,000,000	**$43,000,000**
	LNG - POLB	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**
	LNG - Bond/Other Funding	$0	$222,800,000	$221,800,000	$221,800,000	$221,800,000	**$888,200,000**
		$22,000,000	**$244,800,000**	**$244,800,000**	**$244,800,000**	**$244,800,000**	**$1,001,200,000**
	Measures FY Totals	**$44,000,000**	**$474,600,000**	**$458,300,000**	**$414,000,000**	**$414,000,000**	**$1,804,900,000**

The numbers and types of truck replacements and retrofits were provided earlier in Table 5.2 through 5.4. Additional detailed information on the cost estimates is provided in Appendix A.

Beyond the cost of truck or retrofit incentives, additional funding will be needed for administrative costs associated with operating the program, public outreach, tracking, monitoring, and reporting. There are also costs that are not covered by the current incentive program that would be borne by participating truckers. These costs include income taxes due on the subsidy portion of the new truck's purchase price, and increased insurance rates charged for newer, more valuable trucks. These costs have posed problems in the past as they have priced some truckers out of participation. Mechanisms will be

evaluated and included in the program to cover some or all of these costs for low-income truckers that would otherwise be willing to participate in the program. In addition, the Ports will explore legislative options to exempt port drayage truckers from these tax obligations.

The SCAQMD has set aside $6 million for the San Pedro Bay Ports this year to facilitate the conversion of diesel-powered trucks to the use of LNG. An additional $6 million has been set aside for emissions reductions at the Ports. These monies will be used to co-fund the program. In addition, both Ports will evaluate other grant opportunities that could be used to supplement and expand the program.

It is also important to note that substantial financial incentives for the purchase of alternatively fueled vehicles and equipment have been included in the nation's energy policy. Tax credits of up to 40% of the differential cost of alternatively fueled equipment are available to the purchaser or vendor as well as a 30-cent per gallon fuel tax credit.

Milestones

In order to implement the SPBP-HDV1, the staff from both Ports will undertake the following activities:

1. Develop further program details (including the emblem program, incentives program with an impact fee component such that any short falls in funding are covered, management and oversight of the program, etc.) and an implementation plan for Executive Directors review. This plan will cover the details that will be needed to start the 2007 program and begin to ramp up to the ambitious fleet turnover and retrofit number proposed in the Clean Air Action Plan.

   Schedule: SPBP-HDV1 Implementation plan approved by end of 1st quarter 2007[13].

2. Based on the completed 2005 license plate data, staff will evaluate the number of unique trucks servicing both Ports, evaluate the model years of trucks versus visit frequency, and determine the number of frequent and semi-frequent caller trucks. In addition, the Ports will develop the monitoring, recording keeping, and reporting requirements that will be needed to track the measure's performance and implementation.

   Schedule: End of 1st quarter 2007.

[13] It should be noted that milestone dates are based on calendar years not fiscal years.

3. Develop an RFP for the demonstration of 120 model year 2007 alternative fueled trucks. These initial purchases will be for frequent caller trucks and funded through the Ports to start the program.

   Schedule: 1st quarter 2007.

4. Staff will continue to identify other potential funding sources such as grant programs at the federal, state, and local levels, as well as market-based incentive opportunities. The findings will be included in a fact sheet that will be updated as new funding sources are identified.

   Schedule: 1st quarter 2007 and updated quarterly as needed.

5. Staff will meet with CARB and SCAQMD to discuss the use of tariff as primary or supplemental implementation strategy. A goal of the meetings would be to avoid any conflict between the Ports' measure and any of the agency regulations.

   Schedule: Complete legal analyses of proposed tariffs by 2nd quarter 2007, and bring any appropriate tariff forward for adoption by 3rd quarter 2007. Tariff language would need to be approved by City Attorney, the Ports' Executive Directors, and the Ports' Boards of Harbor Commissioners.

6. The benefits of this program will be quantified and reflected in the annual updates to the Port's HDV emissions inventories.

   Schedule: Annually

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-HDV1 Performance Standards for On road Heavy-Duty Vehicles	Environmental (both Ports)	Number of trucks/retrofits purchased Participants Costs associated with the program Purchased truck activity Location of activity Number of visits to ports Replaced truck specifications AVL data Advertising/outreach mechanisms Any applicant/participant issues needing attention to improve participation in the program	Quarterly

5.1.2 Control Measure Number SPBP-HDV2

Measure Title: ***Alternative Fuel Infrastructure for Heavy-Duty Natural Gas Vehicles***

In support of the significant investment in SPBP-HDV1 for alternative fueled trucks, this measure provides for the development of a refueling and central maintenance facility, jointly owned by both Ports, and located on Terminal Island.

Initiation Year:	*FY2006/2007*
Implementation Schedule:	*FY2006/2007 through FY 2007/2008 (see Table 5.7)*
Tonnage Reduced:	*Not applicable; supports reductions in SPBP-HDV1*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Incentives

Measure Description

Next to the differential in purchase and maintenance costs, the decision to convert from traditionally diesel-powered trucks to a cleaner alternative like CNG or LNG hinges upon the existence of available fueling infrastructure. Engine manufacturers may limit production of natural gas powered trucks if the fueling infrastructure is not in place and energy companies may limit the establishment of CNG or LNG fueling infrastructure if sufficient demand is lacking. The objective of this measure is to alleviate some of these constraints by the Ports jointly building an alternative fuel station and centralized maintenance facility on Terminal Island. Both Ports would work together with SCAQMD and CARB to utilize the agency's expertise on alternative fuel vehicles and infrastructure requirements. To maximize the utilization of the fueling station it will be available for public use. Site and station design, operation and fuel supply for the facility would be contracted through a RFP process.

Implementation Plan

There are three key elements associated with the implementation of this control measure:

1. Final selection of the Terminal Island location that will be co-owned by both Ports. Both Ports will share in the costs associated with the land and the building/operation of the station and maintenance facility.

2. Release RFPs for the design, construction, supply, and operation of the appropriately sized station and maintenance facility.

3. Develop and implement an outreach program to publicize operating hours, location, services provided, and other pertinent information related to the fueling station to encourage its use.

Air Quality Benefits

There are no emission reductions directly related to the performance of this control measure; however this measure is critical to the successful implementation of SPBP-HDV1, which itself results in significant emission reductions.

Financial Costs

The financial cost to both Ports is presented in Table 5.7 below.

Table 5.7: Costs for SPBP-HDV2 by Port by Fiscal Year

SBP-HDV2	Alternate Fuel Infrastructure	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
	POLA	$1,000,000	$1,000,000	$0	$0	$0	**$2,000,000**
	POLB	$1,000,000	$1,000,000	$0	$0	$0	**$2,000,000**
	SCAQMD	tbd	tbd	$0	$0	$0	**$0**
	Bond Funding	$0	$0	$0	$0	$0	**$0**
	Measure FY Totals	**$2,000,000**	**$2,000,000**	**$0**	**$0**	**$0**	**$4,000,000**

Milestones

1. Staff will develop specifications and RFP for the construction of the facilities, operation/fuel supply for/of fueling station, and management/operation of the maintenance facility. The RFPs will be coordinated with each Port's Executive Director.

   Schedule: End of 1st quarter 2007.

2. The Ports will select design firm from the RFP process.

   Schedule: 2nd quarter 2007.

3. The Ports will enter a construction bid process to select a construction firm.

   Schedule: To be determined (TBD); based on final approval date of the design.

4. Complete construction of facility.

   Schedule: TBD

5. Fueling station and maintenance facility will be completed and operational.

   Schedule: TBD

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-HDV2 Alternative Fuel Infrastructure for Heavy-Duty Diesel Vehicles	Environmental/ Engineering (both Ports)	Fueling station Construction contracts Fueling station supply contracts Number of fueling pumps online Fuel throughput by station Amount of infrastructure funding Amount of fuel purchased Location of central maintenance facility Contract for construction Amount of construction funding Contract for operation Amount of operational Funding Central maintenance facility online Activity of facility Fuel Supplied Number of trucks using the facility	Quarterly

5.2 Ocean-Going Vessels Control Measures

OGVs represent the second major source category where emissions reduction efforts are focused in the San Pedro Bay Ports Clean Air Action Plan. This is because of their significant contribution of emissions and their proximity and health risk impact to surrounding communities while at berth. This source category is addressed through a combination of measures that include operational controls, shore-power, cleaner fuels, and a research and development initiative to help identify and demonstrate new technologies to reduce at berth emissions. This final component will be implemented through the Technology Advancement Program.

As stated in Section 4.1, control measures SPBP-OGV1, OGV3, and OGV4 will be evaluated to determine solutions to various logistical issues to ensure effective measure implementation. These issues include: updating the existing radar range capabilities to 40 nm, working with the Marine Exchange and the USCG to resolve issues associated with vessels outside the Coast Guard's administrative area, work with the Marine Exchange to track additional fuel compliance data elements for monitoring and reporting, determine effects of changing VSR zone on areas inside California waters, but beyond 40 nm from Point Fermin, work to get work gang assignments moved to 40 nm, and to evaluate fuel availability and ship tankage availability associated with operating on cleaner fuels. The evaluations and upgrades to the radar system will be completed before the end of 2007.

5.2.1 Control Measure Number SPBP-OGV1
Measure Title: *OGV Vessel Speed Reduction (VSR)*

This measure sets an OGV Transit Standard that 100% of OGVs will comply with the VSR program 20 nm from Point Fermin and expansion to 40 nm from Point Fermin.

Initiation Year:	*2001 (2008 for 40 nm)*
Implementation Schedule:	*Throughout five year period (see Table 5.8)*
Tonnage Reduced:	*Increasing throughout five year period (see Table 5.8)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Lease Requirements & Tariff Reduction Incentives

Measure Description
The objective of the VSR program is to reduce NOx emissions from OGVs by slowing their speeds as they approach or depart the Port. NOx emissions are directly correlated to the engine load and, generally speaking, load and NOx emissions decrease as engine load/vessel speed decreases. A voluntary VSR program currently exists under which vessels slow to 12 knots when they are within 20 nm of Point Fermin. This measure establishes a wider VSR zone with an over-water boundary of 40 nm from Point Fermin.

Since its establishment in 2001, the compliance rate of the VSR program has steadily increased. Overall compliance in 2004 was up to 50%, increasing to 67% in 2005. Overall compliance further increased to 77% for the first eight months of 2006. This increase can be at least partially credited to the practice of assignment of gangs at the 20-mile boundary, reducing the incentive for ships to move quickly through the speed reduction zone.

The Port of Long Beach's VSR dockage incentive program has increased VSR compliance to 87% by August 2006 with a short-term goal to move compliance to 90% of calls by late 2006 (100% of all calls to be compliant by mid 2007). The incentive program has committed funding through FY2006/2007 at a maximum of $2.2 million dollars. The Port of Los Angeles is evaluating a similar program.

Parallel to this voluntary strategy, lease requirements will be established and include compliance rates with the VSR program. The Ports will also evaluate the potential of incorporating a requirement to participate in the VSR program as part of the tariff. Both the lease requirements and tariff strategies would be enforceable measures.

Shipping lines that can demonstrate alternative compliance plans (using controls surplus to the Clean Air Action Plan) that meet or exceed the emissions reductions from VSR at 12 knots will be able to petition to the Ports for changes for specified vessels. The alternative

compliance plans will be reviewed by original MOU signees (Ports, regulatory agencies, and PMSA) for validation and written recommendations from reviewers will be presented to the applicable Executive Director for action.

As stated in Section 5.2 above, there are several technical and logistical issues that need to be resolved prior to the expansion of the program to 40 nm. It is recommend that the radar installation improvements be conducted not only for VSR compliance, but to also provide actual ship speeds through the heavily dominant northern route which will ensure accuracy in estimating emissions through the inventory process.

There are seven key elements to this control measure:

1. The Ports will work with the Marine Exchange and the USCG to resolve issues associated with vessels outside the Coast Guard's administrative area.

2. Renew and revise the MOU between the Ports of Los Angeles and Long Beach, the Marine Exchange, and other affected parties, to procure and install hardware and software needed to track vessel speeds out to 40 nm.

3. The Ports will increase emissions reduction benefits over and above the current program by extending the VSR zone to 40nm after the above issues are resolved.

4. Work with the lines to move work gang assignments out to 40 nm from Point Fermin. This will be an essential step in ensuring that vessels complying with the measure are not "beat" to the line by a non-complying vessel.

5. Evaluate effects of changing the VSR zone on areas inside California waters, but not beyond 40 nm from Point Fermin.

6. Assure compliance with the VSR program through tariff reduction incentives and included in lease requirements for renewed lease agreements as well as encouraging the continued/increased voluntary participation of those whose leases are not up for review.

7. Conduct source testing to verify the effect of the VSR program on DPM and NOx emissions under the Technology Advancement Program. The resulting information will be incorporated into this measure in future annual updates.

Implementation Approach

Staff of both Ports will confer with representatives of the Marine Exchange, and the USCG to discuss how best to upgrade the existing radar system in order to track and report the speed of vessels in the expanded VSR zone. This cost would ultimately be shared by both San Pedro Bay Ports through an MOU with the appropriate entities.

As new leases are negotiated or existing leases come up for renewal, compliance with the VSR program will be a stated condition during negotiations. If compliance does not reach 90% or above by the end of 2007, the Ports will begin the evaluation process of a tariff that would make compliance compulsory.

Slowing down OGV main engines may result in the reduction of pollutants other than NOx. Recent testing by CARB on one ship showed that there could be significant DPM and SOx reductions as well. Further testing will be performed to verify and quantify the benefits from the speed reduction measure. Testing for this purpose would be conducted under SPBP-OGV5.

Air Quality Benefits

The estimated reductions in DPM, NOx, and SOx associated with this measure are presented in the following table. At this time, preliminary data from CARB testing indicates that there is a potentially significant reduction in DPM and SOx emissions resulting from this measure, therefore as part of the Technology Advancement Program emissions testing will be conducted to better understand the impacts of VSR on these pollutants. No credit at this time is accounted for in the emissions reductions section of the Clean Air Action Plan but in future annual updates information gained from the testing will be incorporated.

Table 5.8: Estimated Emissions Reductions for SPBP-OGV1 by Fiscal Year

	FY 2006/2007 (tpy)	FY 2007/2008 (tpy)	FY 2008/2009 (tpy)	FY 2009/2010 (tpy)	FY 2010/2011 (tpy)	Total (tons)
VSR participation (20 nm)						
DPM Reduction	0	0	0	0	0	**0**
NOx Reduction	1,720	1,721	1,721	1,721	1,721	**8,603**
SOx Reduction	0	0	0	0	0	**0**
Expanded VSR (40 nm) participation Lease Based						
DPM Reduction	0	0	0	0	0	**0**
NOx Reduction	0	860	1,721	1,721	1,721	**6,022**
SOx Reduction	0	0	0	0	0	**0**
Total SPBP-OGV1 Emission Reductions[1]						
Total DPM Reductions	**0**	**0**	**0**	**0**	**0**	**0**
Total NOx Reductions	**1,720**	**2,581**	**3,441**	**3,441**	**3,441**	**14,625**
TotalSOx Reductions	**0**	**0**	**0**	**0**	**0**	**0**

[1] Reductions are taken after ARB's adopted Auxiliary Engine regulation is implemented

Technical note on calculation of the air quality benefit

The 2001 Port-wide Baseline Air Emissions Inventory for the Port of Los Angeles calculated pre-VSR ocean-going vessels transit emissions in the fairway zone (outside of the precautionary zone) using the assumption that 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 data set of vessel arrival and departure speeds for vessels visiting the Ports of Los Angeles and Long Beach in the two months immediately preceding initiation of the VSR program in May of 2001. These average pre-VSR speeds are generally lower than Lloyd's cruise or service speeds.

During the preparation of the EI, it was thought that the two-month data set might not adequately reflect pre-VSR conditions, so faster cruise or service speeds from Lloyd's were used to model transiting emissions. The use of the EI methodology results in higher pre-VSR baseline transiting emissions in the fairway zone.

From May 2001 to present, the VSR program emission reductions are calculated assuming and incorporating the two-month data set of actual pre-VSR speeds (broken down by vessel class) to represent the pre-VSR transiting conditions. For calculation purposes, the methodology assigns 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 is calculated between the average pre-VSR baseline speed (by vessel class) and the actual speed recorded by the Marine Exchange radar.

The result is that the VSR emission reductions presented above are significantly higher than what has been reported for the VSR in the past. However, it is important to note that these elevated reductions are most likely not indicative of the actual reductions under the VSR control measure. The actual reductions are presumed to be somewhat lower than the estimates presented above but greater than the estimates reported to date under the VSR program. This issue will be further addressed and refined in the 2005 update to the inventories for both Ports. In addition, a mechanism will be developed for including the reductions achieved by vessels that reduce their speed to something greater than 12 knots, but less than the speed they would travel in unconstrained circumstances (i.e., "partial compliance").

It is also important to note that a reduction in vessel speed may necessitate an increase in auxiliary engine use due to longer transit times. This increase will be mitigated due to the requirements of CARB's auxiliary engine rule. These offsetting emissions, and the impact of CARB's regulation have been accounted for and have been reflected in the emissions benefit calculations.

Financial Costs

The projected funding costs for the measure include port incentive funding for the needed upgrades to the Marine Exchange radar system, administrative costs associated with the control measure, and the incentive funding offered by the Port of Long Beach.

Table 5.9: Costs for SPBP-OGV1 by Port by Fiscal Year

SPBP-OGV1	Vessel Speed Reduction	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
	POLA	$2,550,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	**$11,350,000**
	POLB	$2,550,000	$2,200,000	$2,200,000	$2,200,000	$2,200,000	**$11,350,000**
	SCAQMD	$0	$0	$0	$0	$0	**$0**
	ARB	$0	$0	$0	$0	$0	**$0**
	Measure FY Totals	**$5,100,000**	**$4,400,000**	**$4,400,000**	**$4,400,000**	**$4,400,000**	**$22,700,000**

Milestones

1. Staff from both Ports will meet and confer with the Marine Exchange, the EPA Region 9, CARB, SCAQMD and PMSA to revise and renew the VSR Memorandum of Understanding (unless replaced or superseded by regulation).

   Schedule: Meetings will begin 1st quarter 2007 and be concluded by end of 2nd quarter 2007. MOU signed in the 3rd or 4th quarter 2007.

2. As leases are opened through the EIR process or for renegotiation, or as new leases are negotiated, the Ports will include provisions for compliance with the VSR program.

   Schedule: As leases are opened.

3. Staff from both Ports will concurrently meet with the Marine Exchange and the USCG to draft a procurement plan for the purchase of hardware and software necessary to track vessel speeds out to 40 nm from Point Fermin and to address Coast Guard's administrative area issues.

   Schedule: Meetings will begin 1st quarter 2007 and be concluded by end of 2nd quarter 2007.

4. Renew and revise the MOU between the Ports of Los Angeles and Long Beach, the Marine Exchange, the USCG, and other affected parties to update equipment and software. Procure and install hardware and software needed to track vessel speeds out to 40nm or the result of item 1 above.

   Schedule: Completed 4th quarter 2007.

5. Move gang work assignments to 40 nm from Point Fermin.

   Schedule: Completed 4th quarter 2007.

6. Staff will prepare a presentation and/or fact sheet outlining the air quality benefits of the VSR program and the changes to the VSR zone and new lease requirements as proposed in this measure for distribution to customers, community members and other interested parties.

   Schedule: By end of 4th quarter 2007.

7. Expanded VSR program fully operational.

   Schedule: 1st quarter 2008.

8. If compliance is not above 95% by end of 2007, complete legal review if appropriate and draft tariff language for the VSR program, making the program compulsory.

   Schedule: If compliance is not 95% by end of 2007, complete legal analysis of proposed tariff within 3 months (starting in 2007) and bring any appropriate tariff forward for adoption within 3 months after completed analyses. Tariff language would need to be approved by City Attorney, the Ports' Executive Directors, and the Ports' Boards of Harbor Commissioners.

9. The benefits of the VSR program will be quantified and reflected in the periodic updates to the Port's emissions inventories and reported annually to the Executive Director and the Board of Harbor Commissioners for each Port.

   Schedule: Ongoing.

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-OGV1 OGV Vessel Speed Reduction (VSR)	Environmental (both Ports)	Ship participation Marine exchange data Purchase of radar upgrade equipment & software Installation of radar upgrades & software Operation of upgraded radar & software	Monthly

5.2.2 Control Measure Number SPBP-OGV2
Measure Title: *Reduction of At-Berth OGV Emissions*

The use of shore-power for reducing hotelling emissions implemented at all major container and cruise terminals at the Port of Los Angeles within five years and all container terminals and one crude terminal at the Port of Long Beach within five to ten years. Through the Technology Advancement Program demonstration and application of alternative emissions reduction technologies for non-shore-power ships.

Initiation Year:	*2004*
Implementation Schedule:	*Increasing Throughout five year period (see Table 5.10- 5.14)*
Tonnage Reduced:	*Increasing throughout five year period (see Table 5.15)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Lease Requirements, Incentives, Tariff Changes, & Capital Funding

Measure Description
This measure focuses on reducing dwelling (hotelling) emissions from OGVs while at berth. The measure focuses on two primary approaches for reducing at-berth emissions: (1) shore-power (transferring the electrical generation needs for OGVs while at berth from onboard diesel-electric generators to the cleaner shore-side power grid, which generates power through regulated/controlled stationary sources) and (2) hotelling emissions reduction requirements through alternative technologies, for ships that do not fit the shore-power model. The shore-power approach is generally best suited for vessels that make multiple calls per year, require a significant demand while at berth (function of dwelling load and time at berth), and vessels that will continue to call at the same terminal for multiple years. The most common ship types that are good candidates for shore-power are large string-service containerships, cruise ships, reefer ships, and specially designed crude tankers that have diesel-electric powered pumps. Shore-power requires extensive infrastructure improvements onboard vessels that would use the system, as well as on the terminal side for supplying the appropriate level of conditioned electrical power supply. The onboard infrastructure costs are dependant on the candidate vessel's current configuration, conduit space, and electrical panel space.

Alternative hotelling emissions reduction technologies will be applied to vessels that do not fit the shore-power model and include:

- Exhaust gas scrubbing technologies that capture vessel stack emissions while at berth and "scrubs" exhaust streams either on-shore or on a barge.

- Shore-powered dockside electrical pumps for tankers, which reduce onboard pumping loads (generally these pumps are driven by steam power).

Emerging emissions reduction technologies (such as sea water scrubbers, selective catalytic reduction, etc.) will be evaluated, demonstrated, and implemented through the Technology Advancement Program.

Some of these technologies can potentially achieve the equivalent emissions reductions of shore-power while others have the potential for significant reductions (though not at the same level of shore-power) of hotelling emissions.

Both ports currently have separate and distinct programs; however, they share a common ultimate goal of moving all container berths, cruise ship operations, and other frequent visitors calling in the San Pedro Bay to shore-power, and to move other vessel types towards alternative hotelling emissions reduction technologies. The Port of Long Beach's program is referred to as shore-side power or cold ironing, while the Port of Los Angeles' program for shore-power is called Alternative Maritime Power (AMP™). With regard to shore-power, the ports are in significantly different positions from an infrastructure standpoint. Generally, the Port of Los Angeles has the main electrical trunk lines in place from which to "step-down" and condition power for ships. The Port of Long Beach, on the other hand, needs to bring new electrical service lines from Interstate 405 into the Harbor District to supply the appropriate power, which will require significant infrastructure improvements and thus delay implementation timelines compared with the Port of Los Angeles.

Finally, the Port of Los Angeles will be focusing on developing shore-power infrastructure for all cruise berths and requiring its use by all visiting cruise ships. The cruise operations at the Port of Long Beach are managed and leased by another department at the City of Long Beach and therefore not directly under the control of the Port. The Port is currently looking at mechanisms to require shore-power for cruise ships.

Implementation Plan

The implementation of this measure consists of the two paths: use of shore-power and alternative hotelling emissions reduction technologies for non-shore-power candidate vessels/terminals. The Ports will consider the effectiveness of tariff changes with respect to accelerating the installation of needed infrastructure. Shore-power implementation will be different for each port due to the existing infrastructure differences cited above. In addition to making the terminal infrastructure available, it is imperative that requirements be placed on individual terminals to ensure that vessels use the shore-power facilities. Lease requirements will include specific performance requirements for maximum feasible utilization of the available shore-power infrastructure. The phase-in schedule for those use requirements will be dependent upon several factors, including how many berths at the terminal are equipped with shore-power, retrofit and assignment of vessel strings to use the

available infrastructure, and phase-out of vessels that are not candidates for shore-power (e.g. steamships). As soon as a berth is equipped with shore-power infrastructure, that berth will be used to the maximum extent feasible. Ultimately, after all berths at a terminal are electrified, the goal is 100% utilization of shore-power by candidate vessel calls at that terminal.

Port of Los Angeles AMP™ Implementation

Over the next five years the Port of Los Angeles will conduct a massive infrastructure improvement program to equip a number of berths at container and cruise terminals with AMP™ infrastructure. The proposed scenario focuses terminal infrastructure improvements based on upcoming lease negotiations or EIR dates and will be implemented primarily by lease requirements to use AMP once the infrastructure is in place and operational. The schedules presented within the measure are preliminary schedules developed with the Port's Engineering Department and are based on a series of assumptions of when projects will be cleared through the CEQA process.

The Port of Los Angeles has eight major container terminals and one cruise terminal (with three berths that can accommodate two large cruise ships). Over the next five years, the Port of Los Angeles will conduct a massive infrastructure improvement program to make AMP™ available at a number of berths at container, selected liquid bulk terminals, cruise terminals, and dredge plug-in locations. The following draft table presents the berths at the Port of Los Angeles that are currently planned to be improved and operational by the end of the fifth year of the Clean Air Action Plan. The following table presents the berths at the Port of Los Angeles that will be improved and operational by the end of the fifth year of the Clean Air Action Plan.

Table 5.10: POLA AMP™ Infrastructure by Berth Over Next Five Fiscal Years

Site	Number of Berths	Date Operational
B90-93 (Cruise Terminal)	**2 Berths (2 Vessels)**	**2008**
B100-102 (CS)	**1 Completed, 1 to go**	**2005/2009**
B121-131 (WBCT)	**2 Berths**	**2011**
B136-147 (TraPac)	**2 Berths**	**2009**
B175-181(Pasha)	**1 Berth**	**2011**
B206-209 (LTT)	**1 Berth**	**2011**
B212-218 (YTI)	**1 Completed**	**2006**
B224-236 (Evergreen)	**1 Berth**	**2008**
Pier 300 (APL)	**1 Berth**	**2011**
Pier 400 (APM)	**1 Berth**	**2011**
Pier 400 (Liquid Bulk)	**1 Berth**	**2011**
Total AMP'd Berths	**15 Berths**	

Note: LTT – Long Term Tenant

A preliminary aggressive lease requirement-based rollout scenario was developed in conjunction with POLA Engineering for the AMP™ program. Under this scenario, the POLA would have AMP™ capabilities at 15 berths (2 cruise and 13 container) for a cost of $44 million. The resulting scenario would translate into the following number of AMP™ ship calls presented in Table 5.11 and detailed assumptions are presented in Appendix A.

Table 5.11: POLA Estimated AMP'd Ship Calls by Fiscal Year

Site	FY2006/07	FY2007/08	FY2008/09	FY2009/10	FY2010/11
B90-93 (Cruise Terminal)	**0**	**0**	**100**	**200**	**200**
B100-102 (CS)	**54**	**54**	**54**	**92**	**131**
B121-131 (WBCT)	**0**	**0**	**0**	**0**	**36**
B136-147 (TraPac)	**0**	**0**	**0**	**40**	**106**
B175-181(Pasha)	**0**	**0**	**0**	**0**	**0**
B206-209 (LTT)	**0**	**0**	**0**	**0**	**6**
B212-218 (YTI)	**4**	**11**	**0**	**36**	**52**
B224-236 (Evergreen)	**0**	**0**	**11**	**36**	**52**
Pier 300 (APL)	**0**	**0**	**0**	**0**	**72**
Pier 400 (APM)	**0**	**0**	**0**	**0**	**10**
Pier 400 (Liquid Bulk)	**0**	**0**	**0**	**6**	**6**
Total AMP'd Calls	**58**	**65**	**165**	**410**	**671**

Note: LTT – Long Term Tenant

It should be noted that state and local air quality officials may be considering regulations making the use of shore-power mandatory in the SoCAB.

One berth at the China Shipping terminal and one berth at the YTI terminal are currently AMP™ equipped. The aggressive rollout of AMP™ as shown above will require significant terminal infrastructure improvements for both container and cruise terminals. The pre-construction activities include developing engineering plans and specifications, bid packages, contracting, etc. The shore side infrastructure improvements include installation of 34.5 kV to 6.6 kV transformers, connections ~200' apart along the berth, terminal trenching, etc. In the case of the cruise terminal, shore infrastructure improvements will include a shore based cable management system. The extremely aggressive AMP™ rollout program presented above is based on the following key assumptions/limitations:

- All EIRs/EISs remain on schedule.
- Customer vessels will be ready to use AMP™ shortly after berth infrastructure is completed and operational.
- With the exception of Evergreen, no other temporary AMP™ installations will be constructed. Evergreen is the exception because they already have AMP™ capable vessels.
- Berth 206-209 AMP™ calls will be determined upon lease negations.
- Port can complete AMP™ installations as assumed in the schedule.
- Weekly service calling at each berth using AMP™.
- There will be enough AMP™ equipped vessels to reach 50% of all vessel calls at an AMP™-ready berth.
- By the third year, will be enough AMP™ equipped vessels to reach 70% of all vessel calls at an AMP™-ready berth.
- Initially 40% then 80% of all Princess Cruise Line calls will be AMP™-ready.
- Norwegian Cruise Lines are required to AMP™ all home-ported vessels and shore infrastructure is completed.
- Royal Caribbean Cruise Line will renew their permit, AMP™ their home-ported vessels, and shore infrastructure is completed.

Additional assumptions are provided in Appendix A.

Port of Long Beach Shore-Power Implementation

Over the next five years, the Port of Long Beach currently plans to have crude oil Berth T121 and nine container berths operational with shore-power. In addition, the Port will be undergoing a massive electrical infrastructure improvement program to construct an additional 6.6 kV sub-transmission line to serve the Harbor District, and complete infrastructure improvements for the remaining container terminals, electric dredge plug-ins, and additional infrastructure for electrification of certain types of yard equipment.

Background: The Port of Long Beach Harbor Commission adopted a Green Port Policy in January 2005 that will guide all port operations and future development to achieve significant air quality improvements. Key elements of the Green Port Policy that are being enacted over time are the Port's commitment to implement shore-power; the encouragement of terminal operators to electrify yard equipment; and the conversion to electric dredging for all Port deepening projects. To undertake the large-scale improvements to the electrical system required to support these goals, the Port established an Electrical Infrastructure Program with primary responsibility to manage the strategic planning, development and improvement of the Port's electrical infrastructure. In addition to air quality improvements, the Program also has a goal to reduce the cost of electrical power for Port tenants as an incentive to further air quality improvements by simplifying the existing electrical distribution system and by upgrading the source voltage.

Priorities: Manage the strategic planning, development, and improvement of the Port's electrical infrastructure.

Goals:

- Satisfy future electrical demand due to cold ironing, yard electrification and terminal development.
- Preserve competitiveness.
- Position the Port to take advantage of future electrical service opportunities.

The following tables present the berths that are expected to be improved and operational with shore-power within five years including the expected initial operational date and the number of annual vessel calls. The POLB is limited by the lack of sufficient power infrastructure and, therefore, these analyses need to be completed prior to negotiation with Edison.

Table 5.12: POLB Shore-Power Infrastructure by Berth Over Next Five Fiscal Years

Site	Number of Berths	Date Operational
Pier C (Matson)	**2 Berths**	**2011**
Piers D, E, F (Middle Harbor)	**1 Berth**	**2011**
Pier G (ITS)	**3 Berths**	**2011**
Pier S	**3 Berths**	**2011**
Pier T, Berth T121 (BP)	**1 Berth**	**4th Quarter 2007**
	10 Berths	

Table 5.13: POLB Estimated Shore-Powered Ship Calls by Fiscal Year

Site	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
Pier G (ITS K-Line 3 Berths)	0	0	0	0	150
Pier C (Matson 2 Berths)	0	0	0	0	52
Piers D, E, F (Middle Harbor 1 Berth)	0	0	0	0	17
Pier S (Three Berths)	0	0	0	0	150
Pier T (BP)	0	3	12	12	12
Total Shore-Powered Calls	**0**	**3**	**12**	**12**	**381**

In addition to the ten berths shown in the preceding tables, the Port of Long Beach is committed to provide cold ironing infrastructure at all container and one crude oil terminal within the next ten years. The Port is also committed to work to incorporate cold ironing at terminals within the next five years where no lease renewal opportunity exist to mandate cold ironing. The Port will collaborate with the leaseholders and City of Long Beach to implement cold ironing at the additional berths shown in the following table.

Table 5.14: POLB Potential Additional Shore-Power Berths Over the Next Five Years

Site	Number of Berths	Date Operational
Pier A (SSA)	**1 Berth**	**2011-2016**
Pier H (Carnival)	**1 Berth**	**2011-2016**
Pier J (SSA)	**1 Berth**	**2011-2016**
Navy Mole (Sea-Launch)	**2 Berths**	**2011-2016**
Pier T (TTI)	**1 Berth**	**2011-2016**
	6 Berths	

The following describes specifics of the Port of Long Beach cold ironing program for the next five years.

Port of Long Beach Program Elements for the Next Five Fiscal Years

1. *Electrical Master Plan*

- Scope of Work
  - ✓ Evaluation of the Port's current and future electrical needs
  - ✓ Evaluation and catalogue of alternative power sources and/or pricing structures
  - ✓ Identification of possible regulatory rules that could enhance Green Port Policy goals
  - ✓ Evaluation of electrical facility ownership, transmission and distribution options
- Schedule and Cost
  - ✓ The final report is scheduled to be released in November 2006.

- ✓ The total cost for management, preparation, and review of the electrical master plan is approximately $900,000.

2. *Cold Ironing Program Preparation*

- ➢ Electrical Infrastructure EIR
  - ✓ Preparation of Port wide cold ironing infrastructure document covering electrical system enhancements required to upgrade electrical systems and install necessary infrastructure to provide power to cold ironing systems at all cargo terminal berths. Planning and data gathering for the future environmental document is currently underway.
- ➢ Sizing of Cold Ironing System
  - ✓ Standardization of infrastructure design is underway and addresses container, liquid bulk and break-bulk facility needs.

3. *Electrical Infrastructure Improvement Projects – Status and Schedule*

- ➢ Dredge Connection Point to serve west portion of Harbor District
  - ✓ The Green Port Policy requires dredge equipment to be electrically powered when working in the Harbor District. To accomplish this, an electrical power source to support electrification of hydraulic dredge equipment is required (clamshell dredge equipment has a lower voltage requirement and does not require a stand-alone connection point). Construction of a 15MVA connection point for dredge equipment will be built at Pier T. The work is anticipated to be complete in mid 2007.
- ➢ Pier T Berth T121 Liquid Bulk Terminal
  - ✓ The Port of Long Beach is providing cold ironing infrastructure at the BP West Coast Products terminal, Berth T121. Shipside improvements will be carried out by British Petroleum (BP).
  - ✓ Construction of the offshore structural improvements began in May 2006 and completion of the onshore electrical work is forecasted in July 2007. The estimated cost for the infrastructure improvements being undertaken by the Port of Long Beach is $18 million. The tenant's vessel retrofit program will be complete by late 2007 when it is anticipated cold ironing of BP vessels at Berth T121 will begin.
- ➢ Pier C Container Terminal
  - ✓ A recently approved lease amendment for the SSA Terminals at Pier C requires cold ironing of the two container ship berths. The Port will be responsible for improvement of the terminal electrical capacity and infrastructure, the shipping line responsible for retrofit of the vessel fleet. Environmental documentation to support necessary infrastructure improvements will be required. It is anticipated cold ironing at Pier C could begin in 2011.

- Pier G Container Terminal
  - ✓ A recently approved lease amendment for the (International Transportation Service (ITS) container terminal at Pier G requires cold ironing of the container ship berths. The Port is construct a new ship berth and is retrofit two existing berths for cold ironing. Construction will take place in phases and will include upgrade of the terminal's electrical capacity to accommodate cold ironing. Certain construction elements could be underway by early 2007 with cold ironing of vessels at the first Pier G berth anticipated to begin in 2009 with the other two berths in 2011.
- Pier E Middle Harbor
  - ✓ Preparation of the environmental documents is currently underway for the Pier E and Pier F Middle Harbor development program. Once documents are approved and the phased construction is complete the new container terminal complex will accommodate cold ironing at five ship berths. Depending on the timing for approval of the environmental documents and receipt of develop permits, it is anticipated that one cold-ironed berth could be complete in 2011. As new berths are constructed at the terminal, they will be equipped with cold ironing infrastructure. Berth construction is expected to be completed by 2018, at which time all berths will be equipped for cold ironing.
- Pier S Container Terminal
  - ✓ Preparation of the environmental documents will begin soon for the Pier S container terminal. Once documents are approved and the phased construction is complete the new container terminal complex will accommodate cold ironing at all three container vessel berths. Depending on the timing for approval of the environmental documents and receipt of develop permits, the terminal could accommodate cold ironing at three berths beginning in 2011.
- Terminals where Cold ironing will be Provided
  - ✓ The Port of Long Beach will work with tenants (and City of Long Beach for the cruise terminal) to encourage early implementation of cold ironing at facilities that are not due for lease renewal within the next five years. Terminals include:

    - Pier A Container Terminal
    - Pier J Container Terminal
    - Pier T Container Terminal
    - Sea Launch on the Navy Mole
    - City of Long Beach Cruise Terminal

Standardization of AMP/Cold-Ironing Systems

The International Organization of Standards (ISO) Technical Committee (TC) 8 and Sub-Committee 3 have agreed to provide an environment and work platform to allow the Ports to take a leadership role in developing a shore-to-ship power standard.

Germany and Sweden in MEPC 54/4/3 proposed to the IMO to initiate a process of international standardization of shore-to-ship power technology and urged MEPC to set a time line and threshold for installing shore-power capabilities in ships and Ports. In addition, the MEPC Secretariat (in MEPC 55/4/6) noted that "At the request of IAPH and the International Chamber of Shipping (ICS), ISO would initiate a working group under its Technical Committee 8, Ships and Marine Technology, with active participation from IAPH, ICS, IEC, other industry groups and several ports. The working group would convene its first meeting in the early autumn of 2006. ISO/TC8 has committed to keep the Committee informed of its progress." In support of this, the ISO TC 8 Chairman called a working group meeting in Washington, DC, on September 14-15, 2006. Mr. Fer Van De Laar of the IAPH was instrumental in gaining the Port of Los Angeles' support in nominating Mr. Eric Caris for the convenorship of the working group. The development of an international standard will involve close cooperation between industry, industry associations, and the Ports. The Port of Los Angeles, Port of Long Beach, and the Port of Rotterdam agreed to take a leading role in this effort. The meeting was attended by 33 industry representatives from around the world notably Norway, Denmark, Japan, Canada, Germany, Italy, and Untied States as well as the Port of Los Angeles, Port of Long Beach, Port of Corpus Christi, and Port of Rotterdam. Representatives from the EPA were also present. The purpose for this meeting was to develop a scope and action plan as the first step to standardizing Shore-to-Ship Power System. Five draft committees were formed according to vessel/berth type: tankers/LNG, bulkers, containerships and roll-on/roll-off (ro/ro), cruise ships, and ferries. The scope to be discussed by all groups covered at a minimum the following issues:

- Power demand (for 20 years to come)
- Voltage (440V, 6.6kV, 11 kV)
- Frequency (50 or 60 Hz)
- Power quality - harmonics etc.
- Reliability and fault tolerance (fault current)
- Power transfer (phase rotation/voltage matching/synchronization/time to transfer/etc)
- Grounding (grounding point)
- Code and standards coordination
- Equipment Location (ship/shore)

- Transformer Frequency converter Shore connection point
- Wharf outlets (position & number)
- Cable management system (position and number of cables)
- Communication, control & protocol
- Testing & Responsibilities Procedures

Each draft committee would be the coordinator on one sub-issue to ensure maximum compatibility amongst vessel/berth type installations.

The following are the drafting committees and their sub-issue:

1. Cruise - Sub-issue: Testing and responsibilities
2. Containerships & Ro/Ro - Sub-issue: Grounding
3. Tankers/LNG - Sub Issue: Cables & Connectors
4. Bulkers - Sub issues: Personnel Safety & Control/Communication
5. Ferries

A more detailed explanation of items to be covered under sub-issues are provided as follows:

1. Cables and connectors: a) Cable management, b) Approval standards, c) Cable management system tension control, d) Cable entry protection
2. Grounding: a). Galvanically isolated, b). Grounding switches, c). Cathodic protection
3. Personnel safety: a) F/O cables, b) System & personnel protection
4. Procedures, testing, responsibilities: a) Time to connect, b) No auto-re-closure, c) Training and testing, d) Certification of personnel

The initial objective is to establish a "Publicly Available Specifications" (PAS). The target date is currently April 2007. An international standard will be developed simultaneously. The latter takes more time and therefore the strategy to first establish a PAS. The PAS will allow Ports and carriers to refer to an official document that provides shore-to-ship power specifications.

In order for this effort to formally move forward, a majority vote from voting members of ISO TC8/SC3 is required by October 29, 2006. Each voting member is also required to nominate an "expert". Voting members are:

- ANSI (USA)
- BSI (U.K.)
- DIN (Germany)
- DS (Denmark)

- DSSU (Ukraine)
- GOST R (Russian Federation)
- IPQ (Portugal)
- JISC (Japan)
- KATS (Korea, Republic of)
- NEN (Netherlands)
- SAC (China)
- SNV (Switzerland)
- UNI (Italy)

Alternative Hotelling Emissions Reduction Technologies Implementation

This path focuses on alternative emissions reduction technology strategies for hotelling emissions from vessels that are not good candidates for shore-power. Currently there are no verified emissions reductions technologies for direct use on ship auxiliary emissions other than shore-power. The proposed joint Technology Advancement Program (see Section 5.7 below) will be responsible for identification and demonstration of potential applicable emissions reduction technologies that could be implemented under this portion of the measure.

Even though there are no directly applicable verified emissions reduction technologies, there are measures that can be implemented to reduce the loads required during dwelling for some ships, such as traditional bulk liquid tankers. One such option is the use of shore side electrical pumps for discharging the vessel. These shore-side pumps can assist in reducing the load required by the ship's steam driven pumps such that they are only required to run at a load that moves the liquid over the "rail" or side of the ship, the rest of the liquid pipeline transport is powered by electrically powered on-shore pumps.

In addition, the Port of Long Beach is conducting a demonstration project to evaluate an exhaust stack scrubbing technology that could potentially have similar emissions reductions as shore-power.

Air Quality Benefits

The estimated reductions in DPM, NOx, and SOx associated with this measure are presented in the following table.

Table 5.15: Estimated Shore-Power Emissions Reductions for SPBP-OGV2 by Fiscal Year

	FY 2006/2007 (tpy)	FY 2007/2008 (tpy)	FY 2008/2009 (tpy)	FY 2009/2010 (tpy)	FY 2010/2011 (tpy)	Total (tons)
Total # of container calls affected	**58**	**65**	**65**	**204**	**834**	**1,226**
DPM Reduction	3	3	3	8	30	46
NOx Reduction	92	101	101	318	1,286	1,899
SOx Reduction	43	43	43	136	584	850
Total # of cruise ships calls affected	**0**	**0**	**100**	**200**	**200**	**500**
DPM Reduction	0	0	2	3	3	8
NOx Reduction	0	0	91	181	181	453
SOx Reduction	0	0	25	50	50	126
Total # of liquid bulk ships calls affected	**0**	**3**	**12**	**18**	**18**	**51**
DPM Reduction	0	0	1	1	1	2
NOx Reduction	0	5	18	28	28	78
SOx Reduction	0	2	9	14	14	39
Total SPBP-OGV2 Reduction						
TOTAL Measure DPM Reductions	3	3	5	12	34	56
TOTAL Measure NOx Reductions	92	106	210	527	1,495	2,430
TOTAL Measure SOx Reductions	43	46	77	200	648	1,015

Note: Reductions are taken after ARB's adopted Auxiliary Engine regulation is implemented

At this time, emissions associated with alternative hotelling emissions reduction technologies cannot be estimated and will be updated after successful demonstration of such technologies.

Financial Costs

The financial costs associated with this measure are presented below for each port for the shore-power path only. The initial costs associated with the targeted dwelling emissions reduction requirements are included in the Technology Advancement Program (presented later in this section). The costs presented in this section represent the costs to each port for the implementation of this measure.

Port of Los Angeles AMP™ Costs

The costs associated with the AMP™ program are:

- Capital costs associated with terminal infrastructure improvements.
- Incentive costs for shipboard AMP™ retrofits. These incentives would be paid back incrementally until a total power usage through AMP™ reaches 6.4 million kW-hrs for cruise ships and 3.5 million kW-hrs for container ships. This is a one-time requirement for reimbursement and the usage can be from any AMP™ equipped ship calling the berth.
- Limited incentives for fuel cost neutrality at China Shipping (part of the China Shipping settlement) and NYK, which has a one-year agreement for the retrofitted vessel.

China Shipping settlement funds are already established and set-aside and therefore are not included in the summary table below as these costs will not impact the upcoming FY budgets.

Port of Long Beach Shore-Power Order of Magnitude Costs

The costs associated with the shore-power program are:

- Capital costs associated with the terminal infrastructure improvements at T121.
- Engineering planning/evaluation of bringing required trunk lines down to the terminals.
- Permitting and construction management.
- Coordination with the Port's electrical service provider.

The following table presents order of magnitude estimated costs to provide electrical infrastructure and service capacity enhancements to accommodate use of electric powered dredge equipment within the harbor district and cold ironing up to14 berths by the end of 2011.

Table 5.16: Port of Long Beach Electrical Infrastructure Order of Magnitude Estimated Costs

POLB Cold-Ironing Costs	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
BP T121 Infrastructure	$15,000,000	$3,000,000	$0	$0	$0	**$18,000,000**
Initial Berths & Service Line Extension (ten berths total)	$0	$7,000,000	$19,000,000	$20,000,000	$23,300,000	**$69,300,000**
Possible Additional Berths (six berths total)	$0	$0	$6,000,000	$16,700,000	$20,000,000	**$42,700,000**
Order of Magnitude - Measure FY Totals	**$15,000,000**	**$10,000,000**	**$25,000,000**	**$36,700,000**	**$43,300,000**	**$130,000,000**

Project Elements & Unit Costs

1. Order of magnitude estimated costs are not based on a final project description nor engineering design
2. Estimated unit costs include engineering, permitting, construction, construction management and coordination with SCE where necessary
3. Estimate for service upgrade includes modification of the terminal's electrical system capacity to accommodate additional load
4. Conduit costs include construction of ductbank (within terminal and on wharf) and installation of conductor
5. Ship power outlets assumed to be placed on wharf at 200-ft spacing, five outlets per berth. Cost includes multiple built-in infrastructure/control safety components and electrical grounding features
6. Transformer (7.5 MVA) & switchgear for each berth includes switchgear at the berth and terminal substation where required

Total Combined Costs for Shore-Power

The total cost of the measure, by Port, is presented in the following table. It should be noted that the AMP™ infrastructure costs shown in the table will largely be recovered over time by the lease terms.

Table 5.17: Costs for SPBP-OGV2 by Port by Fiscal Year

SBP-OGV2	Reduction of At-Berth OGV Emis	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
	POLA AMP Costs						
	AMP Infrastructure	$5,500,000	$16,000,000	$12,500,000	$6,000,000	$4,000,000	**$44,000,000**
	Shipboard AMP Incentives	$810,000	$4,050,000	$0	$0	$0	**$4,860,000**
	Cost Neutrality Incentives	$226,800	$0	$0	$0	$0	**$226,800**
		$6,536,800	**$20,050,000**	**$12,500,000**	**$6,000,000**	**$4,000,000**	**$49,086,800**
	POLB Cold Ironing Costs						
	BP T121 Infrastructure	$15,000,000	$3,000,000	$0	$0	$0	**$18,000,000**
	Initial Berths & Srvc Line	$0	$7,000,000	$19,000,000	$20,000,000	$23,300,000	**$69,300,000**
	Possible Additional Berths	$0	$0	$6,000,000	$16,700,000	$20,000,000	**$42,700,000**
		$15,000,000	**$10,000,000**	**$25,000,000**	**$36,700,000**	**$43,300,000**	**$130,000,000**
	Measure FY Totals	**$21,536,800**	**$30,050,000**	**$37,500,000**	**$42,700,000**	**$47,300,000**	**$179,100,000**

Milestones

1. Port of Long Beach will work with SCAQMD and ARB on the challenges associated with shore-power.

   Schedule: 2nd through 4th quarter 2007.

2. Standardization of cold ironing infrastructure and connection equipment through the ISO committees and PAS.

   Schedule: Completed 2nd quarter 2007

3. Conduct pilot test of Alternative Maritime Emissions Control System (AMECS) including emissions reduction evaluation at Port of Long Beach.

   Schedule: Permitting completed by end of 2006. Construction completed by 3rd quarter 2007 (assuming no significant structural modifications to wharf are required). Testing 4th quarter 2007.

4. As leases are opened through the EIR process or for renegotiation, or as new leases are negotiated, the Ports will include provisions for use of shore-power infrastructure.

   Schedule: As leases are opened.

5. Shore-side infrastructure in place and operational as presented above.

   Schedule: As shown above in Tables 5.10, 5.12, and 5.14.

6. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing.

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
CAP-OGV2 Reduction of At-Berth OGV Emissions	Environmental/ Engineering (both Ports)	Number of terminals w/shore-power Terminal infrastructure funding Number of berths w/shore-power Number of ships retrofitted Number of shore-power calls/berth Ship retrofit funding Number of retrofitted ship calls Energy consumption per visit Cost of energy consumed Ship power load per visit Hours per visit Hours shore-powered per visit Auxiliary engine specifications Auxiliary engine fuel consumption rate AMP standardization through ISO	Monthly

5.2.3 Control Measure Number SPBP-OGV3
Measure Title: *OGV Auxiliary Engine Fuel Standards*

Auxiliary engine fuel standard of ≤0.2% sulfur distillate/MGO or equivalent reduction.

Initiation Year:	*2007*
Implementation Schedule:	*Increasing throughout five year period (see Table 5.18)*
Tonnage Reduced:	*Varies throughout five year period (see Table 5.18)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Lease Requirements & Tariff Changes

Measure Description
This measure is designed to require the use of lower sulfur distillate fuels in the auxiliary engines of OGVs within 20 nm of Point Fermin and while at berth. Many of the OGVs that currently frequent the Port burn heavy fuel oil (HFO), (most commonly Intermediate Fuel Oil (IFO) 380), that has a sulfur content ranging from 1.0 to 4.5%. A substantial reduction in DPM can be achieved if these vessels were instead required to use distillate fuels that have a sulfur content of ≤0.2% S MGO. The Ports are focusing this measure and SPBP-OGV4 (Main Engine Fuel Standards) to target fuel quality with the goal of synchronizing both the auxiliary and main engine fuels. In SPBP-OGV4, main engine fuel is targeted at distillate fuels of ≤0.2% sulfur, which is consistent with the recent public announcement by Maersk Line[14]. The Ports believe that synchronizing the auxiliary and main engine fuel standards will reduce logistical and operational hurdles for the carriers.

Over the next year, the Ports will make assertive efforts to work with ports around the Pacific Rim, fuel suppliers, shipping lines, and others to make them aware of the need and available locations of ≤0.2% S MGO fuels. For locations that don't have the supplies available, the Ports will work with the local port authority, local fuel suppliers, and lines in efforts to make the fuel available. It will be critical to both this measure and SPBP-OGV4 that cleaner fuels are available as soon as possible. An update to the Port of Los Angeles' Evaluation of Low Sulfur Marine Fuel Availability - Pacific Rim Report will provide the latest information on the availability of fuels throughout the Pacific Rim. This will help lines identify where to obtain the proper fuels prior to arrival at San Pedro Bay Ports.

CARB's existing auxiliary engine regulation adopted in December of 2005 requires any OGV operating an OGV within 24 nm of the California coastline to utilize MGO or MDO with a sulfur content ≤0.5% in their auxiliary engines beginning January 1 2007, or use alternative emission control systems that result in equivalent emissions reductions to the

[14] "Maersk Line announces fuel switch for vessels calling California," Press Release, Mary Ann Kotlarich, Maersk Inc., May 26, 2006

use of the lower sulfur fuel. Beginning January 1, 2010, owners and operators of OGVs will be required by the State to use MGO with a sulfur content ≤0.1% in their auxiliary engines, or use equally effective alternative emission control systems.

This measure in combination with SPBP-OGV4 goes significantly beyond the existing CARB regulation by requiring ≤0.2% S MGO (prior to 2010) in both auxiliary and main engines, instead of requiring ≤0.5% S MDO or MGO for only OGV auxiliary engine emissions for vessels bound for, or exiting, the Ports. In addition, these measures do not allow for exemption if a ship uses shore-power while hotelling.

Within the VSR boundary, vessels would be required to use ≤0.2% S MGO fuels in the auxiliary engines. The measure would be expanded in the 1st quarter of 2008 with the VSR program out to 40 nm from Point Fermin. The Ports are trying to minimize the use of multiple fuels due to tankage limitations onboard OGVs, therefore, the auxiliary engine fuel requirement will be the same as main engines as stated in SPBP-OGV4. Combined, these two measures significantly go beyond the existing CARB auxiliary fuel rule which eventually gets to ≤0.1% S MDO and eliminates the rule exemption for ships that will be using shore-power when at berth.

The Ports will continue to evaluate the availability of ≤0.1% S fuels and when supply is available and stable, the Ports will review SPBP-OGV3 & 4 for further change to the lower sulfur fuels.

The fundamental elements of this control measure are:

1. The Ports will actively work with fuel providers, shipping lines, and port authorities around the Pacific Rim to ensure that fuel availability will not be an issue and provide an annual updated report on these efforts.[15]

2. The Ports will secure benefits over and above the existing CARB auxiliary regulation by requiring the accelerated introduction of ≤0.2% S MGO fuels used in auxiliary engines between 2006 and 2010 and not exempt the use from ships that use shore-power.

3. Compliance monitoring, record keeping, and reporting.

Implementation Plan

This measure would be implemented through lease requirements, tariff changes, and CEQA mitigation. The standard would be initially applicable for transits (out to 20 nm

[15] Update: Port of Los Angeles, *Evaluation of Low Sulfur Marine Fuel Availability – Pacific Rim*, July 2005. Prepared by Starcrest Consulting Group, LLC.

from Point Fermin) and during hotelling. The Ports will evaluate a tariff to expedite emissions benefits from this measure.

It should be noted that the NNI report assumed that the change to cleaner fuels in both auxiliary and main engines was based on global availability assumptions. The Clean Air Action Plan provides for the active engagement by both Ports to accelerate the availability of the ≤0.2% S MGO fuels available at key ports throughout the Pacific Rim. The Ports are committed to accelerating the implementation of this measure through implementation strategies that will maximize the benefits of cleaner fuels.

The Ports will work jointly with CARB and SCAQMD on regulatory backstop measures for this measure an SPBP-OGV4 with the goal of making state-wide standards.

Air Quality Benefits

The estimated reductions in DPM, NOx, and SOx associated with this measure are presented in the following table.

Table 5.18: Estimated Emissions Reductions for SPBP-OGV3 by Fiscal Year

	FY 2006/2007 (tpy)	FY 2007/2008 (tpy)	FY 2008/2009 (tpy)	FY 2009/2010 (tpy)	FY 2010/2011 (tpy)	Total (tons)
Lease Based Implementation Schedule						
[1]Total SPBP-OGV3 Reduction						
0.2% MGO fuel needed, metric tons	2,662	7,466	11,355	13,071	13,871	48,426
DPM Reduction	**0**	**1**	**4**	**4**	**3**	**13**
NOx Reduction	**0**	**1**	**9**	**13**	**15**	**38**
SOx Reduction	**16**	**43**	**131**	**99**	**26**	**316**

[1] Reductions are taken after ARB's adopted Auxiliary Engine regulation is implemented

Note: This measure may be superseded by CARB regulation beginning FY 2009/2010. Although the emission reductions will persist, these benefits will no longer be attributable to this measure and accounted for as Regulatory Reductions. The emission reductions shown in the table were estimated assuming a reduction from MGO with a sulfur content of ≤0.5% to ≤0.2% sulfur distillate. The figures in the table also include the impact of the CARB measure.

Financial Costs

There are no identified port-related costs associated with the measure as stated above.

Milestones

1. Staff will meet and work with fuel suppliers and other port authorities to make them aware of the requirements of this measure and SPBP-OGV4. Staff, local port authorities, and fuel suppliers will work together in areas that the fuels are not readily available such that the fuel becomes available. The San Pedro Bay Ports will also derive an estimate of fuel demand from ships calling the ports and assess the availability of adequate quantities of ≤0.2% S MGO necessary to supply those vessels visiting the San Pedro Bay Ports. The efforts will be chronicled in an annual fuel availability report.

   Schedule: Completed by end of 2007 and then annually updated.

2. Staff will meet and work with carriers and classification societies to evaluate the technical and safety issues associated with fuel switching or avoiding fuel switching by using compliant fuels at all times.

   Schedule: Completed by end of 2007; then ongoing.

3. Staff will meet with CARB and SCAQMD to discuss the use of tariff as primary or supplemental implementation strategy. A goal of the meetings would be to avoid any conflict between the Ports' measure and any of the agency regulations.

   Schedule: Complete legal analyses of proposed tariffs by 2nd quarter 2007, and bring any appropriate tariff forward for adoption by 3rd quarter 2007. Tariff language would need to be approved by City Attorney, the Ports' Executive Directors, and the Ports' Boards of Harbor Commissioners.

4. Move to 40 nm from Point Fermin when the USCG and Marine Exchange issues are resolved and radar system is in place.

   Schedule: 1st quarter 2008.

5. Port staff will meet and work with the Pacific Ports Air Quality Collaborative in an effort to harmonize ship fuel requirements among the various ports.

   Schedule: Ongoing

6. As leases are opened through the EIR process or for renegotiation, or as new leases are negotiated, the Ports will include provisions for compliance with the Auxiliary Engine Fuel Standard as leases are opened.

   Schedule: As leases are opened.

7. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-OGV3 OGV Auxiliary Engine Fuel Standards	Environmental Staff (both Ports)	Participants Number of ships using IFO Sulfur content of IFO fuels IFO bunker purchase locations Quantity of IFO consumed Number of ships using MDO Sulfur content of MDO Fuels MDO bunker purchase locations Quantity of MDO burned Number of ships using MGO Sulfur content of MGO MGO bunker purchase locations Quantity of MGO burned Ship fueling configurations Number of ships mono fueled Number of ships dual-fueled Number of ships switching fuels Number of ships w/shaft gen. Number of fuel samples taken Meetings w/shipping lines Meetings w/engine manufacturers	Quarterly

5.2.4 Control Measure Number SPBP-OGV4
Measure Title: *OGV Main Engine Fuel Standards*

Main engine fuel standard of ≤0.2% S MGO during arrival and departures at San Pedro Bay Ports.

Initiation Year:	*2007*
Implementation Schedule:	*Increasing throughout five year period (see Table 5.19)*
Tonnage Reduced:	*Increasing throughout five year period (see Table 5.19)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Lease Requirements & Tariff Changes

Measure Description
This program is designed to promote, encourage, and require the use of lower sulfur fuels in the main propulsion engines of OGVs within 20 nm of Point Fermin through 2007 and extended to 40 nm from Point Fermin with the VSR program 1st quarter of 2008; as opposed to the current practice of using fuels that have substantially higher sulfur content. Significant reductions in emissions of DPM, NOx, and SOx can be achieved through the consumption of these "cleaner" fuels. Maersk Line recently announced that it would be operating main engines into and out of the Port of Los Angeles using ≤0.2% sulfur fuels.

Again, as mentioned in SPBP-OGV3, over the next year, the Ports will make assertive efforts to work with ports around the Pacific Rim, fuel suppliers, shipping lines, and others to make them aware of the need and available locations of ≤0.2% S MGO fuels. For locations that don't have the supplies available, the Ports will work with the local port authority, local fuel suppliers, and lines in efforts to make the fuel available. It will be critical to both this measure and SPBP-OGV3 that cleaner fuels are available as soon as possible. An update to the Port of Los Angeles' Evaluation of Low Sulfur Marine Fuel Availability - Pacific Rim Report will provide the latest information on the availability of fuels throughout the Pacific Rim. This will help lines identify where to obtain the proper fuels prior to arrival at San Pedro Bay Ports.

Similar to the auxiliary engine fuel improvement program (SPBP-OGV3) this measure will target the emissions from the main engines all vessels bound for or exiting San Pedro Bay Ports. Within the VSR boundary, vessels would be required to use ≤0.2% S MGO fuels in the main engines. The Ports are trying to minimize the use of multiple fuels (due to the limited tankage available on OGVs) so the main engine fuel requirement will be the similar to SPBP-OGV3. Combined, these two measures significantly go beyond the existing CARB auxiliary fuel rule which eventually gets to ≤0.1% S MDO or MGO, however that rule exempts ships that will be using shore-power when at berth. It should be noted that CARB is developing a main engine fuel requirement regulation at this time.

These are the fundamental elements of the program:

1. The Port will actively work with fuel providers, shipping lines, and port authorities around the Pacific Rim to ensure that fuel availability will not be an issue and provide an annual updated report on these efforts.

2. The Port will secure benefits by requiring the accelerated use of <0.2% S MGO fuel use in main engines over the next five fiscal years. This standard will be re-evaluated during the next five years to determine if fuels with further reductions in sulfur content are sufficiently available.

3. Compliance with the program will be assured through lease requirements included in new or amended lease agreements, incentives to shipping lines, and the use of tariffs will be evaluated.

As stated above in Section 5.2, there are several technical issues associated with this measure that will be worked out by the end of 2007.

Implementation Plan

As proposed, this measure would be initially implemented through lease requirements. Other implementation strategies such as tariffs will be evaluated to accelerate usage across all shipping lines. The Ports will complete the implementation evaluation 1st quarter 2007. The Ports will consider the effectiveness of tariff changes with respect to accelerating the installation of needed infrastructure.

It should be noted that in the NNI report the change to cleaner fuels in both auxiliary and main engines was based on global availability assumptions. The Clean Air Action Plan provides for the active engagement by both Ports to accelerate the availability of the ≤0.2% S MGO fuels available at key ports throughout the Pacific Rim. The Ports are committed to accelerating the implementation of this measure through implementation strategies that will maximize the benefits of cleaner fuels.

The Ports will work jointly with CARB and SCAQMD on regulatory backstop measures for this measure an SPBP-OGV4 with the goal of making state-wide standards.

Air Quality Benefits

The estimated reductions in DPM, NOx, and SOx associated with this measure are presented in the following table. Technical assumptions and details are provided in Appendix A.

Table 5.19: Estimated Emissions Reductions for SPBP-OGV4 by Fiscal Year

	FY 2006/2007 (tpy)	FY 2007/2008 (tpy)	FY 2008/2009 (tpy)	FY 2009/2010 (tpy)	FY 2010/2011 (tpy)	Total (tons)
[1]Total SPBP-OGV4 Reduction						
TOTAL Measure DPM Reductions	5	43	155	205	234	641
TOTAL Measure NOx Reductions	6	52	202	271	311	841
TOTAL Measure SOx Reductions	29	272	1,101	1,489	1,722	4,613

[1] Reductions are taken after ARB's adopted Auxiliary Engine regulation is implemented

Financial Costs

With the decision not to subsidize the higher-cost, lower-S fuels, the cost to the ports for this measure is limited to the costs associated with meeting with fuel providers, shipping lines, and other port authorities, verifying the fuels use, and administering the requirements.

Milestones

1. Staff will meet and work with fuel suppliers and port authorities to make them aware of the requirements of this measure and SPBP-OGV4. Staff, local port authorities, and fuel suppliers will work together in areas that the fuels are not readily available such that the fuel becomes available. The San Pedro Bay Ports will also derive an estimate of fuel demand from ships calling the ports and assess the availability of adequate quantities of ≤0.2% S MGO necessary to supply those vessels visiting the San Pedro Bay Ports. The efforts will be chronicled in an annual fuel availability report.

   Schedule: Completed by end of 2007 and then annually updated.

2. Staff will meet and work with carriers and classification societies to evaluate the technical and safety issues associated with fuel switching or avoiding fuel switching by using compliant fuels at all times.

   Schedule: Completed by end of 2007; then ongoing.

3. Staff will meet with CARB and SCAQMD to discuss the use of tariff as primary or supplemental implementation strategy. A goal of the meetings would be to avoid any conflict between the Ports' measure and any of the agency regulations.

   Schedule: Complete legal analyses of proposed tariffs by 2nd quarter 2007, and bring any appropriate tariff forward for adoption by 3rd quarter 2007. Tariff language would need to be approved by City Attorney, the Ports' Executive Directors, and the Ports' Boards of Harbor Commissioners.

4. Move to 40 nm from Point Fermin when the USCG and Marine Exchange issues are resolved and radar system is in place.

   Schedule: 1st quarter 2008.

5. Staff will meet and work with the Pacific Ports Air Quality Collaborative in an effort to harmonize ship fuel requirements among the various ports.

   Schedule: Ongoing

6. As leases are opened through the EIR process or for renegotiation, or as new leases are negotiated, the Ports will include provisions for compliance with the Main Engine Fuel Standard as leases are opened.

   Schedule: As leases are opened.

7. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
CAP-OGV4 OGV Main Engine Fuel Standards	Environmental (Both Ports)	Number of ships using IFO Sulfur content of IFO fuels IFO bunker purchase locations Quantity of IFO consumed Number of ships using MGO Sulfur content of MGO MGO Bunker purchase locations Quantity of MGO burned Programmatic funding for MGO Ship fueling configurations Number of ships mono fueled Number of ships dual-fueled Number of ships switching fuels Engine manufacturer & model Number of fuel samples taken Meetings w/shipping lines	Quarterly

5.2.5 Control Measure Number SPBP-OGV5
Measure Title: *OGV Main & Auxiliary Engine Emissions Improvements*

This measure provides for main and auxiliary engine emissions reductions that are validated through the Technology Advancement Program. The goal of this measure is to reduce main and auxiliary engine DPM, NOx, and SOx emissions by 90%. The first engine emissions reduction technology for this measure will be the use of MAN B&W slide valves for main engines.

Initiation Year:	*2007*
Implementation Schedule:	*Increasing throughout five year period (see Table 5.20)*
Tonnage Reduced:	*Increasing throughout five year period (see Table 5.20)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Technology Advancement Program, Lease Requirements, Tariff Changes, & Incentives

Measure Description
This measure focuses on reducing DPM, NOx, and SOx emissions from main engines and auxiliary engines. OGV engine standards have not kept pace with other engine standards such as HDVs and CHE. IMO's MARPOL Annex VI is a very weak standard, which took a significant amount of time to ratify. There are discussions to reopen Annex VI and strengthen the standard as well as add a PM standard, though this process will not be completed fast enough to meet the San Pedro Bay Port's goals.

This measure is coupled with the Technology Advancement Program in that some of the technologies that can be utilized to reduce OGV engine emissions have not been assessed to determine the emissions control efficiencies except for repowering (which can only be done on some auxiliary engines) or electrification (again only on auxiliary engines). Therefore, as additional technologies are identified, demonstrated, and the agencies agree to associate reduction levels, they will be folded into this control measure and applied to the sources through a mix of implementation strategies. The ultimate goal is to achieve 90% or greater emissions reductions (DPM, NOx, and SOx) relative to the current Annex VI standard.

The technologies and challenges with the implementation of potential emissions reduction strategies can significantly differ between the two engine types (main and auxiliary). Large direct drive engines are generally two stroke, slow speed, and massive. Auxiliary engines can range from small to large medium speed engines. The following two subsections further describe characteristics and potential technologies that can/could be applied.

Main Engines

Main engines generally come in four configurations: direct drive, geared drive, diesel-electric, and steam. Direct drive is when the engine's drive shaft is directly connected to the propeller. These engines are massive two-stroke engines. In geared drive, the engine's drive shaft is connected to reduction gears that are then connected to the propeller. Generally, the drive shaft can be decoupled from the gears and then coupled back as needed. Diesel-electric configurations are a series of large auxiliary engines (generally medium speed) that turn generators that provide both the propulsion and auxiliary power loads. On some ships instead of several large auxiliary engines, jet turbines are installed to generate electricity. Finally, steam main engines are becoming obsolete but there still are a few ships that use boilers/steam power to provide mechanical power to the propeller.

The first technology that will be coming out of the Technology Advancement Program will be slide valves from engine manufacturer MAN B&W. This technology is relatively easy to install, not overly expensive, and provides good NOx and PM reductions. It is expected that emissions reduction levels will be agreed upon by the Coordination Committee of the Technology Advancement Program by 1st quarter of 2007. In addition, the AMEC system is going to be demonstrated at the Port of Long Beach for an alternative to shore-power for non-containership vessel types. Another technology that is going to be demonstrated shortly will be a seawater scrubber which holds the potential for significantly reducing DPM, NOx, and SOx all at the same time. Additional technologies are provided in the Technology Advancement Program (Section 5.8).

Auxiliary Engines

Auxiliary engines have a wide range of sizes and are generally medium speed diesel engines. Auxiliary engines turn generators that provide electricity to meet the ship's power demand for all non-propeller electrical functions. For diesel-electric ships however, the auxiliaries power even the propulsion engines. Large cruise ships are becoming more and more diesel-electric. A ship's power demand comes from various sources such as navigation system, computers, heating/ventilating/air conditioning, kitchen appliances, lighting, radio/ communications gear, bow thrusters, auxiliary engine blowers, refrigeration, etc. Cruise ships have extensive power requirements for all the passenger facilities onboard.

Selective Catalytic Reduction (SCR) technology is being demonstrated on a containership auxiliary engine that calls at the Port of Los Angeles. Another promising technology is in-line fuel emulsion, where water and the fuel are emulsified just before the fuel enters the engine.

Both Ports believe that existing vessels can become significantly cleaner ships, with respect to air quality, if at a minimum the following five elements are incorporated into the vessel's operations:

1. Use of cleaner 0.2% MGO fuels (SPBP-OGV3 & 4) in both main and auxiliary engines.
2. Compliance with VSR (SPBP-OGV1) on arrivals and departures.
3. Main engines retrofitted with slide valves and other applicable engine rebuild emissions reduction technologies.
4. Auxiliary engine(s) used during transiting are retrofitted with SCR, exhaust gas recirculation, in-line fuel emulsification, etc.
5. During hotelling, ships would have either shore-power capabilities, SCR with a DPM reduction technology, or exhaust gas scrubber(s).

Because of growth in trade and very weak international standards for vessel fuels and emissions, ships will become the dominant source of port-related emissions unless new vessels utilize the full array of technically feasible and cost-effective control technologies required of other source categories. New vessels destined for California service should be built with these technologies. As new orders for ships are placed, the Ports believe it's essential that the following elements be incorporated into the vessel's design and construction:

1. Design in extra fuel storage tanks and appropriate piping to run both main and auxiliary engines on a separate/cleaner fuel if operator elects to have cleaner and other grades of fuel on board.
2. Work with your engine manufacturer to incorporate all their emissions reduction technologies/options (slide valves, common rail, exhaust gas recirculation, etc.) that can be included when ordering main and auxiliary engines.
3. Incorporate SCR and sea-water scrubbers, or sea-water scrubbers alone if they control NOx as effectively as SCR, or equally effective combination of engine controls. If SCR or sea-water scrubber systems are not commercially available at the time of ship construction, design in space and access the installation of equipment after ship is built.
4. Incorporate shaft generators/micro turbines/heat recovery devices to take advantage of main engine power and exhaust heat.
5. Design in space for in-line emulsification and appropriate storage tankage and piping.
6. Design in access space, conduits, cable reels, cable winches, locker space, etc. for shore-power equipment.
7. Order low-NOx burners for auxiliary boilers.

Implementation Plan

The order in which emissions reduction technologies move to this control measure is as follows:

Existing/Emerging Technology → Technology Advancement Program → SPBP-OGV5

Once a technology has successfully passed through the Technology Advancement Program, then it will be integrated into this measure and implemented through the following strategies: lease requirements, tariff changes, CEQA mitigations, or limited incentives.

Air Quality Benefits

Emissions reductions associated with this measure assume slide valves will clear the Technology Advancement Program in 2006. At this time it is not known what emissions reduction magnitude they will achieve but preliminary data suggest on the order of 30% reduction in NOx and 25% DPM. Following these assumptions, implementation is assumed to be through lease requirements and CEQA mitigations. The estimated emissions reductions for this measure are presented in the following table.

Table 5.20: Estimated Emissions Reductions for SPBP-OGV5 by Fiscal Year

	2006/2007 (tpy)	2007/2008 (tpy)	2008/2009 (tpy)	2009/2010 (tpy)	2010/2011 (tpy)	Total (tons)
SPBP-OGV 5 - Slide Valve Retrofit-Main Engine						
TOTAL Measure DPM Reductions	**4**	**22**	**61**	**80**	**92**	**259**
TOTAL Measure NOx Reductions	**34**	**208**	**605**	**812**	**934**	**2,592**
TOTAL Measure SOx Reductions	**0**	**0**	**0**	**0**	**0**	**0**

Financial Costs

With the decision not to subsidize the higher-cost, lower-S fuels, the cost to the ports for this measure is limited to the costs associated with meeting with fuel providers, shipping lines, and other port authorities, verifying the fuels use, and administering the requirements.

Milestones

1. The Ports will publish fact sheets that describe the technologies and what the ports need (in terms of emissions reductions from the current fleet) ship emissions to be reduced to in order to achieve the Clean Air Action Plan's goals. The Ports will visit with and secure commitments from lines, tenants, ship manufacturers, engine manufacturers, and classification societies as well as bring the issue forward in international venues such as the International Association of Port Authorities, International Maritime Organization, and the Pacific Ports Air Quality Collaborative.

   Schedule: Fact sheets will initially be completed by end of 1st quarter 2007 and will be updated continuously from that point forward. Bringing the issue forward through meetings with various stakeholders and international forums will begin by end of 4th quarter 2006.

2. Ports will communicate recommendations for new ship builds to be compliant with the Clean Air Action Plan with shipping lines and ship builders.

   Schedule: Communicated through the Clean Air Action Plan 4th quarter of 2006, and a fact sheet and follow-up to the lines and builders 1st quarter 2007.

3. Validate slide valve emission reductions for DPM and NOx and then require the retrofit of vessels with MAN engines.

   Schedule: Validate DPM and NOx reductions by end of 1st quarter 2007. Retrofit requirements would be made through lease requirements there after.

4. As leases are opened through the EIR process or for renegotiation, or as new leases are negotiated, the Ports will include provisions for compliance with the Main & Auxiliary Engine Emissions Improvements measure.

   Schedule: As leases are opened.

5. Staff will meet and work with the Pacific Ports Air Quality Collaborative in an effort to provide/share information and advance engine emissions improvements.

   Schedule: Ongoing

6. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-OGV5 OGV Main & Auxiliary Engine Emissions Improvements	Environmental (both Ports)	Number of ships retrofitted with slide valves New technologies implemented	Quarterly

5.3 Cargo Handling Equipment Control Measure

5.3.1 Control Measure Number: SPBP-CHE1
Measure Title: *Performance Standards for CHE*

This measure calls for the following CHE improvements:

- ✓ *Beginning 2007, all CHE purchases will meet one of the following performance standards:*
  - *Cleanest available NOx alternative-fueled engine, meeting 0.01 g/bhp-hr PM, available at time of purchase, or*
  - *Cleanest available NOx diesel-fueled engine, meeting 0.01 g/bhp-hr PM, available at time of purchase.*
  - *If there are no engines available that meet 0.01 g/bhp-hr PM, then must purchase cleanest available engine (either fuel type) and install cleanest VDEC available.*
- ✓ *By the end of 2010, all yard tractors operating at the San Pedro Bay Ports will meet at a minimum the EPA 2007 on-road or Tier IV engine standards.*
- ✓ *By the end of 2012, all pre-2007on-road or pre Tier IV off-road top picks, forklifts, reach stackers, RTGs, and straddle carriers <750 hp will meet at a minimum the EPA 2007 on-road engine standards or Tier IV off-road engine standards.*
- ✓ *By end of 2014, all CHE with engines >750 hp will meet at a minimum the EPA Tier IV off-road engine standards. Starting 2007 (until equipment is replaced with Tier IV), all CHE with engines >750 hp will be equipped with the cleanest available VDEC verified by CARB.*

Initiation Year:	*2006*
Implementation Schedule:	*Increasing throughout five year period (see Table 5.21)*
Tonnage Reduced:	*Increasing throughout five year period (see Table 5.21)*
Key Milestone Dates:	*See Milestone Section*

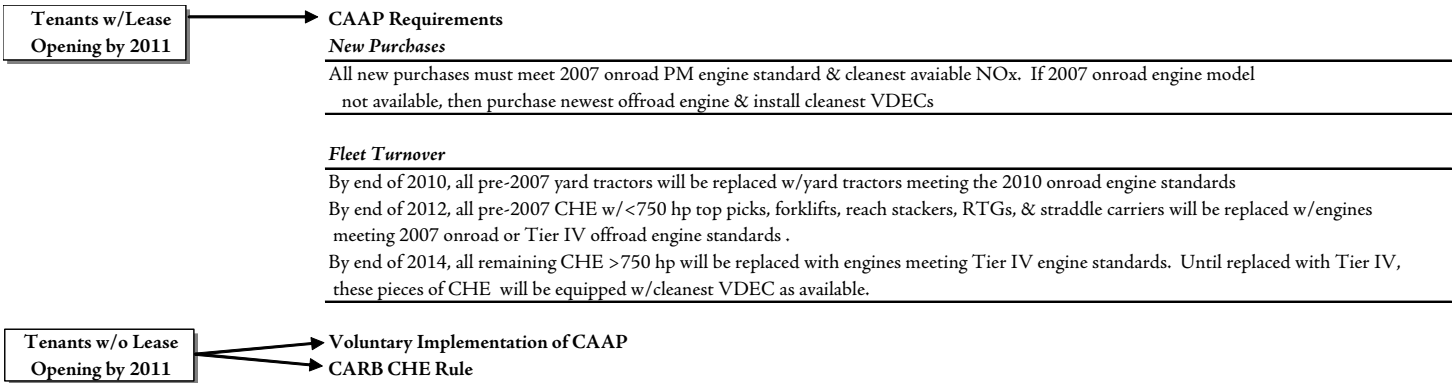
Initial Implementation Strategies: Lease Requirements

Measure Description

This program is designed to achieve the maximum possible emission reductions from cargo handling equipment operating at the port within next five years. This program accelerates CARB's CHE rule requirements. The proposed standards are listed above and include standards for the purchase of new CHE and timetables for the replacement of all pre-2007 engines. This measure will require that all yard tractors (which makes up ~60% of total CHE emissions) to be replaced with equipment that meets the 0.01 g/bhp-hr PM and the cleanest available NOx engines (for either alternative or diesel fueled engines) by the end of 2010. This measure also requires that all other pre-2007 CHE (which makes up ~32% of total CHE emissions) with engines <750 hp will meet the 2010 on-road or Tier IV engine

standards by the end of 2012 Finally, this measure requires all other CHE (which makes up ~8% of total CHE emissions) to meet the Tier IV off-road engine standards by the end of 2014. Starting in 2007 (until equipment is replaced with Tier IV), all such equipment (regardless of model year) will be equipped with the cleanest available VDEC. The following figure provides a summary of the Clean Air Action Plan requirements based on a lease requirement basis.

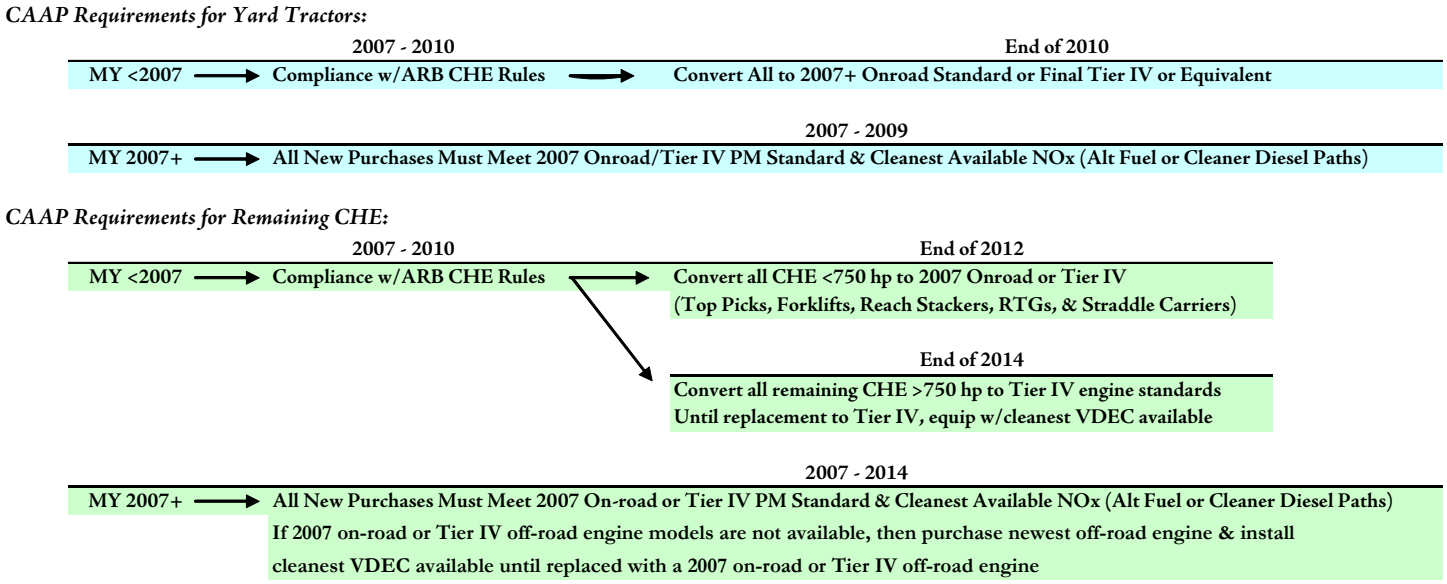
Figure 5.3: SPBP-CHE-1 Requirements



CARB recently adopted a regulation that requires the replacement or retrofit of existing engines with ones that use the cleanest available VDEC and requires, beginning January 1, 2007, that newly purchased, leased or rented CHE meet low PM and NOx limits. CARB's regulation is focused on equipment 2002 and older in 2007–2013 timeframe and 2003–2006 engines and equipment in 2010-2016 timeframe. This control measure further accelerates the CHE modernization concentrating mainly on 2003 and newer equipment that is not covered by the CARB regulation within the 2006/2007 and 2010/2011 fiscal year span.

The following figure provides an overview of how the Clean Air Action Plan requirements and the CARB CHE rule interact.

Figure 5.4: SPBP-CHE-1 & CARB CHE Rule Interaction



CHE other than yard tractors would meet or beat the most stringent applicable standard for the engine type and class as listed above in the CHE improvements summary.

Implementation Plan

The performance standards will be phased in through lease requirements requiring that terminals meet the standards listed above as part of new or amended lease negotiations or when leases are reviewed through the EIR process.

Milestones

1. Staff in cooperation with SCAQMD staff will develop and annually update a technical fact sheet detailing the status of various emissions control technologies or alternative fueled CHE. This fact sheet will contain details such as verification status of various emissions control devices, availability of low emitting equipment, results of successful demonstration of alternatively fueled equipment or new technology aimed at reducing emissions and the names/contact info of vendors or engine manufacturers who offer these products. The fact sheet will be made available on Port websites as well as to customers at the time of lease negotiation.

   Schedule: 1st quarter 2007 and then annually as needed.

2. Staff will develop a status sheet to be updated by the customer showing how they plan to meet the performance standards under this program. This sheet will have the original number of equipment, which is currently being provided by each customer to

the Port for emissions inventory update purposes. At the time of lease renewal, the customer will update this sheet to include, the number of equipment replaced or retrofitted, model year of retrofitted or replaced equipment, the engine manufacturer and the status of emission control devices installed and emissions certification status. This sheet will be used by staff to verify that the goals of this program are being met.

Schedule: 1st quarter 2007.

3. After the measure is approved, staff and SCAQMD will hold a joint outreach meeting for customers to present the funding incentives, funding levels, process, federal tax credits, schedule, and status of technology as outlined in the technical and fiscal fact sheets mentioned above. This will also be an opportunity for staff to gather questions and concerns that the customers might have so that they can be addressed prior to lease negotiations.

   Schedule: 2nd quarter 2007.

4. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

5. As leases are opened through the EIR process or for renegotiation, or as new leases are negotiated, the Ports will include requirements for maximum feasible utilization of the available shore-power infrastructure.

   Schedule: As leases are opened.

Air Quality Benefits

The estimated reductions in DPM, NOx, and SOx associated with this measure are presented in the following table.

Table 5.21: Estimated Emissions Reductions for SPBP-CHE1 by Fiscal Year

	2006/2007 (tpy)	2007/2008 (tpy)	2008/2009 (tpy)	2009/2010 (tpy)	2010/2011 (tpy)	Total (tons)
[1] **Total SPBP-CHE 1 Reduction**						
TOTAL Measure DPM Reductions	**4**	**6**	**9**	**9**	**11**	**40**
TOTAL Measure NOx Reductions	**127**	**195**	**290**	**336**	**376**	**1,323**
TOTAL Measure SOx Reductions	**0**	**0**	**0**	**0**	**0**	**0**

[1] Reductions are taken after ARB's adopted CHE regulation is implemented

The reduction estimates are calculated from 2005 CHE emissions adjusted for the cargo handling equipment regulation adopted by CARB in December of 2005. The 2005 EI currently underway calculated emissions based on population and activity data collected by interviewing terminal operators. The same methodology was used for 2001 baseline emissions calculations. No growth was assumed for future years.

Financial Costs

Since this measure will be implemented as a lease requirement, there will be no direct costs to either Port. The cost of complying with this requirement could be significant for terminal operators, but that cost cannot be estimated at this time.

Elements to Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-CHE1 Performance Standards for CHE	Environmental (both Ports)	Leases and CEQA schedules Number & type of equipment included in lease Performance standards for types of equipment Equipment Activity Levels (part of EI process) Emission Reductions from measure Availability of Fed/State/Local Funds Status of Emissions Control Technologies	Quarterly

5.4 Harbor Craft Control Measures

5.4.1 Control Measure Number SPBP-HC1

Measure Title: *Performance Standards for Harbor Craft*

This measure sets the following three goals for harbor craft home fleeted at either the Port of Los Angeles or the Port of Long Beach:

- ✓ *By the second year of the Clean Air Action Plan, all HC home-ported at San Pedro Bay Ports will meet EPA Tier 2 standards for harbor craft or equivalent reductions.*
- ✓ *By the fifth year, all previously repowered HC home-ported at San Pedro Bay Ports will be retrofitted with the most effective CARB verified NOx and/or PM emissions reduction technologies.*
- ✓ *When Tier 3 engines become available, within five years all HC home-based at San Pedro Bay Ports will be repowered with the new engines.*
- ✓ *All tugs will use shore-power while at their home fleeting location.*

Similar to SPBP-OGV5, this measure also defines "clean harbor craft" for both existing vessels and new builds.

Initiation Year:	*2001*
Implementation Schedule:	*Implemented through lease requirements & emissions inventory updates*
Tonnage Reduced:	*Unquantifiable at this time. Quantifiable after the 2005 emissions inventory update.*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Voluntary, Incentives, & Port of Los Angeles' China Shipping Settlement Funds

Measure Description

Over 150 harbor craft have already been repowered since 2001 with the help of the SCAQMD (under the Carl Moyer Program) and through the Port of Los Angeles' China Shipping Funds. There are approximately 150-200 fishing related vessels that have not been repowered although their numbers are expected to decline sharply as new fishing regulations come online shortly. This control measure focuses on harbor craft that are home-ported at either Port and could potentially be repowered with cleaner engines or retrofitted with verified/verifiable emissions control devices. This would occur either through lease renewals/renegotiations or through application to either the Carl Moyer Program or to the China Shipping Settlement PAQMIP.

Under this program, older propulsion and auxiliary harbor craft engines will be identified through the emissions inventory process as potential candidates for significantly cleaner repower or retrofit. Similar to SPBP-OGV5, this measure would work in tandem with the Advanced Technology Program in that retrofits for harbor craft are not currently verified by CARB and therefore technologies that successfully emerge from the program would be integrated into this measure.

Repowers and retrofits will also be required during lease renegotiation for harbor craft.

In addition, tugs at the home fleeting locations will use shore-power and not operate their auxiliary engines. Fleeting operations are when a tug is waiting for their next assignment and are tied up at their home facilities. This would include the Crowley home-port location next to the Port of Los Angeles fireboat facility, Millennium's home location at the end of Timm Way (south of Ports of Call), and Foss' home location on Pier D in Long Beach.

There are four fundamental elements to this control measure:

1. Through the emissions inventory update process, identify the candidate propulsion and auxiliary harbor craft engines for repower or retrofit.

2. Identify available SCAQMD, PAQMIP, Carl Moyer Program, and other available funds and criteria.

3. Assist owner/operator in applying for grant funding.

4. Develop harbor craft specific guidelines for "clean harbor craft," for both existing vessels and new builds. These guidelines will be updated as successful emissions reduction technologies are demonstrated through the Technology Advancement Program or when new Tier 3 engines are available.

5. Ports will work with SCAQMD, CARB, and EPA to develop and promulgate stringent (90% reduction) Tier III category 1 and 2 engine standards.

6. Tugs will use shore-power while at their home fleeting locations.

Implementation Approach

In order to successfully implement element 1, harbor craft emissions inventory needs to be updated to identify the population of harbor craft engines by model year, type of engines (mechanical versus electronically controlled) and their emissions contribution compared to total harbor craft emissions. This is being accomplished with the 2005 EI update project, which is currently ongoing.

Every year, SCAQMD receives a share of the state's Carl Moyer Program funds to reduce emissions from mobile source engines faster than required by state regulations. Both Ports should coordinate with SCAQMD staff to solicit these funds to clean harbor craft engines.

Staff will provide assistance to identified candidate vessel owner/operators in applying for grant funding.

Since some of the assist tugboats are common to Port of Los Angeles and Long Beach, it is important that staff build a consensus plan to achieve the goals of this measure.

Staff will develop a set of guidelines that will define "clean harbor craft." The Coordination Committee will discuss and draft language for both Port's Executive Directors and respective Boards to approve. Due to the nature of emerging emissions reduction technologies, as well as cleaner engines, the "clean harbor craft" definitions for existing and new builds will be updated annually, as appropriate. Again this measure will rely heavily on the Technology Advancement Program to demonstrate verifiable emissions reduction technologies and cleaner fuels that can reduce emissions.

Air Quality Benefits

Air quality benefits will be updated upon completion of the 2005 emissions inventory updates.

Financial Costs

At this time there are no anticipated costs associated with the program other than those costs associated with the Technology Advancement Program.

Milestones

The following is a list of milestones and their schedule for completion for this control measure:

1. Staff, in cooperation with agencies, will provide information availability of grant funding from various sources such as SCAQMD, CARB grants, and EPA. The information will be made available on port websites.

   Schedule: Starting 4th quarter 2006 and ongoing.

2. Staff, in cooperation with SCAQMD, will develop and annually update a technical fact sheet detailing the status of various emissions control technologies, engine standards, and engines available (including alternative fuels). This fact sheet will contain details such as verification status of various emissions control devices and availability of low emitting engines. The fact sheet will be made available on Port websites as well as to customers at the time of lease negotiation.

Schedule: Starting 2nd quarter 2007 and then annually.

3. Prior to the application deadline, staff and SCAQMD will hold a joint outreach meeting for the customers to present the various grant funding processes and funding levels, program flexibility and status of technology as outlined in the technical/fiscal fact sheets mentioned above. This will also be an opportunity for staff to gather questions and concerns from customers so that these can be addressed prior to lease negotiations. Staff will identify candidate vessels through the emissions inventory process.

   Schedule: Annually

4. Staff will contact and assist candidate vessel owners/operators in applying for grant funding associated with emissions reduction technologies/strategies.

   Schedule: As grant programs become available.

5. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-HC1 Performance Standards for Harbor Craft	Environmental (both Ports)	Lease schedule Carl Moyer funding level for marine application # of harbor craft repowered # of harbor craft retrofitted Activity Verification status (retrofits)	Ongoing Annual

5.5 Railroad Locomotives Control Measures

5.5.1 Measure Number SPBP-RL1

Measure Title: *PHL Rail Switch Engine Modernization*

This measure will be implemented through the second amendment to the operating agreement between the Ports and PHL, which calls for the following:

- ✓ *By 2008, all existing switch engines in the Ports will be replaced with Tier 2 engines and will use emulsified fuels as available or other equivalently clean alternative diesel fuels.*
- ✓ *Any new switch engine acquired after the initial replacement must meet EPA Tier 3 standards or a NOx standard of 3 grams/bhp-hr and a PM standard of 0.0225 g/bhp-hr.*
- ✓ *All switch engines will have 15-minute idling limit devices installed and operational.*
- ✓ *PHL will conduct a series of feasibility tests including: DOC or DPF retrofits, LNG locomotive and hybrid locomotive. Based on successful demonstration of a locomotive DOC or DPF, all of the Tier II engines will be retrofitted preferentially with the DPF, or with the DOC retrofit as a fallback if the DPF trial is not successful.*
- ✓ *The DPF trial and retrofits will be separately funded by the ports as an additional item not in the current amendment.*

Initiation Year:	*2005*
Implementation Schedule:	*Increasing throughout five year period (see Table 5.22)*
Tonnage Reduced:	*Increasing throughout five year period (see Table 5.22)*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: Second Amendment to Operating Agreement

Measure Description

This measure implements the PHL switch engine modernization agreement with the Ports. This program will replace sixteen of PHL's switch engine fleet with newer and significantly cleaner Tier 2 compliant railroad locomotive engines equipped with idling controls. Emissions associated with switch engine activities are significant and generally occur within Port boundaries. The fundamental elements associated with this control measure:

1) According to the terms of the second amendment of the operational agreement between PHL, Port of Los Angeles and Port of Long Beach, PHL will procure and replace sixteen older technology locomotives with engines that meet or surpass the most stringent applicable emission standards.
2) Staff will track the progress of locomotive replacement, testing of a locomotive DOC or DPF, demonstrations of LNG, hybrid, and multiple engine generator set locomotives, installation/operation of 15-minute idle restrictors, and use of emulsified fuels.

3) If the DOC or DPF testing is successful, DOCs or DPFs will be installed on all the Tier 2 locomotives.
4) If PHL purchases additional locomotives, they will exceed Tier 2 standards or the most stringent standards in effect at the time of their purchase.
5) Emulsified diesel fuel or other clean alternative diesel fuel will be used in all diesel fueled switchers.

Demonstration of additional technologies not specifically listed above will be part of the Technology Advancement Program which is further described later in Section 5. Successfully demonstrated emission reduction technologies from that program will be incorporated into existing or additional control measures. Again, this measure focuses only on the implementation of the second amendment of the operational agreement between PHL and the Ports.

Implementation Approach

This program calls for sixteen of PHL's current fleet of 20 switching locomotives to be replaced by new locomotives meeting Tier 2 emission levels. Agreement among PHL, the Port of Los Angeles, and the Port of Long Beach to proceed with this measure has been reached, and deliveries of the new locomotives are expected beginning in early 2007.

The Ports have approved the funding for this modernization program. Carl Moyer grant funds have also been awarded to PHL for a portion of the fleet modernization costs. As part of the agreement with the Ports of Los Angeles and Long Beach, PHL will conduct demonstration testing of a hybrid electric and a LNG locomotive, and will also install a DOC or DPF on one of the Tier 2 locomotives for evaluation purposes. If the DPF test is successful, they will be installed on the remaining Tier 2 locomotives. In addition, if PHL purchases additional locomotives, they will meet Tier 2 standards or the most stringent standards in effect at the time of their purchase. In addition, emulsified fuels will be used in all switch engines.

From May 31, 2006 to September 30, 2006, PHL conducted its own independent demonstration project of a multiple engine generator set locomotive. The 4 month demonstration project was considered successful and PHL has been approved for Carl Moyer funding for replacing an additional 3 locomotives with multiple engine generator set locomotives. In accordance with the second amendment of the operational agreement, which states that any new switch engine acquired after the initial replacement must meet EPA Tier 3 standards or a NOx standard of 3 grams/bhp-hr and a PM standard of 0.0225 g/bhp-hr, the multiple engine generator set locomotives achieves these levels. The locomotives are expected to be in use in 2008.

Air Quality Benefits

The estimated reductions in DPM, NOx, and SOx associated with this measure are presented in the following table. The emission reductions associated with limiting idle times from switch engines included in the MOU between CARB and the Rail industry has been quantified and the figures in the table have been adjusted to reflect these reductions.

Table 5.22: Emissions Reductions for SPBP-RL1 by Port by Fiscal Year

Reductions (tpy)	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
DPM	3	3	3	3	3
NOx	163	163	163	163	163
SOx	0.2	0.2	0.2	0.2	0.2

Financial Costs

The funding for this measure has been allocated prior to the period of this plan (i.e., prior to FY 2006/2007). The costs listed in the table below are for each Port's funding for the purchasing of new Tier 2 rail locomotives.

Table 5.23: Costs for SPBP-RL1 by Port by Fiscal Year

SPBP-RL1	PHL Moderinization	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
	POLA (Tier II Engines)	$5,000,000	$0	$0	$0	$0	**$5,000,000**
	POLB	$5,000,000	$0	$0	$0	$0	**$5,000,000**
	SCAQMD	$5,500,000	$5,500,000	$0	$0	$0	**$11,000,000**
	ARB	$0	$0	$0	$0	$0	**$0**
	FY Totals	**$15,500,000**	**$5,500,000**	**$0**	**$0**	**$0**	**$21,000,000**

Milestones

1. Multiple Engine Generator Set locomotive demonstration.

   Schedule: Completed 4th quarter 2006.

2. Hybrid locomotive demonstration.

   Schedule: Completed 2nd quarter 2006

3. LNG locomotive demonstration.

   Schedule: Starting 1st quarter 2007 and ending 1st quarter 2008.

4. DPF/DOC demonstration.

   Schedule: Starting 2nd quarter 2007 and ending 2nd quarter 2008.

5. All Tier II locomotive engines operational.

   Schedule: 4th quarter 2007.

6. All Multiple Engine Generator Set locomotives operational.

   Schedule: 4th quarter 2008.

7. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-RL1 PHL Rail Switch Engine Modernization	Environmental/ Executive (both Ports)	Delivery & number of switchers Activity of switchers Emulsified fuel consumption of switchers Amount of incentive funding Demonstration projects Installation/operation of 15-minute idling restrictors	Quarterly

5.5.2 Measure Number SPBP-RL2
Measure Title: *Existing Class 1 Railroad Operations*

This measure effects only existing Class 1 railroad operations on Port property (SPBP-RL3 effects all new or redeveloped rail yards). The goal of this measure is to secure a MOU with the Class 1 railroads, and use other contractual mechanisms, to reduce emissions from their existing operations on Port properties that do not have a CEQA action pending in the next five years (i.e. new or redeveloped rail yard). The goals laid out for the measure are:

- ✓ *By 2011, all diesel-powered Class 1 switcher and helper locomotives entering Port facilities will be 90% controlled for PM and NOx, will use 15-minute idle restrictors, and after 1 January 2007, the use of ULSD fuels.*

- ✓ *Starting in 2012 and fully implemented by 2014, the fleet average for Class 1 long haul locomotives calling at Port properties will be Tier III equivalent (Tier 2 equipped with DPF and SCR or new locomotives meeting Tier 3) PM and NOx and will use 15-minute idle restrictors. Class 1 long haul locomotives will operate on USLD while on Port properties by the end of 2007. Technologies to get to these levels of reductions will be validated through the Technology Advancement Program.*

Initiation Year:	*2007*
Implementation Schedule:	*Implemented through MOU and other contractual provisions*
Tonnage Reduced:	*Unquantifiable at this time*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategies: MOU & Other Contractual Provisions

Measure Description

This measure focuses on existing Class 1 locomotives operating on Port properties. Standards for new or redeveloped rail yards on Port properties are addressed in RL-3 (see SPBP-RL3 for new or redeveloped rail yard requirements).

In 1998 Memorandum of Mutual Understandings and Agreements (MOU), CARB and the Class 1 railroads (BNSF and UP) entered into an agreement that would set the fleet average for locomotives operating in the South Coast nonattainment area at 5.5 g/hp-hr (equivalent to the Tier 2 new locomotive NOx standard included in the Final EPA National Locomotive Rule). The Tier 2 engine standards require an approximate 58% level of NOx control for new locomotives. Under a subsequent 2005 MOU the Class 1 railroads agreed to:

1. Phase-out all "non-essential" idling (by 1 January 2007 for all California-based locomotives)
2. Install idling reduction devices (limiting idling to 15 minutes) on California-based locomotives within three years (30 June 2008)
3. "Maximize" the use of ULSD (15 ppm) after 1 January 2007

The 1998 MOU focuses on fleet averaging for locomotives operating in the South Coast nonattainment area. Fleet averaging means that not all locomotives will meet the 5.5 g NOx/hp-hr target, however taking the fleet as a whole, the fleet average must meet the target. This provides flexibility to the Class 1 railroads on how to best meet that target. That leaves the line haul locomotives operated by BNSF and UP as the focus of this measure.

In addition to meeting the requirements in the above MOUs, this measure calls for significant reductions from switcher and helper locomotives that service Port facilities. These locomotives don't have the challenges of the long-haul locomotives, as they are assigned to specific facilities or finite regional areas as compared to the long-haul locomotives that travel over the national rail network.

Under the CARB Emission Reduction Plan for Ports and Goods Movement in California. CARB states their belief that advanced technologies, which can control emissions by 90% of PM and NOx, will be available by 2012 assuming that EPA sets an effective Tier 3 standard by 2012. CARB has assumed an accelerated locomotive replacement rate of 10% per year. Based on this timetable, 40% of the California fleet could be 90% controlled by 2015, and 90% of the fleet could be 90% controlled by 2020. On the other hand, the draft 2007 AQMP proposes that all locomotives operating in the Basin by 2014 have Tier 3 equivalent emissions and that all locomotives moving in and out of the two Ports would be equipped with Tier 3 equivalent controls by 2011.

Under this measure, the Ports and the Class 1 railroads will seek to enter into an MOU and in addition the Ports will utilize all available contractual mechanisms, which may affect rail operations to achieve the above performance standards. Any proposed MOU would be subject to public notice and comment.

The Ports will join with SCAQMD to urge EPA to adopt stringent Tier 3 emission standards for locomotives to require 90% below Tier 2 standards of PM and NOx, to be implemented no later than 2012. The Ports will also join with SCAQMD to request that any public bond funding for rail infrastructure be conditioned to require compliance with the performance standards in this measure.

Implementation Plan

This control measure calls for the Ports to enter a formalized MOU (subject to public review and comment) with the Class 1 railroad operators, and to evaluate and in addition utilize all available contractual provisions which may affect rail operations to achieve the goals of this measure as stated above.. It should be noted that lease requirements or CEQA actions associated with a new or modified rail yard would be covered under RL3.

With respect to 15-minute idling restrictors, BNSF's goal is to equip switchers and intrastate locomotives with idling controls within 3 to 4 years (as stated in 2005). The potential exists to accelerate this schedule to 2 years. Although installation of tamper proof idle control technology in an abbreviated timeframe would not be a problem on GE locomotives, a problem could exist on EMD locomotives. Therefore, a certain amount of research and testing may be necessary. This testing will be incorporated into the Technical Advancement Program. Alternative compliance for long haul locomotive equipment that aren't equipped with 15-minute idle restrictor will be operational such that all non-essential idling will be eliminated while operating at Port facilities.

DPFs, SCRs, and other technologies would, to the extent necessary, be validated as part of the Technology Advancement Program include a long-haul duty cycle locomotives. The most effective of these technologies will be utilized to meet the goals of this measure.

Air Quality Benefits

Emissions reductions at this time are not quantifiable.

Financial Costs

At this time there are no anticipated Port-related costs associated with the control measure other than administrative costs.

Milestones

1. Meet and work with representatives of the Rail industry to draft a plan for limiting emissions from locomotives consistent with the goals of this measure. Modification of the existing, or development of a new MOU, may be required. Any MOU would be subject to public review and comment.

   Schedule: Begin negotiations with Class 1 railroads in 1st quarter 2007.

2. Include conditions to implement this measure in contractual agreements that may affect rail operations.

   Schedule: Ongoing

3. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing once the MOU is in effect.

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-RL2 Operational Controls for Class 1 Railroads	Environmental (both Ports)	Number & activity data of Class 1 switchers, helpers, and long haul locomotives on Port property Number and date when switchers achieve goal Number of long haul that meet goal	Annually

5.5.3 Measure Number SPBP-RL3
Measure Title: *New and Redeveloped Rail Yards*

This measure focuses on new and redeveloped rail facilities located on Port properties with the goal of incorporating the cleanest locomotive, CHE, and HDVs technologies into their operations. The performance standards for these rail yards include:

- ✓ *Cleanest available technology for switcher, helper, and long haul locomotives (e.g. electric, diesel-electric hybrids, multiple engine generator sets, DPM and NOx retrofits (DPFs, SCRs, etc.), alternative fuel, etc.) integrated into new and redeveloped rail yards consistent with goals and timeframe of SPBP-RL2*
- ✓ *"Green-container "transport systems*
- ✓ *Idling shut-off devices*
- ✓ *Idling exhaust hoods*
- ✓ *ULSD or alternative fuels*
- ✓ *Clean CHE and HDVs*

Initiation Year:	*2006*
Implementation Schedule:	*New or redeveloped projects/lease requirements will be used to phase in the performance standards for clean rail yards.*
Tonnage Reduced:	*Not quantifiable at this time*
Key Milestone Dates:	*See Milestone Section*

Initial Implementation Strategy: Lease Requirements and CEQA
Measure Description

Rail facilities include many emission-producing activities for switcher and long haul locomotives -- including switching, idling, loading/unloading of railcars by CHE, and drayage of containers to and from the rail yard. Under this measure, new rail facilities, or modifications to existing rail facilities, will incorporate clean low emitting equipment including the cleanest locomotive technologies available. A list of such technologies will be provided for project proponents to consider in developing new facilities, and choices will be formalized in project approvals and lease requirements. The initial expectations for cleanest rail yard technologies include the following requirements:

- ➢ Newly acquired switching locomotives will be clean technology locomotives (e.g. electric, diesel-electric hybrids, multiple engine generator sets, or alternative fuel).
- ➢ Existing Class 1 switcher locomotives that operate on Port properties will meet the requirements detailed in SPBP-RL2.
- ➢ Existing Class 1 switching locomotives will have 15-minute idling shut-off devices installed and operational.

- Switchers operating on Port properties will use ULSD fuels.
- Class 1 helper locomotives will be turned off while on Port properties. If for safety reasons helper locomotives need to be on then they will meet similar controls as long haul locomotives.
- Starting in 2012 and fully implemented by 2014, the fleet average for Class 1 long haul locomotives calling at Port properties will be Tier III equivalent (Tier 2 equipped with DPF and SCR or new locomotives meeting Tier 3) PM and NOx and will use 15-minute idle restrictors. Class 1 long haul locomotives will operate on USLD while on Port properties by the end of 2007. Technologies to get to these levels of reductions will be validated through the Technology Advancement Program.
- Idling exhaust hoods equipped with emission controls will be used at locations where essential idling occurs routinely (such as for maintenance activities) if such hoods are shown to be effective emission control devices by testing currently underway.
- New and modified rail facilities will be subject to the conditions of CHE measure SPBP-CHE1, and will have provisions requiring service by clean trucks as defined by measure SPBP-HDV1.

The Ports plan is to maximize the use of on-dock rail as an effective way to limit emissions associated with operation of on-road trucks and rail yards near residential areas. Several factors effect use of on-dock rail, such as: shipper and steamship line logistics (transloading, transportation costs, etc.), railroad operations (equipment availability, train schedules, and steamship line contracts/arrangements), terminal operations/congestion, and on-dock rail yard capacity. To accommodate projected increases in intermodal traffic and maximize rail movement of cargo, greater efficiencies in on-dock rail operations, and additional rail infrastructure beyond what currently exists, will need to be planned by the Ports. Rail infrastructure supporting port operations consists of on-dock and near-dock rail yards and trackage connecting port terminals with the Alameda Corridor. Greater rail operational efficiencies and additional capacity in the ports is important to maximize use of the Alameda Corridor, and consequently reduce truck trips.

Some of the rail infrastructure improvements can be constructed within the existing land area to increase capacity. Capacity of the existing on-dock rail yards, can also be increased through expanded hours of operations and improved efficiency in operational procedures. However, these physical improvements and operational changes may not be sufficient to accommodate the long-term growth forecasts for both Ports. Existing rail yards will need to be made more efficient and expanded, and new yards will need to be evaluated and planned to minimize their impacts on communities. The existing rail yards cannot be expanded without additional land area and it's important to note that although rail yard expansions are needed in the face of projected cargo volumes, there is also a practical limit total size of on-dock rail facilities.

For these reasons, the ports will take all opportunities to maximize on-dock rail, and explore any other alternatives, in order to (1) reduce the need for truck drayage and (2) minimize the need for rail yard operations outside of the ports that are in relatively close proximity to residential and other receptors. In addition, the ports will evaluate and publicly report to the Boards of Harbor Commissioners regarding means to achieve these goals. Such evaluation shall include an assessment of (1) means to maximize use and efficiency of on-dock rail operations, and (2) the extent to which alternatives to development of additional rail yard capacity could be implemented, including the potential benefits and impacts of transporting containers by rail from the ports to relatively remote areas where trains to specific destinations would be created.

As on-dock rail becomes maximized, near-dock rail facilities could further increase the capacity of moving cargo out of the port-area by rail and limit the distance of truck drayage. The community impacts around these facilities require the cleanest technologies and operational controls. This is why one of the primary elements of the Technology Advancement Program is to develop new "green-container" transport systems to reduce the impacts on communities, fuel consumption, and the environment, while assuring that all discretionary cargo utilizes is not drayed inland by trucks.

Implementation Plan

This measure will be implemented through lease requirements and the CEQA process for new or modifications to existing facilities.

Air Quality Benefits

The air quality benefits of this measure will accelerate the improvements to be gained from locomotive and CHE regulations and from the MOU between the class 1 railroads and the CARB. Since the measure will affect new or modified rail facilities that have not been designed, estimating the level of emission reductions is not possible at this time. However, the measure will result in reduction of emissions of DPM, NOx, other criteria pollutants, and other diesel-related pollutants beyond what will be achieved by upcoming regulations and the railroad/CARB MOU.

Financial Costs

At this time there are no anticipated costs to the ports associated with this control measure.

Milestones

1. For new or modified rail facilities staff will identify the cleanest locomotive technologies and clean cargo handling equipment and heavy-duty vehicle technologies,

   Schedule: Concurrent with EIR development; ongoing.

2. The benefits of this program will be quantified and reflected in the periodic updates to the Port's emissions inventories.

   Schedule: Ongoing

Elements To Be Tracked

The following is an initial list of elements that will be tracked for the control measure. Throughout the implementation of this measure it may be deemed that additional elements need to be tracked or that elements listed below will no longer need to be tracked. This will be driven by the reporting requirements/requests of the Executive Directors and the Boards.

Measure	Lead Department	Initial Measure-Related Tracking Elements	Initial Frequency
SPBP-RL3 Performance Standards for New or Modified Rail Facilities	Environmental (both Ports)	Planned new rail facilities Rail facilities to be modified/expanded Upcoming rail facility lease renewals Status of evaluation/demonstration projects for innovative control technologies	On-going

5.6 Construction Activity

As stated in Section 4.2, construction activity emissions will be assessed through the CEQA evaluation process and control strategies that may be required to meet CEQA mitigation requirements will be incorporated into bid packages for the actual construction work. The CEQA process will be the implementation method for ensuring construction activities meet health risk mitigation requirements.

Construction equipment includes marine sources (primarily dredges) and land sources (excavators, cranes, etc.). For all dredging related projects there are two primary types of dredges that operate at the San Pedro Bay Ports: cutter-suction head and clamshell. For San Pedro Bay Ports, cutter-suction head dredging and all clamshell dredging will be required to be shore-powered.

Land and marine based construction equipment will be required to meet the control strategies that may be required as mitigations in the project's CEQA document. The Ports, SCAQMD, and ARB will be developing a list of Best Management Practices (BMPs) associated with construction activities by the end of 2007. These BMP will be incorporated in construction contracts.

Additional emissions control strategies are being explored. For example, the Port of Los Angeles is developing a concept that would include emissions limits and controls in their bid packages. Bidders would receive a "calculator," which they would fill out and submit with their bids. "Emissions calculators" may be developed prior to the bid solicitation package going public and would incorporate that project's emissions limitations, control strategies applicable to construction equipment, and other limitations/specifications developed under the CEQA analysis. The calculator would be simplified to the extent that that dredge/construction companies would not need to hire air quality expertise to fill out the calculator to determine whether their bid meets the specific project requirements. In addition, contract specification language would be developed and incorporated into the construction contracts stating the reporting, recordkeeping requirements, and penalties (should any requirement not be met).

The bid package and contract language would be developed on the next project requiring CEQA analysis after the Clean Air Action Plan is adopted by each Port. The language would be shared between Ports to facilitate the process of incorporating air quality requirements into construction bids and contracting. It is also noted that the language would most likely be different for each Port due to each city's requirements.

5.7 Technology Advancement Program

The Clean Air Action Plan's Technology Advancement Program is an integrated component that will evaluate, demonstrate, and incorporate new strategies and technologies into the suite of control measures that will ultimately result in significant reductions of DPM and criteria pollutants. Demonstrations will include technologies that utilize "green" and renewable energy sources. This initiative builds on the success and synergies of the San Pedro Bay Ports, CARB, SCAQMD, EPA Region 9, and customers/tenants working together to find joint solutions. Several successful projects have been completed over the years between these entities, and this program would help to build on that success.

The Technology Advancement Program will be the forum where needed research and development (R&D), evaluations of emissions strategies, as well as demonstration and pilot projects will be coordinated between both Ports and with the regulatory agencies. This coordination is focused on 1) mutual agreement on the methods by which emissions reduction strategies and technologies are tested/demonstrated, 2) consensus agreement on the emissions reductions from particular strategies and technologies that are tested and evaluated, and 3) opportunities for the regulatory agencies to co-fund projects that they are interested in. In addition to regulatory agencies, other co-funding entities, particularly other Ports, shipping lines, and tenants will be able to partner in specific R&D, demonstrations, and pilot projects.

It is envisioned that the Technology Advancement Program would be the catalyst for identifying, evaluating, and demonstrating/piloting new emissions reduction technologies/strategies that could then be utilized in future updates to the Clean Air Action Plan as new control measures,

alternatives to existing strategies, or as additional mitigation options for new projects. Below is a simplified illustration of how the process would work.

Existing/Emerging Technology → Technology Advancement Program → Implementation

There are four fundamental areas in which the program will focus its initial work:

- Specific Control Measure Requirements
- "Green-Container" Transport Systems
- Emerging Technology Development
- Emissions Inventory Improvements

Further details on these four components are provided below.

Specific Control Measure Requirements

Specific control measure requirements identified in Section 5 that need demonstration, additional evaluation, and testing include:

- SPBP-OGV1: Emissions source testing of ships participating in the VSR program to determine the magnitude of DPM, NOx, and SOx reductions associated with the measure. As part of this effort, selected ships will undergo in-use testing of the main engines to determine the effects of the VSR program.
- SPBP-OGV2: Demonstration and testing of AMECs system with respect to at-berth emissions reductions. The Port of Long Beach is leading this effort with their demonstration at a bulk facility. This demonstration will be rolled into the Technology Advancement Program.
- SPBP-OGV4: Evaluation of technical, logistical, and fuel supply issues associated with use of cleaner fuels in the main engines. An update to the Port of Los Angeles Fuel Availability Study as well as starting discussions with fuel suppliers and producers on availability at ports that are in associated strings with the Ports.
- SPBP-OGV5: Demonstration and emissions source testing of main and auxiliary engine emissions reduction strategies such as MAN-B&W slide valves. Slide valves are being utilized by several ships however; emissions reduction claims by the manufacturers have not been evaluated with test data. As part of this effort, the engine manufacturer will be asked to submit their testing data on slide valves and as needed in-use source testing will be conducted. In addition to slide valves, other promising emissions reduction technologies (such as exhaust gas scrubbers, selective catalytic reduction, seawater scrubbers, etc.) will be similarly evaluated as part of the program to determine the magnitude of emissions reductions and to ensure that emissions don't actually increase.

- SPBP-OGV5: Discuss and draft proposed "clean ocean-going vessel" guidelines with respect to air quality for both existing vessels and new builds.
- SPBP-CHE1: Demonstrate electric powered CHE that can meet the operational requirements of the terminal.
- SPBP-HC1: Demonstration, emissions source testing, and evaluation of emissions reduction technologies for harbor craft. Focusing on the transfer of successful control strategies for other land-based sources that use similar engines, such as DPFs and DOCs. In addition, new technologies or approaches such as hybrid configurations that are currently being applied on rail locomotives. Beyond retrofits, demonstrate the feasibility of hybrid tugboats (similar to the rail locomotive version) and determine if electric tugboats are feasible.
- SPBP-HC1: Discuss and draft proposed "clean harbor craft" guidelines with respect to air quality for both existing vessels and new builds. The draft language will be submitted to both Port's Executive Directors for approval and then to each Port's respective Boards. The approved guidelines will be used during lease negotiations with tenants that home-port harbor craft.
- SPBP-RL1: Demonstration, emissions source testing, and evaluation of emissions reduction technologies for switcher locomotives including DOCs, DPFs, hybrid electric, and alternative fueled LNG locomotives.
- SPBP-RL2: Demonstration, emissions source testing, and evaluation of emissions reduction technologies for long-haul locomotives including DOCs, DPFs, SCRs, and other emerging technologies that could be utilized by these locomotives. In addition, testing of tamper proof 15-minute idle restrictors for EMD powered locomotives may be necessary.

In addition to these specific requirements, additional demonstration, testing, and evaluation will be conducted on emerging emissions reductions strategies that could be incorporated into the Clean Air Action Plan. As these strategies are successfully demonstrated and evaluated, they will be incorporated into new or alternative control measures and become part of latest Clean Air Action Plan update.

"Green-Container" Transport Systems

This component of the program is focused on finding the next generation of transport solutions for goods movement. The ultimate goal is a 21st century electric powered system that will move cargo from our docks to the destinations within 200 miles that today are moved by truck. It make take 20 years to complete such a system but it will always be 20 years away unless in the next five years we build and test a demonstration prototype and perfect a detailed plan for widespread construction.

It is the goal of this effort to find and demonstrate innovative technologies that can be utilized for more efficient and greener movement of cargo. This includes renewable energy technologies,

hybrid technologies, and broadening the use of electrification (from "green energy" sources) in port-related sources. In the face of growing cargo throughput and activity, the ultimate goal is to move to pollution-free technologies and strategies. The program will not only evaluate innovative strategies, but will provide funding for pilot programs to demonstrate their feasibility.

The Ports are committed to this endeavor and have already released a joint RFP for advanced cargo transportation technology evaluation and comparison with regards to container transport to near dock rail facilities. Advance technologies included for evaluation include: linear induction motor systems, electric container conveyor systems including "mag-lev," freight shuttle systems, aerospace freight options, etc. As part of the scope, the Ports will develop an RFP to undertake design and construction of prototype systems. It is important to note that this is only the start to pursuing green-container transport solutions. In addition to this first RFP, the Port of Los Angeles will out reach to other Pacific Rim Ports for their ideas and collaboration on green transport solutions. The Port will do this through their Pacific Ports Air Quality Collaborative initiative developed with the Shanghai Municipal Port Administrative Center.

The ports will also solicit and evaluate new technologies that can be used on OGVs that go beyond cold-ironing at berth and fuel improvements. This process will be broad in the range of technologies that will be evaluated and demonstrated, such as scrubbing technologies (like demonstration of sea-water scrubbers on containerships which significantly reduce DPM, NOx, and SOx) that can be retrofitted into ships, renewable energy options (e.g. solar, wind, fuel cells, etc.) , hull improvements, new propulsion technologies, etc.

Other source categories will be evaluated, and demonstration/pilot projects will be conducted, to evaluate and ultimately integrate "green-container" transport into the current transport systems.

Emerging Technology Development

The emphasis of this portion of the Technology Advancement Program is to facilitate testing of emerging technologies that can be used to reduce emissions associated with the five port-related source categories. As new technologies emerge, promising technologies that are beyond the R&D phase will be evaluated by the Ports and regulatory agencies as to their likely successful use on port-related emissions sources. In addition to emission reduction technologies that target DPM, NOx, and SOx, the Technology Advancement Program will evaluate and demonstrate technologies that target ultra fine particles and greenhouse gases. If funding a demonstration project is deemed appropriate then the technology/strategy would be implemented under this part of the program and if found to be successful and implementable, then the technology/strategy would be incorporated into existing control measures, made its own control measure, or used as an alternative to existing technologies/strategies.

Emissions Inventory Improvements

This portion of the Technology Advancement Program focuses on increasing the accuracy of the key monitoring and tracking elements which is the emissions inventory. Under this effort the goal will be to improve the emissions inventories so that they are reflective of ever changing working conditions as well as improve the turnaround time of the inventories. These improvements include:

- Evaluating emissions factors and conducting source testing to improve their representation of the emissions loading from the various port-related sources.
- Evaluating duty-cycles/load factors and conducting data logging to improve their representation of the duty-cycles for the various port-related sources. The Ports started an initial evaluation program for duty-cycle data logging of CHE which will be completed in 2007. These results will be reviewed by the emissions inventory Technical Working Group and included in the emissions estimate calculations.
- Determining OGV actual speeds from 20 to 40 nm from Point Fermin using the enhanced radar system proposed in SPBP-OGV-1. This will significantly improve the accuracy of emissions estimates through that reach of the transit.
- Evaluate the incorporation of Automatic Identification System (AIS) data into the emissions estimates for OGVs. This could provide detailed speed data throughout the study area.
- Include ultra fines in the emissions inventories when emissions estimating methodologies are approved.
- Evaluate direct data uploads to emissions inventory database to facilitate the transfer of information.
- Health risk assessment improvements and standardization.
- Evaluate critical highway speed data to better improve the accuracy of HDV emissions estimates.
- Discussions with OGV engine manufacturers to evaluate their test data and understanding of the emissions profiles of their engines at different loads and determine if improvements can be made to better represent what the engines are producing (emissions) at various loads encountered during transit and maneuvering.

Additional assumptions used in the emissions inventories and health risk assessments would be evaluated on a regular basis and if deemed appropriate for additional study/data gathering then these elements would be included into this portion of the program.

Funding and Organization

The Technology Advancement Program will be primarily funded by both Ports with additional funding from participating agencies, other interested Ports, and interested shipping lines and tenants. Projects will be developed and implemented under each of the areas listed above. Results

from evaluations, R&D, testing, demonstrations, and pilot projects will be included in the annual update to the Clean Air Action Plan and reported to each Port's Board of Commissioners on a regular basis.

The structure of the program will be developed by a Coordination Committee consisting of both Ports and funding partners. When other entities are co-funding specific projects then they will be included in the Coordination Committee for their specific project. The Coordination Committee's initial task will be to develop guidelines on how the program will function, how decisions will be made, how evaluation, testing, and demonstrations will be organized, and how reporting of progress will be made. Details of the general operation of the Technology Advancement Program will be presented to both Ports' Executive Directors by the end of 1st quarter 2007. The Committee would also develop fact sheets on various technologies and post those fact sheets to a Clean Air Action Plan website. In addition to the outline of how the program will work, the Coordination Committee will present a list of projects expected to be started in 2007, a list of expected projects the following year, and identification of funding entities for each project. Staff will provide updates to their respective Executive Directors and Boards of Harbor Commissioners on the activities of the Coordination Committee.

The annual minimum funding levels for the Technology Advancement Program, by Port, are presented in the following table. The 2006/7 funding level for SCAQMD, CARB, EPA Region 9, and other entities fund includes a rail locomotive demonstration. Additional funding beyond this level is not determined at this time.

Table 5.24: Annual Funding Level for Technology Advancement Program by Fiscal Year

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Technology Advancement Program	POLA	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	**$7,500,000**
	POLB	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	**$7,500,000**
	SCAQMD/EPA/Other Agencies	$400,000	TBD	TBD	TBD	TBD	**$400,000**
	Other Ports	TBD	TBD	TBD	TBD	TBD	TBD
	FY Totals	**$3,400,000**	**$3,000,000**	**$3,000,000**	**$3,000,000**	**$3,000,000**	**$15,400,000**

Milestones

1. Coordination Committee to meet and draft guidelines how the program will work, including a list of initial projects, who will be funding the projects, cost estimates, and schedules when the projects are anticipated to be started. This information will be provided to each Port's Executive Director for comments.

   Schedule: End of 1st quarter 2007.

2. Start work on projects.

   Schedule: TBD and presented in draft schedule provide in Milestone #1 above.

5.8 Infrastructure & Operational Efficiency Improvements Initiatives

This initiative identifies projects at the San Pedro Bay Ports that improve infrastructure and operational efficiencies that also have an air quality benefit. The types of projects that are included in this element of the Clean Air Action Plan are generally initiated primarily as transportation or operational improvements; however, an air quality benefit does result from completing these projects. Projects examples include, but are not limited to:

- Focusing on on-dock versus near-dock rail infrastructure
- Grade separations
- OCR/RFID gates at terminals
- Terminal cargo handling/configuration efficiency improvements
- Evaluation of other potential operational efficiencies approaches that would reduce emissions associated with the port-related source categories

The emissions reduced from these projects would be quantified and reported under this element. This initiative will most likely be undertaken by the same group and structure as the Technology Advancement Program.

The annual funding levels for the Infrastructure & Operational Efficiency Improvements Initiatives, by Port, are presented in the following table.

Table 5.25: Annual Funding Level for Infrastructure & Operational Improvements by Fiscal Year

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Infrastructure Operational Improvements	POLA	$500,000	$500,000	$500,000	$500,000	$500,000	**$2,500,000**
	POLB	$500,000	$500,000	$500,000	$500,000	$500,000	**$2,500,000**
	FY Totals	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$1,000,000**	**$5,000,000**

5.9 POLA – China Shipping Settlement

In February 2003, the POLA joined environmental and Harbor-area community groups in a settlement agreement that includes a series of environmental programs designed to improve the area's air quality and quality of life. As part of this settlement, the POLA has committed over $20 million over five years to pay for air quality mitigation projects that reduce Port operation emissions that affect the communities of Wilmington and San Pedro. This program is known as the Port Air Quality Mitigation Incentive Program (PAQMIP). In accordance with the settlement agreement, the PAQMIP expends funds for projects and improvements that reduce emissions from Port operations that affect the communities of Wilmington and San Pedro. All emission reductions resulting from funded projects are retired by the POLA for the benefit of the environment.

The PAQMIP is in its third year[16], with the most recent Request for Proposals planned for issuance in June/July 2006. The primary purpose of this program is to provide financial incentives to assist in the implementation of projects that will accomplish two objectives: (1) reduction of emissions associated with port operations in the communities of San Pedro and Wilmington, and (2) research and development of specific technologies that can be applied in the San Pedro Bay Port area to achieve the first objective.

Near-term emission reductions are primarily sought for DPM, although reductions in other pollutants including NOx, CO, and VOCs are also desirable. All projects must provide emission reductions that are real, surplus, and quantifiable.

An additional $10 million in Port mitigation settlement funds is separately committed to the Gateway Cities Clean Air Program to be used as incentives to replace, repower or retrofit existing diesel-powered on-road trucks, in order to reduce emissions from these sources[17]. Since the Port is committing significant resources to this Gateway Cities Program, projects submitted in response to the PAQMIP RFPs that could otherwise be funded by the Gateway Cities Program receive lower priority. This ensures that projects funded by the PAQMIP provide a broad range of technologies and applications, beyond that of the Gateway Cities Program.

Applications and proposals are reviewed and evaluated by the Port of Los Angeles Community Advisory Committee (PCAC) and the Port's Environmental Mitigation Coordinator (EMC), in consultation with the Port of Los Angeles Technical Advisory Committee (Port TAC). Roles of each entity are summarized below.

The Port of Los Angeles Community Advisory Committee was established as a standing committee of the Port of Los Angeles Board of Harbor Commissioners in 2001. The PCAC makes recommendations to the Board of Harbor Commissioners regarding applications/ proposals. Recommendation options include approval, denial or approval with modifications.
The settlement agreement created the Port TAC to: advise the PCAC and the EMC on the best use of air quality mitigation funding; support RFP development, and conduct proposal evaluations. The Port TAC consists of one representative from each of the following entities/agencies:

- SCAQMD
- CARB
- EPA
- Mobile Source Air Pollution Reduction Review Committee (MSRC)
- South Coast Carl Moyer Memorial Air Quality Fund

The EMC reviews and coordinates Port TAC and PCAC evaluation recommendations regarding eligible proposals. Staff then prepares a Board staff report that incorporates the Port TAC and

[16] 3rd time an RFP is issued to solicit projects.
[17] This program can be reviewed at http://www.gatewaycog.org/cleanairprogram/index.html

EMC evaluation recommendations for Board consideration. The Port TAC may also make recommendations directly to the Board, independent of the staff report or PCAC recommendations. PCAC Air Quality Subcommittee consultants also participate as non-voting observers and discussants in Port TAC discussions.

A wide range of potential project types can be used on a variety of port equipment. Emission reduction strategies may include: repowers, retrofits, after-market technologies and new engine purchases.

Several program categories have been identified for consideration under PAQMIP solicitation. These categories include:

- Stationary Source Projects including dockside equipment electrification/alternative fuel, fuel cell/cold ironing, emergency generation, dredges, etc.
- On-Road Heavy-duty vehicles
- Off-Road Heavy-Duty Equipment and Engines
  - ✓ Specialty Port equipment (i.e., top-pick, side-pick, yard hostlers, etc.)
  - ✓ Construction equipment, including crane electrification
  - ✓ Marine engines and equipment on ships (ocean-going vessels and line-haul tugs) that regularly call at the Port
  - ✓ Marine engines and equipment on tugs and harbor craft if the craft is berthed at, and directly serves the Port
  - ✓ Forklifts
  - ✓ Auxiliary power units
  - ✓ Locomotives that regularly serve the Port
- Fueling Infrastructure for alternative fuel vehicles operating in and around the Port.
- Alternative Diesel Fuel Strategies
- Research and development, including intent to demonstrate. Research and development or new technology demonstrations that are implemented on Port-specific equipment are eligible. R&D and/or demonstration projects are evaluated based on their ability to provide potential benefits in the Port and its surrounding communities (Wilmington and San Pedro).

The Port of Los Angeles funding levels for the CS settlement are presented in the following table.

Table 5.26: Port of Los Angeles Funding for CS Settlement by Fiscal Year

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
China Shipping Settlement	POLA	$6,000,000	$6,000,000	$0	$0	$0	**$12,000,000**
		$6,000,000	**$6,000,000**	**$0**	**$0**	**$0**	**$12,000,000**

5.10 Anticipated Emission Reductions Summary

This section summarizes the estimated emissions reductions that will be achieved within the first five-year window of the Clean Air Action Plan by implementing the control measures affecting heavy–duty trucks, cargo handling equipment, and ocean going vessels. The estimates represent reductions from the amount of emissions that would have been emitted in the absence of the corresponding control measures (emissions remaining after measure implementation). These reductions do not account for possible increases or decreases in activity levels over the five-year period.

Because of the difficulty associated with forecasting changes in emissions over time, the Clean Air Action Plan has been developed without a specific set of growth assumptions. Instead, the measures have been developed with a focus on opportunities for implementation to ensure that what is planned has the highest probability of full implementation. In addition, the plan ensures real emission reductions based on the current emissions inventory without the uncertainty of growth estimates.

Compared with the estimated emissions from heavy–duty trucks, cargo handling equipment, and ocean going vessels in the absence of the Clean Air Action Plan measures, emission reductions associated with these three source categories will result in more than a 50% reduction in DPM emissions (a known toxic air contaminant), over a 45% reduction in NOx, a precursor to the formation of photochemical smog, and greater than a 35% reduction in SOx which can form sulfuric acid when combined with water in the atmosphere. These estimated reductions are over and above those reductions associated with regulatory programs already adopted by the California Air Resources Board, such as the auxiliary engine rule for ocean-going vessels and the cargo handling equipment rule.

Tables 5.27, 5.28, and 5.29 present the summary DPM, NOx, and SOx emission reductions attributable to the Clean Air Action Plan based on the control measure reductions. The ton-per-year emissions inventory estimates included in these tables reflect the best information on emissions available at this time, taking into account changes in methods and inventory data since the development of the 2001/2002 port emissions inventories. The emission estimates for heavy-duty diesel trucks were derived from the 2001/2002 mileage estimates for trucks serving the two Ports, updated to reflect new activity information from the terminals and revised emission rate information from CARB. The emission estimates from ocean-going vessels are those from the 2001 Port of Los Angeles and 2002 Port of Long Beach emissions inventories. Some adjustment was made to the assumed vessel speeds in the Port of Long Beach inventory to make them consistent with the Port of Los Angeles' 2001 inventory methodology. The cargo handling equipment emission estimates are the draft estimates developed for the 2005 port-wide inventory updates for the Port of Los Angeles and the Port of Long Beach.

For each measure, Tables 5.27, 5.28, and 5.29 summarize the estimated emission reductions in tons per year, and the percentages that those reductions represent of the assumed base emissions. For

the ocean-going vessel measures, the overall percent reductions are also listed. Because there are several ocean-going vessel measures with overlapping effects, the overall reductions depend upon the sequencing of implementation, such that the final magnitude of reductions achieved by any one measure will depend on the order in which measures are implemented. Therefore, the final sum of the ocean-going vessel measure reductions is different from the total of the individual ocean-going vessel measure reductions shown in the tables. For both the ocean-going vessel and cargo handling equipment measures, the percentage reductions are those of the plan alone, without the addition of the reductions that will result from CARB's regulations affecting those source categories.

Although not listed in the tables, Clean Air Action Plan control measures focused on locomotives and harbor craft will also result in emission reductions. For example, the MOU between the Ports and the local switching railroad will result in the replacement of their fleet of old switching locomotives with new Tier 2 units, and includes provisions for testing and installing DPM emission control devices, testing various alternative technology switching locomotives, and purchasing ultra-low emission locomotives whenever additional locomotives are added to the fleet. The estimated reductions from this measure are 3 tons per year of DPM and 163 tons per year of NOx attributable to the change to Tier 2 locomotives. Additional reductions will come from control device installations and use of alternative technology locomotives.

Locomotive and harbor craft emission reductions will be estimated in more detail as these measures are more fully developed and implemented. Reductions have not been estimated for these source categories because of uncertainties including specifics on harbor craft engine populations, implementation and timing mechanisms for locomotive measures, and future plans for the expansion of rail yards or the development of new rail yards. Any attempts to estimate reductions from these source categories would be based on numerous assumptions that would render the estimates highly speculative at best, and may not properly reflect the reductions that will ultimately be achieved when the measures are fully developed.

Table 5.27: Clean Air Action Plan Control Measure DPM Reductions Summary

HDV Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions	tons per year	966	966	966	966	966
SPBP-HDV 1	tons reduced per year	22	236	442	612	782
	percent reduction	3%	25%	46%	63%	81%

OGV Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions before regulation	tons per year	1,231	1,231	1,231	1,231	1,231
ARB Aux Engine Rule	tons reduced per year	44	88	88	91	93
	percent reduction	4%	7%	7%	7%	8%
Assumed base emissions after regulation	tons per year	1,186	1,142	1,142	1,140	1,137
SPBP-OGV 1	tons reduced per year	0	0	0	0	0
(no PM reduction)	percent reduction	0%	0%	0%	0%	0%
SPBP-OGV 2	tons reduced per year	3	3	5	12	34
	percent reduction	0.2%	0.2%	0.4%	1.0%	2.5%
SPBP-OGV 3	tons reduced per year	0	1	4	4	3
	percent reduction	0.0%	0.1%	0.4%	0.4%	0.3%
SPBP-OGV 4	tons reduced per year	5	43	155	205	234
	percent reduction	0%	4%	14%	18%	21%
SPBP-OGV 5	tons reduced per year	4	22	61	80	92
	percent reduction	0%	2%	5%	7%	8%
Overall reductions	tons reduced per year	12	68	214	282	331
Overall % reduction SPBPCAAP measures only		1%	6%	19%	25%	29%

CHE Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions before regulation	tons per year	152	152	152	152	152
ARB CHE Regulation	tons reduced per year	10	46	76	85	93
	percent reduction	7%	30%	50%	56%	61%
Assumed base emissions after regulation	tons per year	142	106	76	67	59
SPBP-CHE 1	tons reduced per year	4	6	9	9	11
	percent reduction	3%	6%	12%	14%	19%

HDV, OGV, CHE Totals					
Base emissions after regulation	2,295	2,215	2,185	2,173	2,163
All source categories reductions, tons per year	38	310	665	904	1,125
All source categories reductions, percent	2%	14%	30%	42%	52%

Table 5.28: Clean Air Action Plan Control Measure NOx Reductions Summary

HDV Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions	tons per year	10,269	10,269	10,269	10,269	10,269
SPBP-HDV 1	tons reduced per year	167	1,771	3,329	4,778	6,228
	percent reduction	2%	17%	32%	47%	61%

OGV Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions before regulation	tons per year	13,574	13,574	13,574	13,574	13,574
ARB Aux Engine Rule	tons reduced per year	132	263	263	263	263
	percent reduction	1%	2%	2%	2%	2%
Assumed base emissions after regulation	tons per year	13,443	13,311	13,311	13,311	13,311
SPBP-OGV 1	tons reduced per year	1,616	2,349	3,216	3,441	3,441
	percent reduction	12%	18%	24%	26%	26%
SPBP-OGV 2	tons reduced per year	92	106	210	527	1,495
	percent reduction	1%	1%	2%	4%	11%
SPBP-OGV 3	tons reduced per year	0	1	13	19	23
	percent reduction	0.0%	0.0%	0.1%	0.1%	0.2%
SPBP-OGV 4	tons reduced per year	6	52	202	271	311
	percent reduction	0.0%	0.4%	1.5%	2.0%	2.3%
SPBP-OGV 5	tons reduced per year	34	208	605	812	934
	percent reduction	0%	2%	5%	6%	7%
Overall reductions	tons reduced per year	1,831	2,874	4,146	4,506	5,281
Overall % reduction SPBPCAAP measures only		14%	22%	31%	34%	40%

CHE Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions before regulation	tons per year	3,916	3,916	3,916	3,916	3,916
ARB CHE Regulation	tons reduced per year	124	772	1,296	1,301	1,377
	percent reduction	3%	20%	33%	33%	35%
Assumed base emissions after regulation	tons per year	3,792	3,144	2,620	2,615	2,539
SPBP-CHE 1	tons reduced per year	127	195	290	336	376
	percent reduction	3%	6%	11%	13%	15%

HDV, OGV, CHE Totals					
Base emissions after regulation	27,504	26,724	26,200	26,195	26,119
All source categories reductions, tons per year	2,125	4,839	7,764	9,620	11,885
All source categories reductions, percent	8%	18%	30%	37%	46%

Table 5.29: Clean Air Action Plan Control Measure SOx Reductions Summary

HDV Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions	tons per year	9	9	9	9	9
SPBP-HDV 1	tons reduced per year	0	1	1	2	2
	percent reduction	1%	7%	14%	21%	27%

OGV Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions before regulation	tons per year	7,749	7,749	7,749	7,749	7,749
ARB Aux Engine Rule	tons reduced per year	1,013	2,026	2,026	2,026	2,026
	percent reduction	13%	26%	26%	26%	26%
OGV1	tons reduced per year	0	0	0	0	0
OGV2	tons reduced per year	43	46	77	200	648
OGV3	tons reduced per year	16	43	131	99	26
OGV4	tons reduced per year	29	272	1,101	1,489	1,722
OGV5	tons reduced per year	0	0	0	0	0
Total		89	360	1,310	1,788	2,396
Overall reductions	tons reduced per year	98	367	1,280	1,715	2,207
Overall % reduction SPBPCAAP measures only		1%	6%	22%	30%	39%

CHE Measures		'06/'07	'07/'08	'08/'09	'09/'10	'10/'11
Assumed base emissions before regulation	tons per year	8	8	8	8	8
ARB CHE Regulation	tons reduced per year	0	0	0	0	0
	percent reduction	0%	0%	0%	0%	0%
Assumed base emissions after regulation	tons per year	8	8	8	8	8
SPBP-CHE 1	tons reduced per year	0	0	0	0	0
	percent reduction	0%	0%	0%	0%	0%

HDV, OGV, CHE Totals					
Base emissions after regulation	6,753	5,740	5,740	5,740	5,740
All source categories reductions, tons per year	98	368	1,281	1,717	2,210
All source categories reductions, percent	1%	6%	22%	30%	38%

The following Figures 5.5 through 5.7 present in graphical form the effect of the emission reductions listed above, and illustrates the year-by-year effects of the implementation of plan measures, by pollutant, for the three source categories included in the tables. In these charts, the "emissions remaining" represent the emissions (in tons per year) remaining after the reductions from the implementation of the Clean Air Action Plan measures and the implementation of CARB's ocean-going vessel auxiliary engine rule and cargo handling equipment rule. The "Base Emissions" without the Clean Air Action Plan measures shown on the charts include the reductions from the CARB rules but do not include any assumption of growth.

Figure 5.8 is a summary of reductions for all three pollutants addressed by the Clean Air Action Plan, showing tons reduced for each year of the initial plan implementation.

Figure 5.5: Clean Air Action Plan Control Measures – Remaining DPM

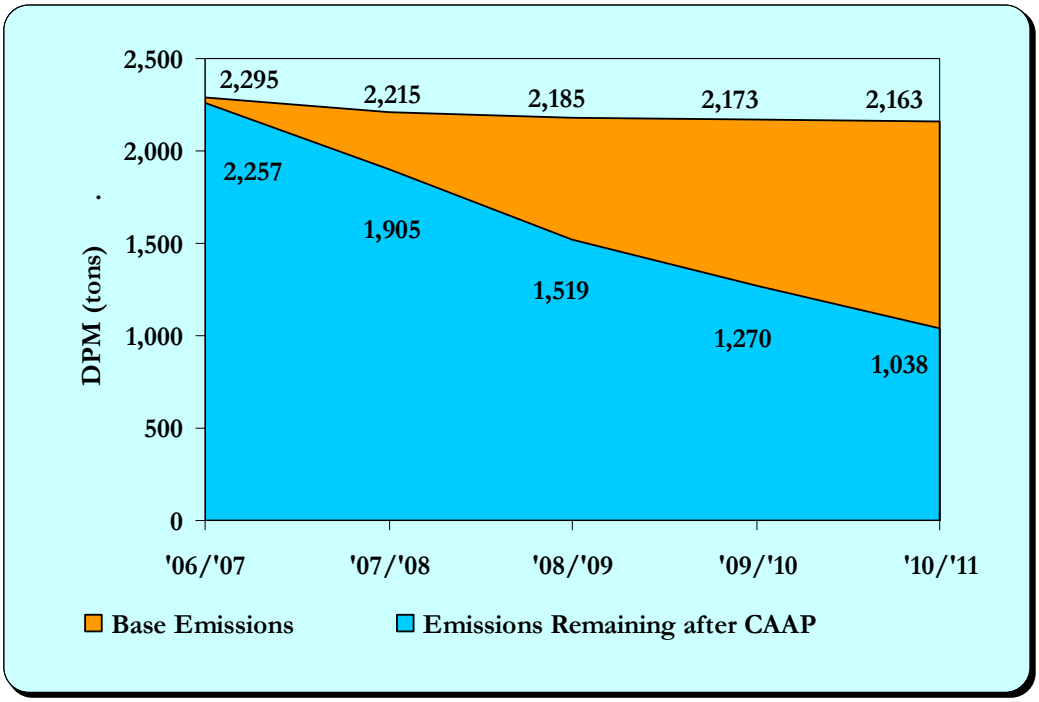


Figure 5.6: Clean Air Action Plan Control Measures – Remaining NOx

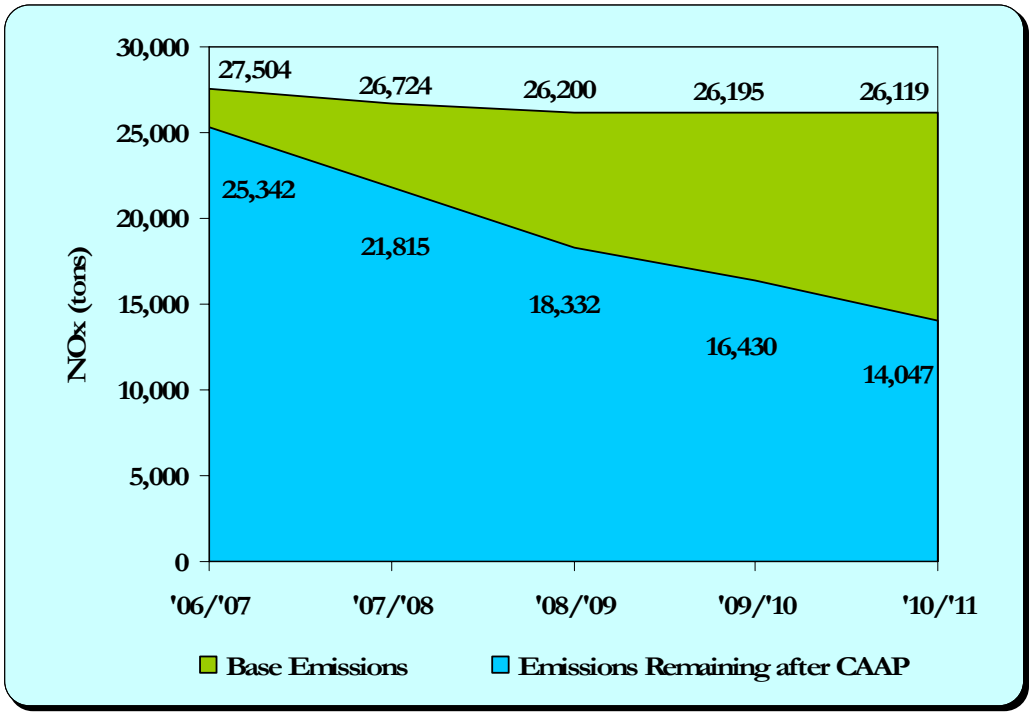


Figure 5.7: Clean Air Action Plan Control Measures – Remaining SOx

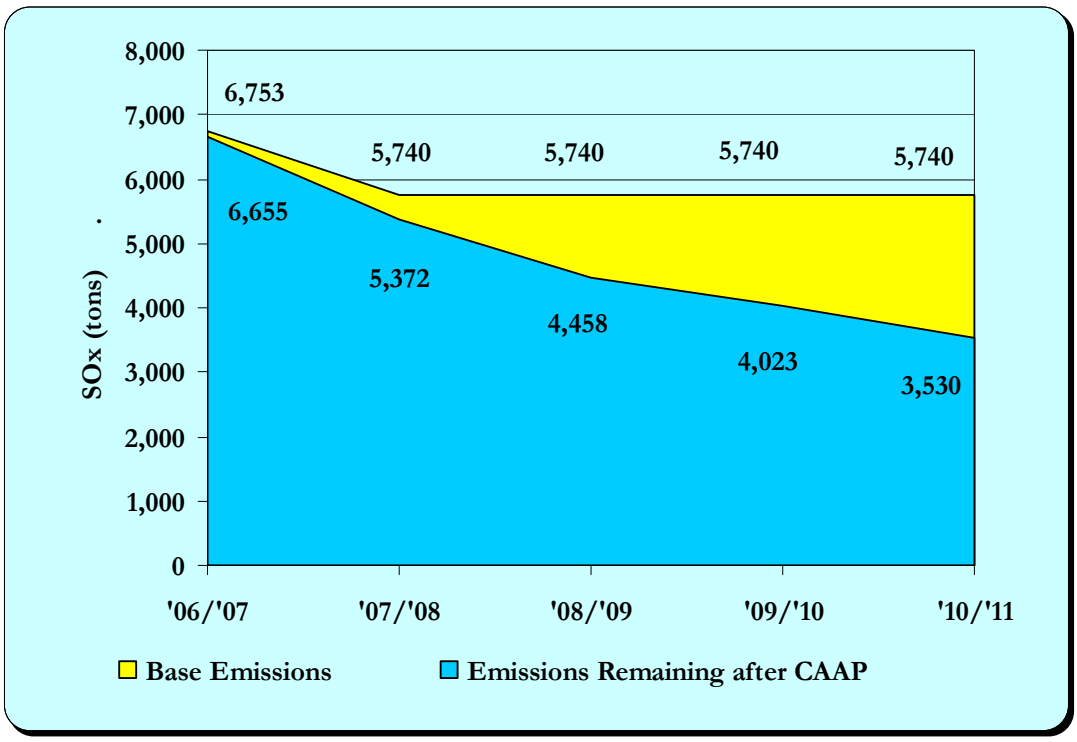
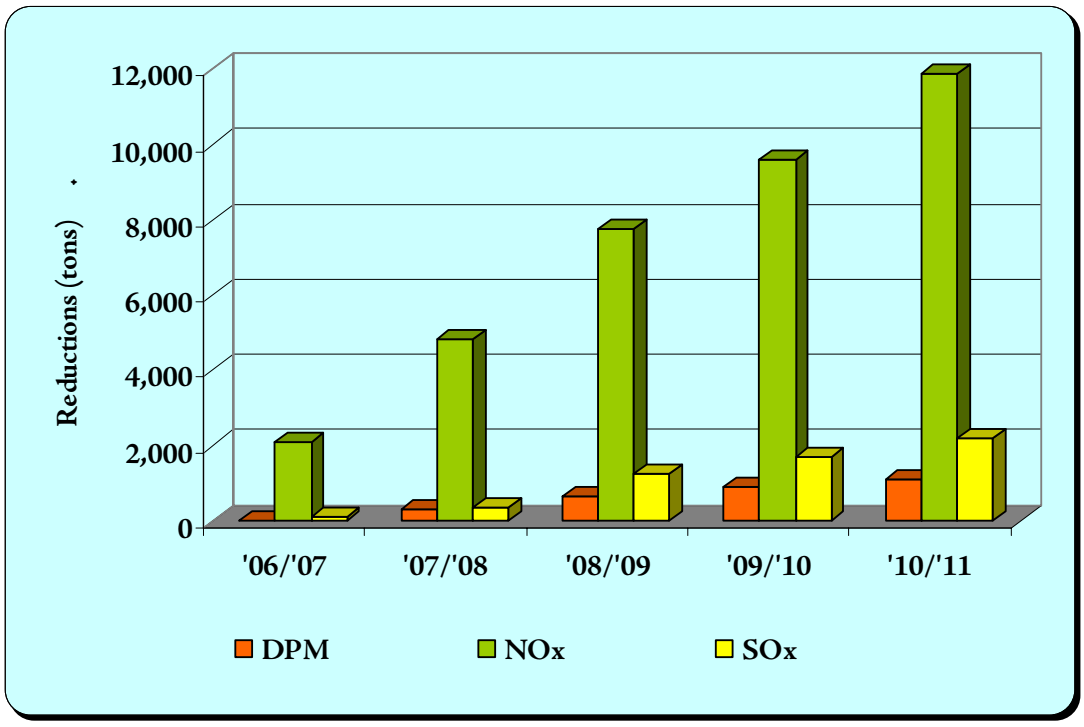


Figure 5.8: Clean Air Action Plan Control Measure Reductions



SECTION 6: FUTURE EMISSIONS PROJECTIONS

As discussed and presented in Section 5, initial implementation of the Clean Air Action Plan measures focuses on heavy–duty trucks, cargo handling equipment, and ocean going vessels. This section discusses and presents the emission reduction estimates for the implementation of these initial measures over the five-year period covered by this edition of the Clean Air Action Plan. Additional reductions may be achieved during this period as additional measures are developed and implemented, rail and harbor craft measures become quantifiable, and as existing measures are reviewed and amended.

With respect to growth, the Clean Air Action Plan's measures were developed with two basic approaches: 1) emission reductions based on defined levels of funding, and 2) emission reductions based on phased-in lease requirements.

The first approach is not affected by growth in activity levels, but is based on unit costs and defined levels of activity. For example, SPBP-OGV2 emission reductions are based on a discrete number of shore-power stations and a defined number of participating vessel calls. If the level of activity in the Ports grows, the estimated tons of emission reductions associated with this measure will remain the same because the measure is based on a defined number of shore-power stations and vessel calls. The measure does include additional features that will encourage additional reductions that would react to growth, such as the focus on alternatives to shore-power, and additional shore-powered vessel calls will be sought. These additional reductions are not reflected in the number presented in this section because they have not been quantified.

In the second approach, the amount of emissions reduced would be proportional to any growth that might occur. This is because these measures will apply to all of an affected activity, such as all of a certain type of equipment. If more equipment is used, or if existing equipment is used to a greater extent, then the reductions associated with the measure will increase to the same extent. For example, if a terminal is required to replace its equipment with new equipment that reduces emissions by 90%, then regardless of any increase in number of pieces of equipment or hours of equipment operation, the emission reduction will remain at 90%. Since the emission reductions discussed in Section 5 are based on an assumption of no emissions growth from 2005, they can be adjusted to incorporate any assumption of growth such as that included in the Goods Movement Plan, the NNI report, or a projected per-year increase. After completion of the 2005 emissions inventory updates and development of a growth forecast, the Clean Air Action Plan will be updated in later years to the agreed upon growth projections.

This section presents the emission reductions in two subsections that address different aspects of the reductions and their relationship to port growth, and to other emission reduction studies/plans such as CARB's GMP and City of Los Angeles' NNI. Subsection 6.1 looks at the effect of the measures on emissions, taking into account the assumptions of growth in activity and emissions used by CARB in their GMP. While actual growth may not be the same as these estimates, the use of these estimates allows an evaluation of how the measures will react to the same growth

assumptions as in the GMP, which in turn provides insight on how the Clean Air Action Plan will perform under those assumptions. Section 6.2 provides a qualitative comparison between the Clean Air Action Plan and the GMP, and the Clean Air Action Plan and NNI.

6.1 Effects of Growth on Emission Reduction Measures

One issue that affects the presentation of emission reductions over a multi-year period is that of growth in port operations and the resulting change in emissions. The growth in emissions is the net change in emissions over time due to changes in port activity (usually an increase) and changes in emissions per unit of activity (an increase or decrease depending on the effectiveness of emission control requirements, fleet turnover, and efficiencies/inefficiencies in operations from one year to the next). It is difficult to reliably estimate the change in emissions related to port operations over the period covered by the plan because of significant unknowns such as new technology and technology implementation rates, operational changes that can affect operating efficiencies, emission reduction programs implemented voluntarily by the private businesses operating within the ports, and other factors.

Initial findings from the 2005 emissions inventories for the Ports indicate that for some source categories, even with the increase in cargo throughput over the past few years, emissions are lower due to purchases of new equipment, more efficient operations, and application of emission control technologies. After the conclusion of the 2005 emissions inventories, the Ports will work with agencies to compare the baseline inventories (2001 and 2002 for the Port of Los Angeles and the Port of Long Beach, respectively) with the inventory updates. The goal will be to establish a better methodology for predicting cargo activity and emissions growth by source category. In lieu of this methodology, the emission growth estimates in the Goods Movement Plan have been used in an evaluation of the effect of growth on the Clean Air Action Plan measures.

The GMP projections that have been used are those for the South Coast ports and international goods movement, which is a domain that, while not identical, most closely reflects the San Pedro Bay Ports' emissions inventories. The GMP projections, which were provided by staff of the South Coast Air Quality Management District, include an increase in DPM and NOx emissions from OGVs and decreases in emissions of these pollutants from CHE and HDVs. The decreases are due to existing emission control regulations, but not including recently enacted standards affecting OGV fuels and CHE replacements, and are projected to occur due to normal equipment and vehicle turnover. In developing the emission projections with growth for this section, the decrease has not been included (the "base" emissions have been held constant instead of being reduced each year). This has been done as a conservative assumption because it is possible that normal turnover will be inhibited as terminal operators and vehicle owners prepare to comply with Clean Air Action Plan measures. To count reductions from turnover as well as reductions from plan measures may be double counting, which is to be avoided.

The following tables detail the projected emissions from the three source categories for which emission reductions have been estimated in this initial version of the Clean Air Action Plan. Each

table lists projected emissions as if there were no plan (emissions with growth, no control measures) and the targeted emissions remaining after implementation of the plan (emissions with growth and Clean Air Action Plan control measures). By the fifth year of the plan (2011) the tables shows an annual targeted reduction of 47% of DPM, 45% of NOx, and 52% of SOx from OGV, CHE, and HDV sources (annual targeted reductions identified for each year of the plan are also identified). As noted above, the emissions growth estimates that underlie CARB's GMP have been used to project the emissions growth shown in these tables.

Table 6.1: Effect of Growth & Clean Air Action Plan on DPM Emissions

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
DPM Emissions with Growth, no Control Measures											
OGVs	1,231	1,436	1,641	1,847	2,052	2,175	2,298	2,421	2,544	2,667	2,780
CHE	181	174	166	159	152	152	152	152	152	152	152
HDVs	1,236	1,168	1,101	1,033	966	966	966	966	966	966	966
Total	**2,648**	**2,778**	**2,909**	**3,039**	**3,170**	**3,293**	**3,416**	**3,539**	**3,662**	**3,785**	**3,898**
DPM Emissions with Growth and CAAP Control Measures											
OGVs	1,231	1,436	1,641	1,847	2,052	2,175	2,196	2,116	1,921	1,864	1,836
CHE	181	174	166	159	152	152	138	100	67	58	48
HDVs	1,236	1,168	1,101	1,033	966	966	944	730	524	354	184
Total	**2,648**	**2,778**	**2,909**	**3,039**	**3,170**	**3,293**	**3,278**	**2,946**	**2,512**	**2,276**	**2,068**
Percent Reduction							**4%**	**17%**	**31%**	**40%**	**47%**

Table 6.2: Effect of Growth & Clean Air Action Plan on NOx Emissions

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NOx Emissions with Growth, no Control Measures											
OGVs	13,574	15,452	17,329	19,207	21,085	22,207	23,329	24,451	25,573	26,696	27,800
CHE	4,352	4,243	4,134	4,025	3,916	3,916	3,916	3,916	3,916	3,916	3,916
HDVs	9,569	9,744	9,919	10,094	10,269	10,269	10,269	10,269	10,269	10,269	10,269
Total	**27,495**	**29,439**	**31,383**	**33,326**	**35,270**	**36,392**	**37,514**	**38,636**	**39,758**	**40,881**	**41,985**
NOx Emissions with Growth and CAAP Control Measures											
OGVs	13,574	15,452	17,329	19,207	21,085	22,207	20,174	19,255	17,653	17,304	16,828
CHE	4,352	4,243	4,134	4,025	3,916	3,916	3,665	2,949	2,330	2,279	2,163
HDVs	9,569	9,744	9,919	10,094	10,269	10,269	10,102	8,498	6,940	5,491	4,041
Total	**27,495**	**29,439**	**31,383**	**33,326**	**35,270**	**36,392**	**33,940**	**30,703**	**26,924**	**25,074**	**23,032**
Percent Reduction							**10%**	**21%**	**32%**	**39%**	**45%**

Table 6.3: Effect of Growth & Clean Air Action Plan on SOx Emissions

Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
SOx Emissions with Growth, no Control Measures											
OGVs	7,749	8,902	10,054	11,207	12,360	13,119	13,878	14,638	15,397	16,157	16,916
CHE	8	8	8	8	8	8	8	8	8	8	8
HDVs	9	9	9	9	9	9	9	9	9	9	9
Total	**7,766**	**8,919**	**10,071**	**11,224**	**12,377**	**13,136**	**13,895**	**14,655**	**15,414**	**16,174**	**16,933**
SOx Emissions with Growth and CAAP Control Measures											
OGVs	7,749	8,902	10,054	11,207	12,360	13,119	11,939	10,174	8,895	8,474	8,046
CHE	8	8	8	8	8	8	8	8	8	8	8
HDVs	9	9	9	9	9	9	9	8	8	7	7
Total	**7,766**	**8,919**	**10,071**	**11,224**	**12,377**	**13,136**	**11,956**	**10,191**	**8,910**	**8,490**	**8,061**
Percent Reduction							**14%**	**30%**	**42%**	**48%**	**52%**

The following figures are based on the tables above that compare the forecast emission reductions of the Clean Air Action Plan with the growth in emissions that would occur with the growth rate projections used in the GMP. The starting points in terms of emissions are the "assumed base emissions" listed in Tables 5.27, 5.28, and 5.29, which are the base emissions from which the Clean Air Action Plan reductions have been calculated. Growth of these emissions is based on the emission growth rates in CARB's GMP projections of changes in emissions without the GMP measures.

Each figure shows the growth line of emissions (assuming CARB's GMP growth assumptions) of the specified pollutant without the effect of Clean Air Action Plan measures, and the reductions of emissions that are forecast to occur with implementation of plan measures. In each figure, the triangle-shaped area at the upper right side of the chart represents the emissions eliminated by the plan measures.

Figure 6.1: Effect of Growth & Clean Air Action Plan on DPM Emissions

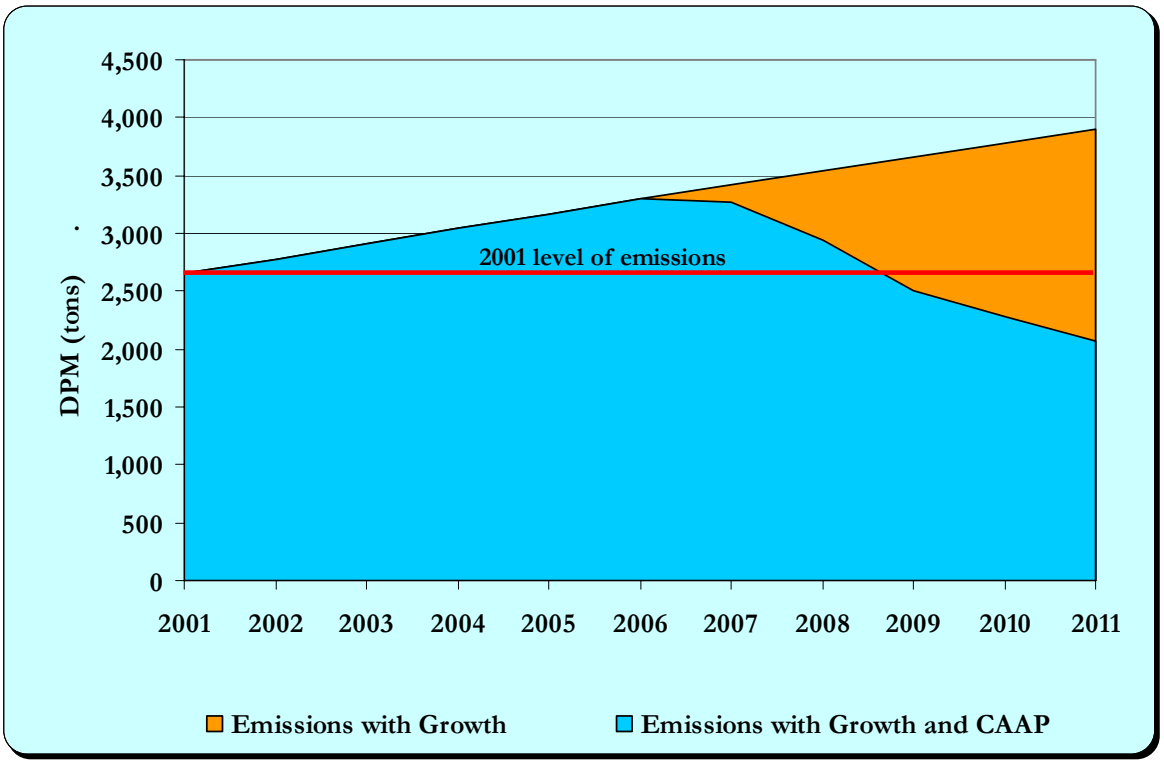


Figure 6.2: Effect of Growth & Clean Air Action Plan on NOx Emissions

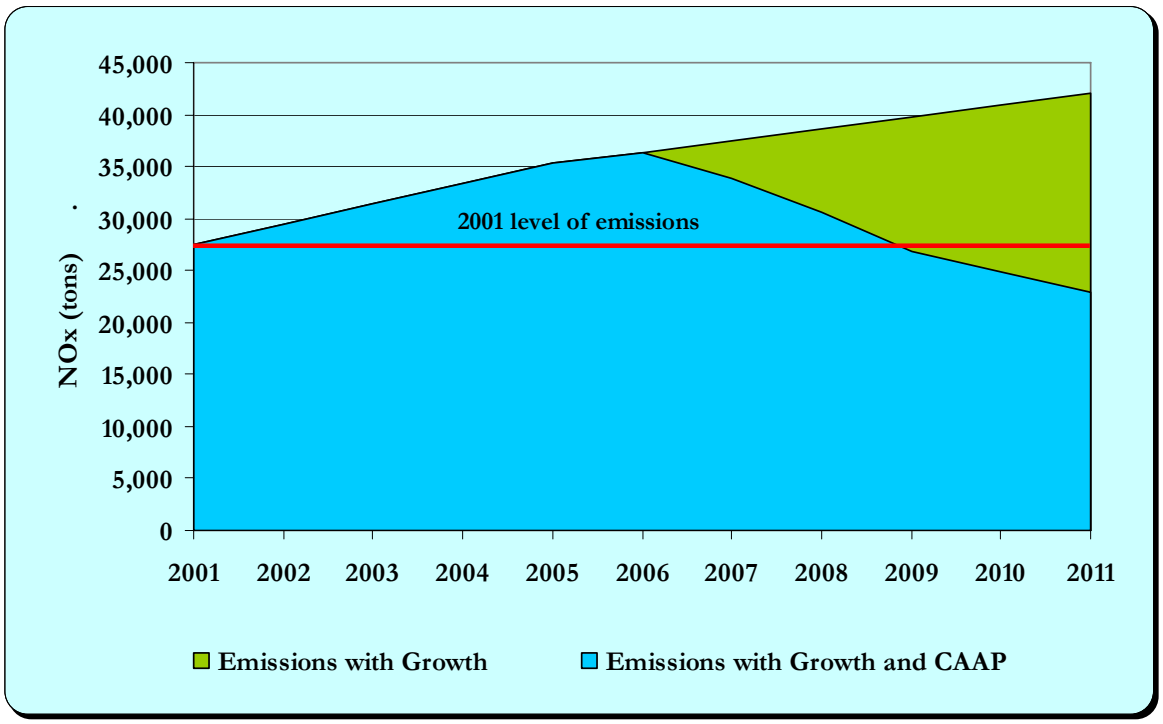
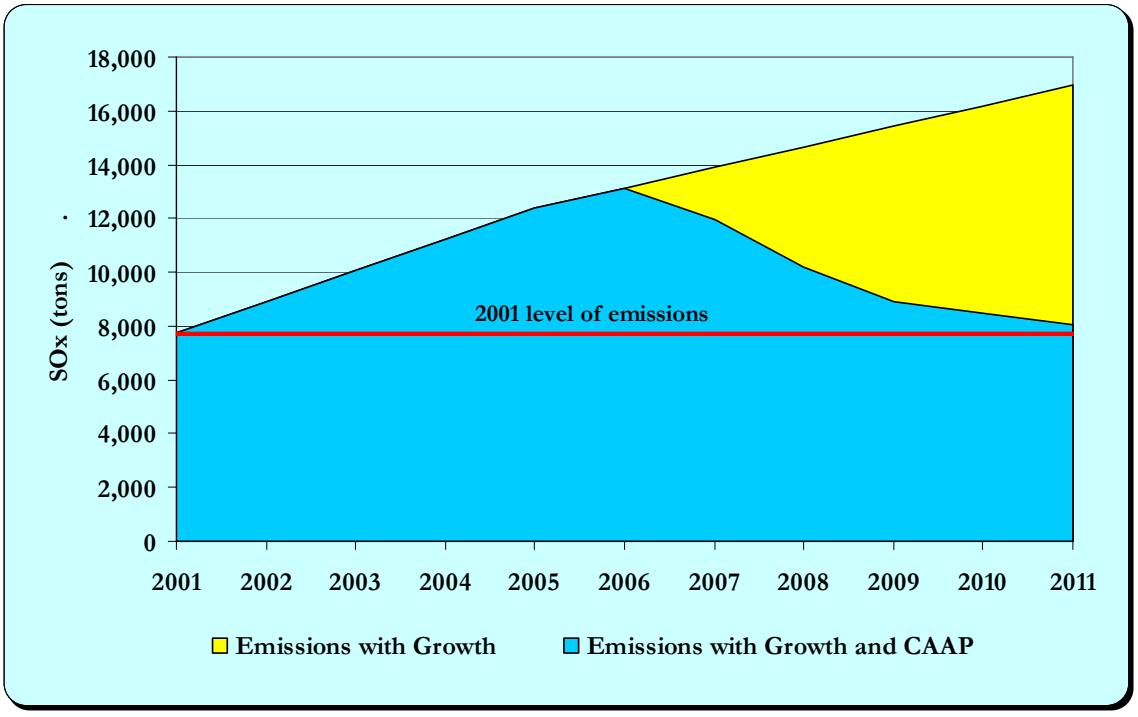


Figure 6.3: Effect of Growth & Clean Air Action Plan on SOx Emissions



6.2 Comparison with Other Programs

This section compares the relative emissions reductions achieved in the first five years of initial implementation (2007 to 2011) of the San Pedro Bay Clean Air Action Plan (CAAP), the CARB's state-wide Goods Movement Plan (GMP), and the City of Los Angeles' NNI Task Force Report. Qualitative comparisons are presented in Tables 6.4 and 6.5 below, for CAAP against GMP and CAAP against NNI, respectively. The tables present assessments based on (a) Source Categories, (b) Control Strategies, and (c) Overall Source Category Emissions Reductions for DPM and NOx.

A comparison of the first five years' overall emission reductions is also provided in each table. Relative evaluations are tabulated with respect to CAAP compared to the other plans, so that CAAP reductions are either "greater than" (>), "equal to" (=), or "less than" (<) projected GMP or NNI reductions. Multiple indicators are used (e.g., >>) to represent large differences between the plans. Where appropriate, "TBD" appears in the tables to denote a comparison "To Be Determined" at a future date when additional information becomes available.

As stated above, CAAP and GMP are compared in Table 6.4. It's important to note that CAAP and GMP are complementary approaches, in that the plans rely on each other to ensure that health risk and mass emissions goals are met in a timely manner. Because of this approach, the tabulated results may unavoidably include some double counting of emissions reductions. This is because the estimated benefits of the GMP assume that local plans and measures (like the CAAP) will be adopted and implemented. A more complete assessment of the combined effects of the two plans is currently being developed by the CARB and SCAQMD, but is not available at this time. When this more complete assessment is complete, it will be added to the next CAAP update.

The comparison of CAAP with NNI also merits special comment. Table 4.2 (Section 4) outlines how proposed NNI control measures were integrated into the CAAP. The resulting NNI reductions were estimated to be greater than those projected for the CAAP, suggesting that the CAAP falls short of the NNI results. However, Port staff believes that several NNI measures include either unsupported or unspecified assumptions regarding implementation and/or funding mechanisms (amounting to some $15 billion for just the Port of Los Angeles). In contrast, the CAAP is a living plan with implementation schedule, specific/detailed strategies and milestones, includes identified funding mechanisms to cover the Ports' cost, and has a strong Technology Advancement Program.

Table 6.4: Ports' Comparison of Clean Air Action Plan (CAAP) and CARB's Near-Term GMP Strategies

Source Categories Control Strategies/Overall Reductions	**CAAP Compared w/ Near-Term GMP (Cummaltive Benefits 2007-2011)**	**Comments**
Heavy-Duty Vehicles (Trucks)		
Modernization & Retrofits	>	CAAP focuses on replacing all frequent caller & older semi-frequent caller trucks to MY2007+
Overall DPM Emission Reductions	=	CAAP and GMP are basically the same reductions
Overall NOx Emission Reductions	>>	CAAP replaces all of frequrent callers & 1/3 of semi-frequent callers w/MY2007 trucks
Ocean-Going Vessels		
Vessel Speed Reduction	>	CAAP boundary goes to 40 nm by 1st quarter 2008; GMP goes out to 24 nm
At-Berth Emission Reductions	=	CAAP has earlier implementation
Aux Engine Fuel Changes	>	CAAP first 4 years lower sulfur fuel than GMP, has no exemptions for shore power, & 40 nm
Main Engine Fuel Changes	>>	CAAP has lower sulfur fuels & starts sooner than GMP
Advanced Technologies	>	CAAP includes comprehensive & funded Technology Advancement Program
Overall DPM Emission Reductions	>	CAAP reductions are greater within the first five years of implementation
Overall NOx Emission Reductions	>	CAAP reductions are greater within the first five years of implementation
Cargo Handling Equipment		
Modernization	>	CAAP & GMP work together; CAAP targets CHE not in GMP & focuses on modernization
Overall DPM Emission Reductions	>	CAAP has earlier implmentation
Overall NOx Emission Reductions	>	CAAP has earlier implmentation

Table 6.4: Ports' Comparison of Clean Air Action Plan (CAAP) and CARB's Near-Term GMP Strategies (cont'd)

Source Categories Control Strategies/Overall Reductions	**CAAP Compared w/ Near-Term GMP (Cummaltive Benefits 2007-2011)**	**Comments**
Harbor Craft		
Performance Standards	=	CAAP & GMP similar reductions; HC has been significantly reduced through Carl Moyer
Overall DPM Emission Reductions	TBD	CAAP probably same levels as GMP in first five years
Overall NOx Emission Reductions	TBD	CAAP probably same levels as GMP in first five years
Rail Locomotives		
PHL Switch Engine Moderization	N/A	
Existing Class 1 Rail Operations	=	CAAP & GMP consistent for switchers & helpers
New Class 1 Rail Yard Standards	N/A	CAAP has stringent new rail yard standards
Overall DPM Emission Reductions	TBD	CAAP probably greater reductions then GMP
Overall NOx Emission Reductions	TBD	CAAP probably greater reductions then GMP
5-Year Reductions		
Overall DPM Emission Reductions	>	CAAP higher reductions over first five years than GMP
Overall NOx Emission Reductions	>	CAAP higher reductions over first five years than GMP

Table 6.5: Ports' Comparison of Clean Air Action Plan (CAAP) and City of Los Angeles' NNI Task Force Report

Source Categories Control Strategies/Overall Reductions	**CAAP Compared with NNI (Cummaltive Benefits 2007-2011)**	**Comments**
Heavy-Duty Vehicles (Trucks)		
Modernization & Retrofits	>>	CAAP focuses on replacing all frequent & older semi-frequent caller trucks to MY2007+
Overall DPM Emission Reductions	>	CAAP focuses on replacing all frequent & older semi-frequent caller trucks to MY2007+
Overall NOx Emission Reductions	>>>	CAAP focuses on replacing all frequent & older semi-frequent caller trucks to MY2007+
Ocean-Going Vessels		
Vessel Speed Reduction	=	CAAP & NNI basically the same
At-Berth Emission Reductions	=	CAAP & NNI basically the same
Aux Engine Fuel Changes	<	NNI assumed faster fuel implementation based on % call targets; CAAP evaluting tariffs
Main Engine Fuel Changes	<	NNI assumed faster fuel implementation based on % call targets; CAAP evaluting tariffs
Advanced Technologies	>	CAAP & NNI call for aggressive reductions; CAAP has funded Technology Advancement Prog.
Overall DPM Emission Reductions	<	NNI reductions keyed to high % of calls being at 0.2% S starting in 2007 through first five years
Overall NOx Emission Reductions	<	CAAP technologies through lease changes; NNI assumes quick introduction of retrofit technology
Cargo Handling Equipment		
Modernization	=	CAAP primary focus DPM then NOx; NNI primary focus NOx then DPM
Overall DPM Emission Reductions	>	CAAP has slightly more DPM reductions in first five years
Overall NOx Emission Reductions	<	NNI has slightly more NOx reductions in first five years

Table 6.5: Comparison of Clean Air Action Plan (CAAP) and City of Los Angeles' NNI Task Force Report (cont'd)

Source Categories Control Strategies/Overall Reductions	**CAAP Compared with NNI (Cummaltive Benefits 2007-2011)**	**Comments**
Harbor Craft		
Performance Standards	=	
Overall DPM Emission Reductions	TBD	CAAP probably will achieve the same levels as NNI in first five years
Overall NOx Emission Reductions	TBD	CAAP probably will achieve the same levels as NNI in first five years
Rail Locomotives		
PHL Switch Engine Moderization	=	CAAP & NNI basically the same
Existing Class 1 Rail Operations	=	CAAP & NNI basically the same
New Class 1 Rail Yard Standards	>	CAAP incorporates stringent requirements on new or modified rail yards on Port properties
Overall DPM Emission Reductions	TBD	CAAP probably similar to NNI until new/modified rail yard standards take effect
Overall NOx Emission Reductions	TBD	CAAP probably similar to NNI until new/modified rail yard standards take effect
5-Year Reductions		
Overall DPM Emission Reductions	<	NNI fuel change penetration assumptions much higher then CAAP in first five years
Overall NOx Emission Reductions	=	CAAP & NNI basically the same

SECTION 7: BUDGET SUMMARY

There are several types of costs and funding sources associated with the implementation of the Clean Air Action Plan, including:

- Costs borne by the industries/terminals affected by the plan's requirements,
- Costs borne by the Ports in developing required infrastructure improvements, funding incentives, and implementing control measures, and
- Costs borne by regulatory agencies to fund incentives.

This document is a tool developed expressly for the Ports to implement a comprehensive plan that will reduce both health-risk and mass emissions associated with port operations. Both Ports have a five year fiscal planning horizon and the Clean Air Action Plan identifies costs that will be incurred by the Ports from the implementation of various measures and elements of the plan. Health care costs and industry costs are not the focus of this document. Costs that need to be borne by the Ports must be identified to ensure that the programs that the Ports are taking funding responsibility for can be budgeted. Potential available funding from regulatory agencies are also included for planning purposes.

The two types of costs presented in this section are direct costs and indirect costs. Direct costs are those costs that will need to be spent in the implementation of the proposed measures over the next five fiscal years. These costs were estimated to assist financial planning requirements of both Ports. Indirect costs are those costs that occur as a result of the implementation of the Clean Air Action Plan.

Similar to the entire Clean Air Action Plan, the budget estimates will be reexamined each year prior to the budget cycle so that the Ports can plan for the needed funding levels for the upcoming fiscal year. The revised budget estimates will be published for public review as part of the Clean Air Action Plan annual update.

7.1 Direct Costs

Both Ports are committing significant direct funding to the Clean Air Action Plan. For budgetary planning purposes, the Ports need to identify available funding streams from the air agencies, other entities, etc., and to identify Port-related funding that will be dedicated to the plan over the next five fiscal years and beyond. Incentive funding includes impact fees to accelerate the replacement and retrofit of "dirty" trucks servicing the Ports. The impact fees would be set such that any short falls in funding for SPBP-HDV1 are covered. Port incentive funds, agency funds, and other entity funds will be used to fund the comprehensive Technology Advancement Program. Incentive funding does not include any capital infrastructure costs (shore side power costs), the existing PHL switch engine fleet turnover agreement, infrastructure and operational improvement funding, and the Port of Los Angeles' China Shipping Settlement funding. Even with Port, agency, and

potential state bond funding, gaps associated SPBP-HDV1 remain. One mechanism that could alleviate the funding shortfall is the application of impact fees associated with the movement of cargo or sources (i.e., trucks, locomotives, vessels, etc.). However, for impact fees to achieve the desired results, they must be structured across both Ports and applied appropriately. In addition, such fees would be targeted close to the beneficial cargo owner as possible, a description of this concept can be found in Section 3.1.2. It should be noted, that if the state's Goods Movement bond is not passed in the November elections, then the impact fees would be used as a funding source to fill any funding gaps. Administration costs include the level of effort anticipated to administer and track the performance of the various control measures and programs presented in the Clean Air Action Plan. Both Ports have similar contributions to the Clean Air Action Plan, however the Port of Long Beach's cost associated with SPBP-OGV2 will be significantly higher than Port Los Angeles due to greater electrical infrastructure improvement needs. Current total monetary commitments for each funding entity over the next five years:

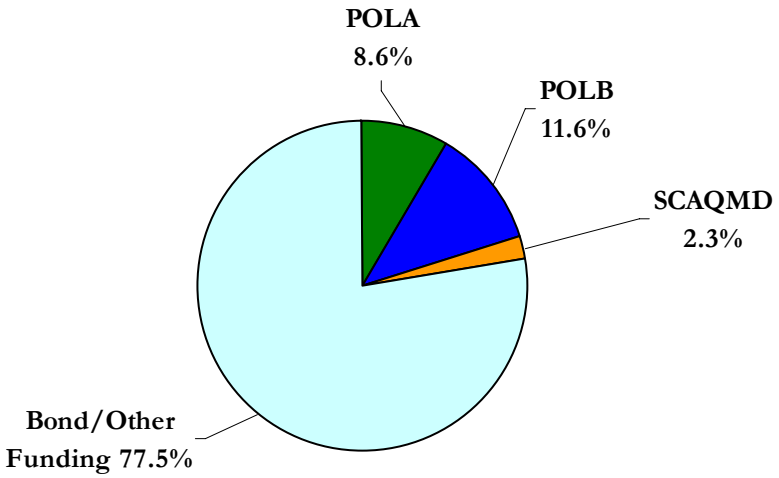
- Port of Los Angeles $177,500,000
- Port of Long Beach $240,400,000
- SCAQMD (initial commitment) $47,000,000
- Bond/Impact Fee Funding $1,602,900,000

Table 7.1 presents the Ports' fiscal year distribution of the above total Clean Air Action Plan funding anticipated to be spent over the next five years. In addition, it shows SCAQMD initial commitments and bond/other funding (made up primarily of the SPBP-HDV1 impact fees and potential bond monies if the State's Goods Movement bond passes in November). These amounts include the elements as presented in Sections 4 and 5 (incentive funding, capital costs, the PHL agreement, Port of Los Angeles China Shipping settlement monies, and plan administration). Figure 7.1 presents the percent of that funding by entity.

Table 7.1: Total Costs by Entity Over Next Five Years

	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Totals
POLA	$39,500,000	$47,700,000	$35,100,000	$28,600,000	$26,600,000	**$177,500,000**
POLB	$42,000,000	$31,600,000	$45,600,000	$57,300,000	$63,900,000	**$240,400,000**
SCAQMD	$17,500,000	$11,500,000	$6,000,000	$6,000,000	$6,000,000	**$47,000,000**
Bond/Other Funding	$0	$436,600,000	$418,300,000	$374,000,000	$374,000,000	**$1,602,900,000**
FY Totals	**$99,000,000**	**$527,400,000**	**$505,000,000**	**$465,900,000**	**$470,500,000**	**$2,067,800,000**

Figure 7.1: Percent of Total Costs by Entity



Other potential funding entities could include the Maritime Goods Coalition, the West Coast Diesel Collaborative, the EPA, the United States Department of Transportation, the Department of Energy, etc. Staff from both Ports will continue to identify potential entities and include them in the list of possible funding sources.

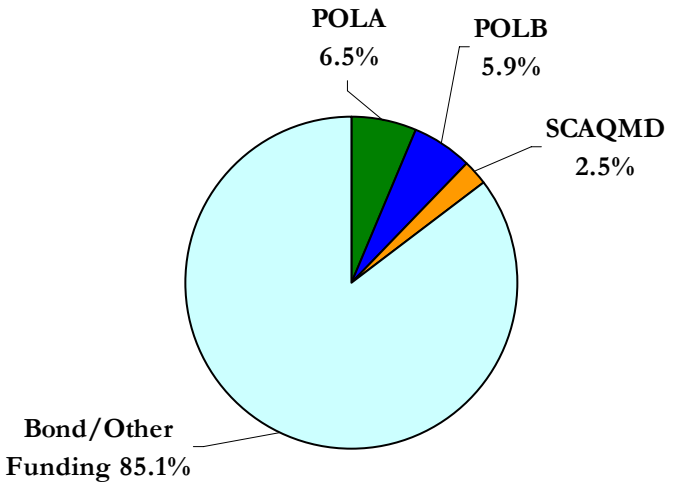
The San Pedro Bay Ports Clean Air Action Plan total operational costs (without the PHL agreement, shore-power infrastructure capital costs, and the Port of Los Angeles China Shipping settlement monies) are presented by entity and fiscal year in Table 7.2. Figure 7.2 presents the percentage of the total costs over the five fiscal years by entity. These operational costs represent the funding budgets beyond existing capital projects for each Port.

Table 7.2: Total Operational Costs by Entity

	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
POLA	$28,000,000	$25,700,000	$22,600,000	$22,600,000	$22,600,000	**$121,500,000**
POLB	$27,000,000	$21,600,000	$20,600,000	$20,600,000	$20,600,000	**$110,400,000**
SCAQMD	$17,500,000	$11,500,000	$6,000,000	$6,000,000	$6,000,000	**$47,000,000**
Bond/Other Funding	$0	$436,600,000	$418,300,000	$374,000,000	$374,000,000	**$1,602,900,000**
Totals	**$72,500,000**	**$495,400,000**	**$467,500,000**	**$423,200,000**	**$423,200,000**	**$1,881,800,000**

Note: This does not include shore-power capital costs, and POLA CS monies.

Figure 7.2: Percent of Total Operational Costs by Entity



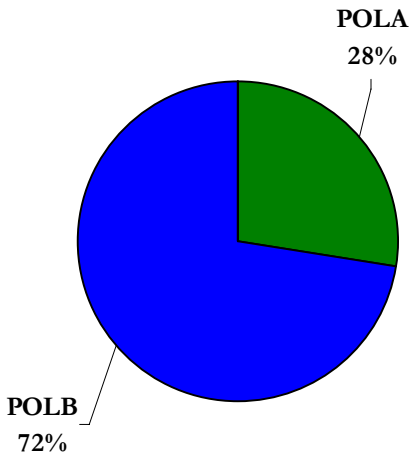
The total capital costs by Port are presented in Table 7.3 and Figure 7.3.

Table 7.3: Total Capital Costs by Port

	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Totals
POLA	$6,700,000	$21,100,000	$12,500,000	$6,000,000	$4,000,000	**$50,300,000**
POLB	$16,400,000	$11,000,000	$25,000,000	$36,700,000	$43,300,000	**$132,400,000**
SCAQMD	tbd	tbd	tbd	tbd	tbd	**$0**
Bond/Other Funding	$0	$0	$0	$0	$0	**$0**
FY Totals	**$23,100,000**	**$32,100,000**	**$37,500,000**	**$42,700,000**	**$47,300,000**	**$182,700,000**

Note: This does not include POLA CS monies

Figure 7.3: Percent of Total Capital Costs by Port



Note: This does not include POLA CS monies.

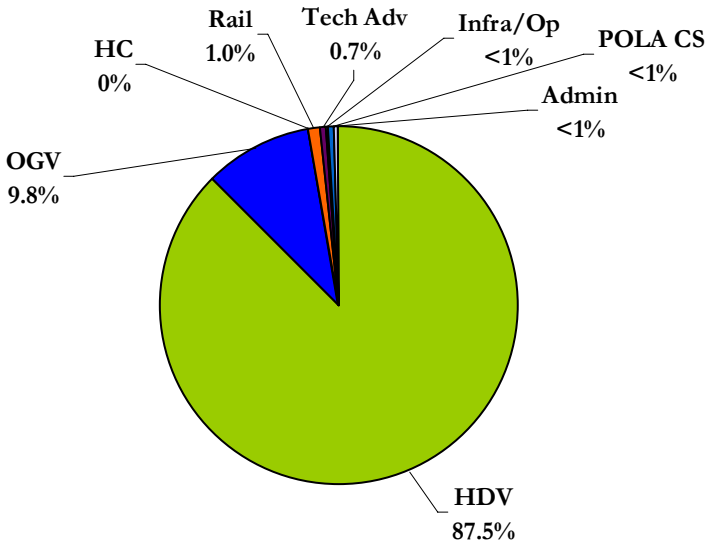
The total costs (operational and capital) spent by source category and Clean Air Action Plan initiative are provided by fiscal year in Table 7.4 and Figure 7.4 presents the percent of total funding for those categories over the five year period.

Table 7.4: Total Costs by Source Category & Initiative by Fiscal Year

Total SPBPCAAP Funding	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Totals
HDV	$46,000,000	$476,600,000	$458,300,000	$414,000,000	$414,000,000	**$1,808,900,000**
OGV	$26,600,000	$34,500,000	$41,900,000	$47,100,000	$51,700,000	**$201,800,000**
HC	$0	$0	$0	$0	$0	**$0**
Rail	$15,500,000	$5,500,000	$0	$0	$0	**$21,000,000**
Tech Adv	$3,400,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	**$15,400,000**
Infra/Op	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**
POLA CS	$6,000,000	$6,000,000	$0	$0	$0	**$12,000,000**
Admin	$800,000	$800,000	$800,000	$800,000	$800,000	**$4,000,000**
FY Totals	**$99,300,000**	**$527,400,000**	**$505,000,000**	**$465,900,000**	**$470,500,000**	**$2,068,100,000**

Note: POLA CS – Port of Los Angeles China Shipping settlement money

Figure 7.4: Percent of Total Costs by Five Source Category & Initiative



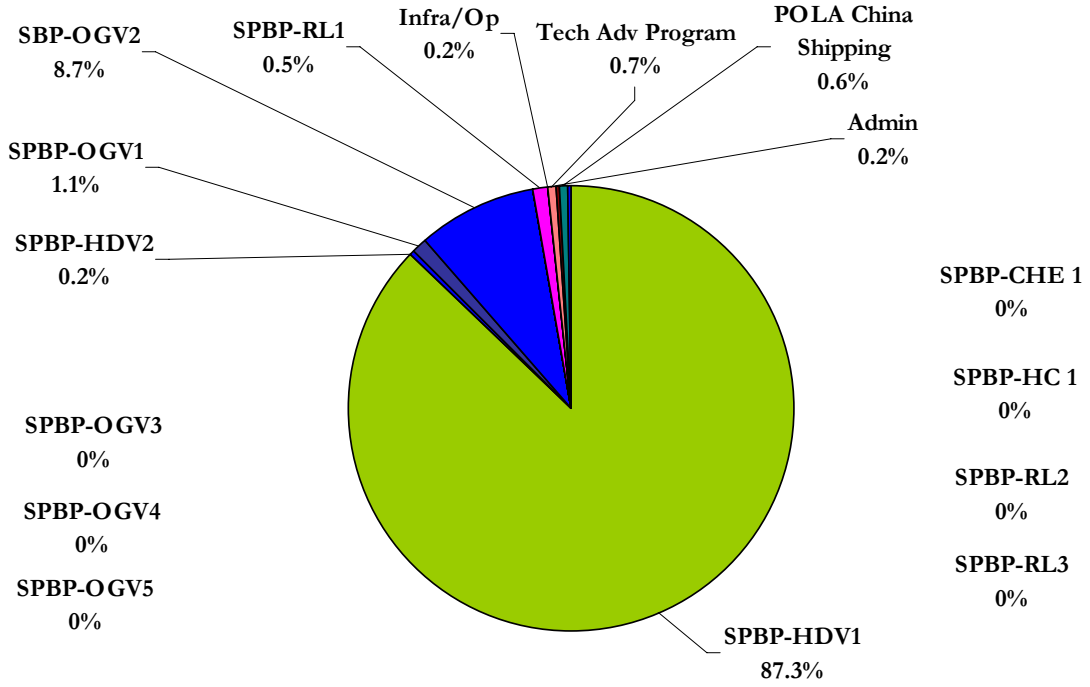
The total costs (operational and capital) associated by control measure and the Clean Air Action Plan initiative by fiscal year are presented in Table 7.5 and the percent of total costs of each control measure and initiative are presented in Figure 7.5 on the next.

Table 7.5: Clean Air Action Plan Total Costs by Control Measure & Initiative by Fiscal Year

Total SPBPCAAP Funding	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Totals
SPBP-HDV1	$44,000,000	$474,600,000	$458,300,000	$414,000,000	$414,000,000	**$1,804,900,000**
SPBP-HDV2	$2,000,000	$2,000,000	$0	$0	$0	**$4,000,000**
SPBP-OGV1	$5,100,000	$4,400,000	$4,400,000	$4,400,000	$4,400,000	**$22,700,000**
SBP-OGV2	$21,500,000	$30,100,000	$37,500,000	$42,700,000	$47,300,000	**$179,100,000**
SPBP-OGV3	$0	$0	$0	$0	$0	**$0**
SPBP-OGV4	$0	$0	$0	$0	$0	**$0**
SPBP-OGV5	$0	$0	$0	$0	$0	**$0**
SPBP-CHE 1	$0	$0	$0	$0	$0	**$0**
SPBP-HC 1	$0	$0	$0	$0	$0	**$0**
SPBP-RL1	$15,500,000	$5,500,000	$0	$0	$0	**$21,000,000**
SPBP-RL2	$0	$0	$0	$0	$0	**$0**
SPBP-RL3	$0	$0	$0	$0	$0	**$0**
Tech Advancement Program	$3,400,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	**$15,400,000**
Infra/Op	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**
POLA China Shipping	$6,000,000	$6,000,000	$0	$0	$0	**$12,000,000**
Admin	$800,000	$800,000	$800,000	$800,000	$800,000	**$4,000,000**
FY Totals	**$99,300,000**	**$527,400,000**	**$505,000,000**	**$465,900,000**	**$470,500,000**	**$2,068,100,000**

Note: Port of Long Beach optional shore-power facility costs for berths identified in Table 5.14 are included for planning purposes.

Figure 7.5: Clean Air Action Plan Percent Total Costs by Control Measure & Initiative



7.2 Indirect Costs

The second type of costs associated with the Clean Air Action Plan are indirect costs to the Ports resulting from the implementation of the plan. Potential indirect costs include:

- Reduction of revenue from loss of third party vessel operators
- Reduction of revenue from reduced rate of return during lease negotiations
- Cargo diversion to other West Coast ports
- Other undetermined costs associated with implementation of the Clean Air Action Plan

These costs cannot be quantified at this time; however, they could be significant and should be monitored throughout the implementation of the Clean Air Action Plan. These costs are factors that should be considered when developing Port budgets and may have an impact on bonding decisions.

7.3 Funding Strategies

A fundamental challenge to achieving the stated goals and implementing the Clean Air Action Plan is funding the control measures in an equitable manner. As presented in Section 7.1, the direct costs associated with the Clean Air Action Plan are significant and will require more then the Port and SCAQMD committed funding. This is primarily due to the aggressive truck replacement and retrofit measure SPBP-HDV1. However, to cover this cost, the Ports will utilize some or all of following funding stream options to cover the entire cost of the Clean Air Action Plan:

- Utilize public funding if the State's Goods Movement bond is passed
- Impact fees associated with SPBP-HDV1 targeted as close to the beneficial cargo owner as possible (which could include the licensed motor carrier)
- Franchise approach
- Joint Powers Authority

The advantage of moving the cost burden for the clean up of the trucking fleet to the shipping industry is that this avoids the scenario where the local communities bear the brunt of the clean up for goods that are not sold in the area. Additional information on the incentive program with impact fee component and potential tariff changes will be developed and provided by the Ports in the 1st quarter of 2007 as the program is developed.

A Port administered fee also has several implementation options such as varying fee levels by the Port (including ports that do not set surcharges), and would allow individual ports more flexibility in determining and directing what their air quality mitigation strategies.

APPENDIX A – Supporting Technical Details

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Appendix A

Technical Details Related to Clean Air Action Plan Measures' Emissions Reduction Calculations

From Table A-1, SCAQMD DRAFT 2007 AQMP

Source Category	2002 Baseline Emissions DPM (tpd)	NOx (tpd)	SOx (tpd)
Stationary Sources			
Fuel Combustion	6.40	34.74	2.25
Waste Disposal	N/A	1.76	0.41
Cleaning & Surface Coating	N/A	0.12	0.02
Petroleum Production & Mrkting	N/A	0.42	6.96
Industrial Processes	N/A	0.18	0.04
Solvent Evap	N/A	0.00	0.00
Misc Processes	N/A	55.38	12.06
Totals	**6.40**	**92.60**	**21.74**
On-Road Mobile Sources			
LDA-Passenger	N/A	173.97	1.27
LDT-T1	N/A	36.10	0.26
LDT-T2	N/A	93.91	0.52
MDT-T3	N/A	46.51	0.30
LHDGT1-T4	N/A	27.13	0.07
LHDGT2-T5	N/A	4.73	0.01
MHDGT-T6	N/A	7.87	0.01
HHDGT	N/A	6.18	0.00
LHDDT1-T4	0.02	1.45	0.01
LHDDT2-T5	0.11	10.46	0.05
MHDDT-T6	1.39	64.11	0.52
HHDDT	9.11	139.45	0.98
Motorcycels	0.09	2.03	0.00
Diesel Urban Buses	0.25	13.91	0.14
Gas Urban Buses	N/A	1.11	0.00
School Buses	0.15	4.47	0.04
Other Buses	0.07	4.10	0.02
Motor Homes	N/A	4.77	0.02
Totals	**11.19**	**642.26**	**4.22**
Other Mobile Sources			
Aircraft	0.78	13.58	1.34
Trains	0.92	37.91	1.24
Ships & Commerical Boats	4.45	64.29	23.45
Recreational Boats	5.57	12.93	0.03
Off-Road Vehicles	N/A	0.48	0.20
Off-Road Equipment	13.66	231.46	1.25
Farm Equipment	0.52	8.52	0.06
Fuel Storage & Handling	0.00	0.00	0.00
Truck Stops	0.00	0.00	0.00
Totals	**25.90**	**369.17**	**27.57**

	DPM (tpd)	NOx (tpd)	SOx (tpd)
Total Stationary & Area	**6.40**	**92.60**	**21.74**
Total On-Road	**11.19**	**642.26**	**4.22**
Total Other Mobile	**25.90**	**369.17**	**27.57**
Total Anthropogenic	*43.49*	*1,104.03*	*53.53*
POLA+POLB Baseline Emissions	*5.24*	*97.17*	*24.24*
% SPBP of 2002 SoCAB Baseline Emis	**12.0%**	**8.8%**	**45.3%**

	DPM (tpd)	NOx (tpd)	SOx (tpd)
Total Stationary & Area	**6.40**	**92.60**	**21.74**
Total On-Road	**10.68**	**616.88**	**3.89**
Total On-Road PORTS RELATED	*0.51*	*25.38*	*0.33*
Total Other Mobile (w/o Ports)	**21.18**	**297.38**	**3.66**
Total Other Mobile PORTS RELATED	*4.72*	*71.79*	*23.91*
Totals	*43.49*	*1,104.03*	*53.53*

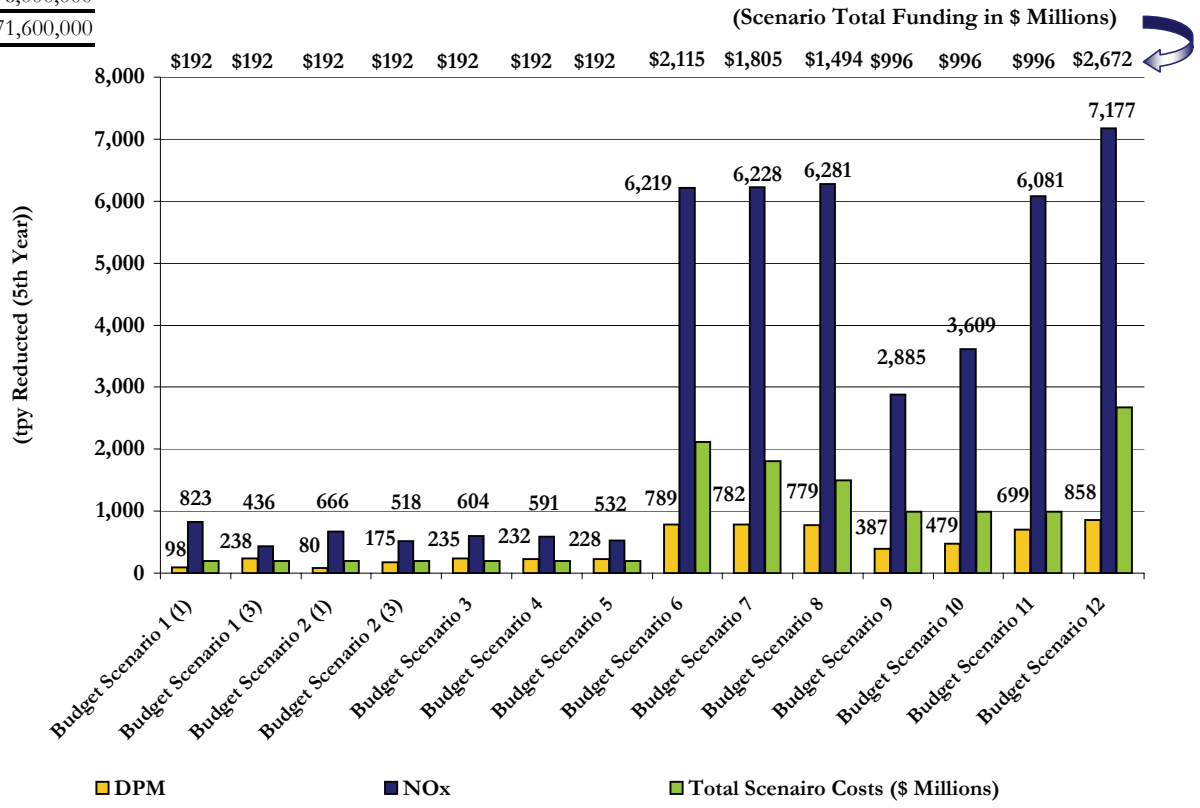
	DPM (tpd)	NOx (tpd)	SOx (tpd)
Total Stationary & Area	**6.40**	**92.60**	**21.74**
Total On-Road	**10.68**	**616.88**	**3.89**
Total Other Mobile	**21.18**	**297.38**	**3.66**
Total San Pedro Bay Ports Related	*5.24*	*97.17*	*24.24*
Totals	*43.49*	*1,104.03*	*53.53*

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Scenarios for Policy Discussion

Heavy-Duty Vehicles (Trucks)

	Reductions (5th Year) DPM (tpy)	NOx (tpy)	Total Scenairo Costs (US$)
Budget Scenario 1 (1)	98	823	$192,000,000
Budget Scenario 1 (3)	238	436	$192,000,000
Budget Scenario 2 (1)	80	666	$192,000,000
Budget Scenario 2 (3)	175	518	$192,000,000
Budget Scenario 3	235	604	$192,000,000
Budget Scenario 4	232	591	$192,000,000
Budget Scenario 5	228	532	$192,000,000
Budget Scenario 6	789	6,219	$2,115,200,000
Budget Scenario 7	782	6,228	$1,804,900,000
Budget Scenario 8	779	6,281	$1,494,100,000
Budget Scenario 9	387	2,885	$996,000,000
Budget Scenario 10	479	3,609	$996,000,000
Budget Scenario 11	699	6,081	$996,000,000
Budget Scenario 12	858	7,177	$2,671,600,000

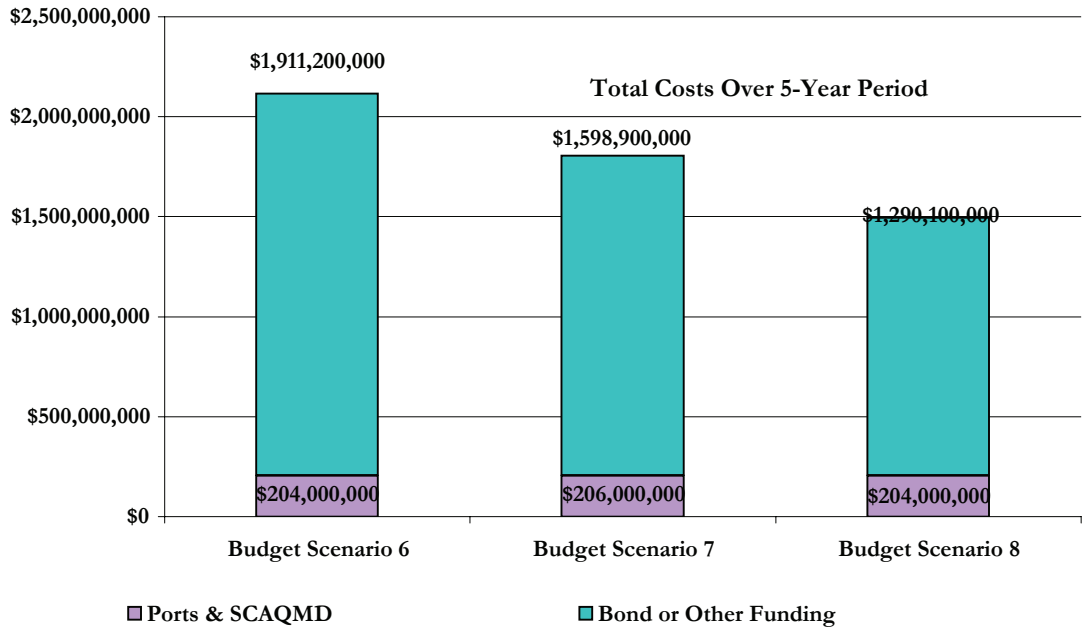


2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Scenarios for Policy Discussion

Heavy-Duty Vehicles (Trucks)

	Reductions (5th Year) DPM (tpy)	NOx (tpy)	Total Scenairo Costs (US$)	Ports & SCAQMD (US$)	Bond or Other Funding (US$)
Budget Scenario 6	789	6,219	$2,115,200,000	$204,000,000	$1,911,200,000
Budget Scenario 7	782	6,228	$1,804,900,000	$206,000,000	$1,598,900,000
Budget Scenario 8	779	6,281	$1,494,100,000	$204,000,000	$1,290,100,000



	Totals Over 5 FY: Total Clean Air Action Plan Clean Diesel (CD) Incentives	Total Clean Air Action Plan Alt Fuel Spending	Total 5 Fiscal Year Incentives	
Budget Scenario 1	$140,000,000	$52,000,000	**$192,000,000**	No Bond Funding
Budget Scenario 2	$36,000,000	$156,000,000	**$192,000,000**	
Budget Scenario 3	$152,000,000	$40,000,000	**$192,000,000**	
Budget Scenario 4	$142,000,000	$50,000,000	**$192,000,000**	
Budget Scenario 5	$104,000,000	$88,000,000	**$192,000,000**	
Budget Scenario 6	$121,900,000	$1,993,300,000	**$2,115,200,000**	Bond Funding
Budget Scenario 7	$803,700,000	$1,001,200,000	**$1,804,900,000**	
Budget Scenario 8	$1,464,100,000	$30,000,000	**$1,494,100,000**	
Budget Scenario 9	$6,000,000	$990,000,000	**$996,000,000**	
Budget Scenario 10	$486,000,000	$510,000,000	**$996,000,000**	
Budget Scenario 11	$966,000,000	$30,000,000	**$996,000,000**	
Budget Scenario 12	$1,088,000,000	$1,583,600,000	**$2,671,600,000**	

< PRELIMINARY DRAFT RESULTS >

HDV Fleet Truck Characteristic (from work on 2005 EI Update)

~40,000+ Individual Trucks Serving San Pedro Bay Ports

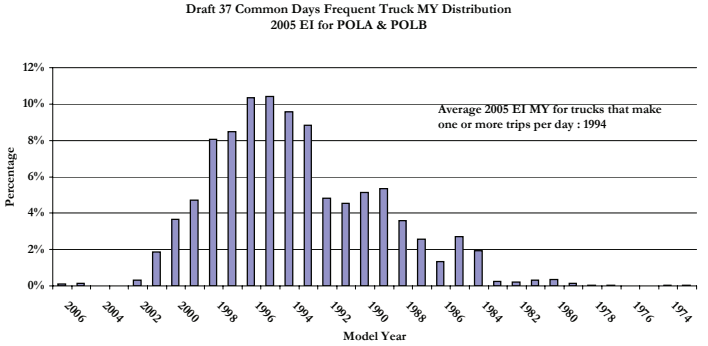
Of Those,

~7,000 Frequent Callers (7 trips/wk or more) = 50% of All Calls

~9,800 Semi-Frequent Callers (3.5 to <7 trips/wk) = 30% of All Calls

~16,800 Frequent/Semi-Frequent Callers Make 80% of All Calls

Note: $1M/year is included in Tech Adv Program for electric/hybrid trucks (not shown)



Budget Scenario 1 — Funding Mostly CD New Trucks

Deployment Combination 1		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding New Trucks		1,081 trucks	77		653	
100% Alt Fuel Funding New LNG		276 trucks	20		170	
		1,357 trucks	**98**	298 Total	**823**	2,378 Total

Deployment Combination 2	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding New Trucks	1,081 trucks	77		653	
100% Alt Fuel Funding Westport LNG	307 trucks	22		206	
	1,388 trucks	**100**	304 Total	**859**	2,477 Total

Budget Scenario 1 — Funding Mostly CD DPFs

Deployment Combination 3	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding DPFs	5,700 DPFs	186		0	
100% Alt Fuel Funding New LNG	707 trucks	52		436	
		238	807 Total	**436**	1,153 Total

Deployment Combination 4	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding DPFs	5,700 DPFs	186		0	
100% Alt Fuel Funding Westport LNG	786 trucks	57		528	
		244	822 Total	**528**	1,408 Total

Budget Scenario 2 — Funding Mostly Alt Fuel New Trucks

Deployment Combination 1	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding New Trucks	278 trucks	20		148	
100% Alt Fuel Funding New LNG	828 trucks	61		518	
	1,106 trucks	**80**	254 Total	**666**	2,057 Total

Deployment Combination 2	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding New Trucks	278 trucks	20		148	
100% Alt Fuel Funding Westport LNG	920 trucks	67		623	
	1,198 trucks	**87**	271 Total	**771**	2,332 Total

Budget Scenario 2 — Funding Mostly CD DPFs

Deployment Combination 3	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding DPFs	3,495 DPFs	114		0	
100% Alt Fuel Funding New LNG	828 trucks	61		518	
		175	716 Total	**518**	1,332 Total

Deployment Combination 4	#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
100% CD Funding DPFs	3,495 DPFs	114		0	
100% Alt Fuel Funding Westport LNG	920 trucks	67		623	
		181	733 Total	**623**	1,607 Total

Budget Scenario 3 — Funding Mostly CD

Deployment Combination 1		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
CD Funding New Trucks	66%	775 trucks	56		473	
CD Funding DPFs	34%	5,017 DPFs	164		0	
Alt Fuel Funding New LNG		212 trucks	16		130	
		987 trucks	**235**	711 Total	**604**	1,724 Total
		5,017 DPFs				

Deployment Combination 2		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
CD Funding New Trucks	66%	775 trucks	56		473	
CD Funding DPFs	34%	5,017 DPFs	164		0	
Alt Fuel Funding Westport LNG		236 trucks	17		158	
		1,011 trucks	**237**	716 Total	**631**	1,810 Total
		5,017 DPFs				

Budget Scenario 4 — Fudning Mostly CD

Deployment Combination 1		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
CD Funding New Trucks	64%	702 trucks	50		429	
CD Funding DPFs	36%	4,963 DPFs	162		0	
Alt Fuel Funding New LNG		265 trucks	19		163	
		967 trucks	**232**	702 Total	**591**	1,694 Total
		4,963 DPFs				

Deployment Combination 2		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
CD Funding New Trucks	0%	702 trucks	50		429	
CD Funding DPFs	0%	4,963 DPFs	162		0	
Alt Fuel Funding Westport LNG		0 trucks	22		197	
		702 trucks	**234**	708 Total	**626**	1,802 Total
		4,963 DPFs				

Budget Scenario 5 — Fudning Mostly Alt Fuels

Deployment Combination 1		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
Alt Fuel Funding New LNG		467 trucks	34		287	
CD Funding New Trucks	50%	402 trucks	29		245	
CD Funding DPFs	50%	5,049 DPFs	165		0	
		868 trucks	**228**	698 Total	**532**	1,538 Total
		5,049 DPFs				

Deployment Combination 2		#'s	Reductions (tpy) - 5th Year DPM	Reductions (tpy) - Total DPM	Reductions (tpy) - 5th Year NOx	Reductions (tpy) - Total NOx
Alt Fuel Funding Westport LNG		519 trucks	38		348	
CD Funding New Trucks	50%	402 trucks	29		245	
CD Funding DPFs	50%	5,049 DPFs	165		0	
		921 trucks	**232**	708 Total	**593**	1,723 Total
		5,049 DPFs				

Totals Over 5 FY

	Total Clean Air Action Plan Clean Diesel (CD) Incentives	Total Clean Air Action Plan Alt Fuel Spending	Total 5 Fiscal Year Incentives	
Budget Scenario 1	$140,000,000	$52,000,000	**$192,000,000**	No Bond Funding
Budget Scenario 2	$36,000,000	$156,000,000	**$192,000,000**	
Budget Scenario 3	$152,000,000	$40,000,000	**$192,000,000**	
Budget Scenario 4	$142,000,000	$50,000,000	**$192,000,000**	
Budget Scenario 5	$104,000,000	$88,000,000	**$192,000,000**	
Budget Scenario 6	$121,900,000	$1,993,300,000	**$2,115,200,000**	Bond Funding
Budget Scenario 7	$803,700,000	$1,001,200,000	**$1,804,900,000**	
Budget Scenario 8	$1,464,100,000	$30,000,000	**$1,494,100,000**	
Budget Scenario 9	$6,000,000	$990,000,000	**$996,000,000**	
Budget Scenario 10	$486,000,000	$510,000,000	**$996,000,000**	
Budget Scenario 11	$966,000,000	$30,000,000	**$996,000,000**	
Budget Scenario 12	$1,088,000,000	$1,583,600,000	**$2,671,600,000**	

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HDV Fleet Truck Characteristic (from work on 2005 EI Update)

~40,000+ Individual Trucks Serving San Pedro Bay Ports

Of Those,

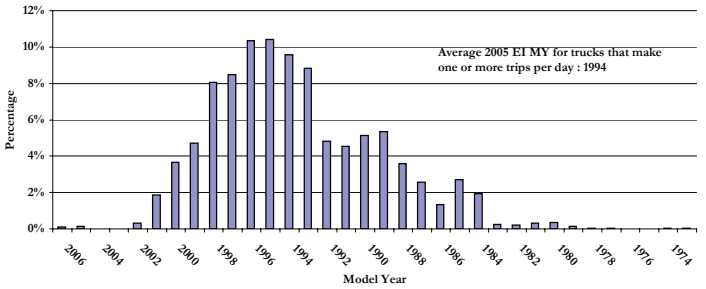
~7,000 Frequent Callers (7 trips/wk or more) = 50% of All Calls

~9,800 Semi-Frequent Callers (3.5 to <7 trips/wk) = 30% of All Calls

~16,800 Frequent/Semi-Frequent Callers Make 80% of All Calls

Note: $1M/year is included in Tech Adv Program for electric/hybrid trucks (not shown)

Draft 37 Common Days Frequent Truck MY Distribution
2005 EI for POLA & POLB



Budget Scenario 6	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	10,575 trucks	697		5,444		Alt Fuel Funding Westport LNG	10,575 trucks	696		5,874	
Calls.	CD Funding New Trucks	46 trucks	3		25		CD Funding New Trucks	46 trucks	3		25	
	CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705		CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705	
Mostly Alt Fuel Replacments	CD Fudning Cleaire	844 DPFs	7		45		CD Fudning Cleaire	844 DPFs	7		45	
+ Retrofits		10,622 trucks	**789**	2,112 Total	**6,219**	16,644 Total		10,622 trucks	**788**	2,108 Total	**6,649**	17,757 Total
		5,956 DPFs						5,956 DPFs				

Budget Scenario 7	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	5,311 trucks	350		2,728		Alt Fuel Funding Westport LNG	5,311 trucks	350		3,148	
Calls.	CD Funding New Trucks	5,311 trucks	344		2,750		CD Funding New Trucks	5,311 trucks	344		2,750	
	CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705		CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705	
50/50 Alt Fuel & CD Replacments	CD Fudning Cleaire	844 DPFs	7		45		CD Fudning Cleaire	844 DPFs	7		45	
+ Retrofits		10,622 trucks	**782**	2,095 Total	**6,228**	16,273 Total		10,622 trucks	**782**	2,095 Total	**6,648**	17,242 Total
		5,956 DPFs						5,956 DPFs				

Budget Scenario 8	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	159 trucks	11		80		Alt Fuel Funding Westport LNG	177 trucks	12		97	
Calls.	CD Funding New Trucks	10,463 trucks	679		5,450		CD Funding New Trucks	10,463 trucks	679		5,450	
	CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705		CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705	
Mostly CD Replacements + Retrofits	CD Fudning Cleaire	844 DPFs	7		45		CD Fudning Cleaire	844 DPFs	7		45	
		10,622 trucks	**779**	2,100 Total	**6,281**	16,120 Total		10,640 trucks	**780**	2,103 Total	**6,298**	16,174 Total
		5,956 DPFs						5,956 DPFs				

Budget Scenario 9	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	5,252 trucks	384		2,860		Alt Fuel Funding Westport LNG	5,841 trucks	425		3,681	
Calls.	CD Funding New Trucks	46 trucks	3		25		CD Funding New Trucks	46 trucks	3		25	
	CD Funding Cleaire + Chip Reflash	0 DPFs	0		0		CD Funding Cleaire + Chip Reflash	0 DPFs	0		0	
Mostly Alt Fuel Replacments	CD Fudning Cleaire	0 DPFs	0		0		CD Fudning Cleaire	0 DPFs	0		0	
		5,298 trucks	**387**	1,013 Total	**2,885**	7,548 Total		5,887 trucks	**428**	1,120 Total	**3,706**	9,679 Total
		0 DPFs						0 DPFs				

	Totals Over 5 FY			
	Total Clean Air Action Plan Clean Diesel (CD) Incentives	Total Clean Air Action Plan Alt Fuel Spending	Total 5 Fiscal Year Incentives	
Budget Scenario 1	$140,000,000	$52,000,000	**$192,000,000**	No Bond Funding
Budget Scenario 2	$36,000,000	$156,000,000	**$192,000,000**	
Budget Scenario 3	$152,000,000	$40,000,000	**$192,000,000**	
Budget Scenario 4	$142,000,000	$50,000,000	**$192,000,000**	
Budget Scenario 5	$104,000,000	$88,000,000	**$192,000,000**	
Budget Scenario 6	$121,900,000	$1,993,300,000	**$2,115,200,000**	Bond Funding
Budget Scenario 7	$803,700,000	$1,001,200,000	**$1,804,900,000**	
Budget Scenario 8	$1,464,100,000	$30,000,000	**$1,494,100,000**	
Budget Scenario 9	$6,000,000	$990,000,000	**$996,000,000**	
Budget Scenario 10	$486,000,000	$510,000,000	**$996,000,000**	
Budget Scenario 11	$966,000,000	$30,000,000	**$996,000,000**	
Budget Scenario 12	$1,088,000,000	$1,583,600,000	**$2,671,600,000**	

< PRELIMINARY DRAFT RESULTS >

HDV Fleet Truck Characteristic (from work on 2005 EI Update)

~40,000+ Individual Trucks Serving San Pedro Bay Ports

Of Those,

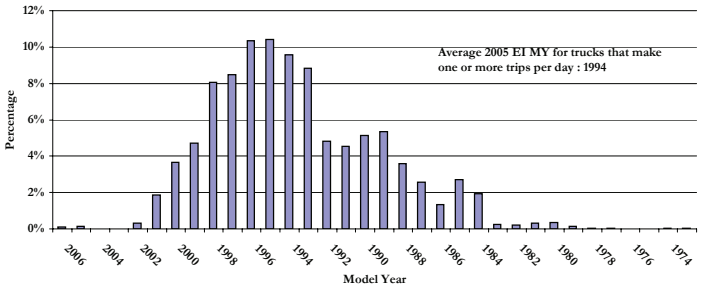
~7,000 Frequent Callers (7 trips/wk or more) = 50% of All Calls

~9,800 Semi-Frequent Callers (3.5 to <7 trips/wk) = 30% of All Calls

~16,800 Frequent/Semi-Frequent Callers Make 80% of All Calls

Note: $1M/year is included in Tech Adv Program for electric/hybrid trucks (not shown)

Draft 37 Common Days Frequent Truck MY Distribution
2005 EI for POLA & POLB



Budget Scenario 10	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	2,706 trucks	198		1,473		Alt Fuel Funding Westport LNG	3,009 trucks	219		1,896	
Calls.	CD Funding New Trucks	3,273 trucks	234		1,746		CD Funding New Trucks	3,273 trucks	234		1,746	
	CD Funding Cleaire + Chip Reflash	2,492 DPFs	40		344		CD Funding Cleaire + Chip Reflash	2,492 DPFs	40		344	
50/50 Alt Fuel & CD Replacments	CD Fudning Cleaire	844 DPFs	7		45		CD Fudning Cleaire	844 DPFs	7		45	
+ Retrofits		5,979 trucks	**479**	1,251 Total	**3,609**	9,408 Total		6,282 trucks	**501**	1,307 Total	**4,031**	10,511 Total
		3,336 DPFs						3,336 DPFs				

Budget Scenario 11	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	159 trucks	11		86		Alt Fuel Funding Westport LNG	177 trucks	12		105	
Calls.	CD Funding New Trucks	8,900 trucks	599		5,244		CD Funding New Trucks	8,900 trucks	599		5,244	
	CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705		CD Funding Cleaire + Chip Reflash	5,112 DPFs	82		705	
Mostly CD Replacements + Retrofits	CD Fudning Cleaire	844 DPFs	7		45		CD Fudning Cleaire	844 DPFs	7		45	
		9,059 trucks	**699**	1,607 Total	**6,081**	13,157 Total		9,077 trucks	**700**	1,610 Total	**6,100**	13,214 Total
		5,956 DPFs						5,956 DPFs				

Budget Scenario 12	**Deployment Combination 1**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**		**Deployment Combination 2**	**#'s**	**Reductions (tpy) - 5th Year & Total Reductions DPM**		**NOx**	
Funding Targets 80% of All Truck	Alt Fuel Funding New LNG	8,400 trucks	433.49		3,723		Alt Fuel Funding Westport LNG	362 trucks	12		105	
Calls.	Bond CD Funding New Trucks	8,400 trucks	424.89		3,455		CD Funding New Trucks	8,400 trucks	425		3,455	
	Bond CD Funding Cleaire + Chip Reflash	0 DPFs	0.00		0		CD Funding Cleaire + Chip Reflash	0 DPFs	0		0	
Bond Funding CD Retro/Replace	Bond CD Fudning Cleaire	0 DPFs	0.00		0		CD Fudning Cleaire	0 DPFs	0		0	
Ports/SCAQMD Alt Fuel Replacements		16,800 trucks	**858**	2,176 Total	**7,177**	18,021 Total		8,762 trucks	**437**	1,610 Total	**3,560**	13,214 Total
		0 DPFs						0 DPFs				

Assumptions

Mileage Accrual rate for Ports trucks is same as in EMFAC2002 ver 2.2

Replaced trucks VMT is same as of the original trucks

SCAQMD will commit $12 million first year then minimum of $6 million per year over the last four fiscal years

ARB & EPA funding not identified at this time

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 1 - Funding Focused on Greatest DPM Emissions Reductions

Budget Overview

Measure #	Measure Description	Budget by Measure						Notes
SBP-HDV1	HDV Incentives (Clean Diesel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Funding Type
	Clean Diesel - POLA	$13,000,000	$15,000,000	$14,000,000	$13,000,000	$12,000,000	**$67,000,000**	Operational
	Clean Diesel - POLB	$13,000,000	$15,000,000	$14,000,000	$13,000,000	$12,000,000	**$67,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SC annual $
	Clean Diesel - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$32,000,000	**$30,000,000**	**$28,000,000**	**$26,000,000**	**$24,000,000**	**$140,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$1,000,000	$1,000,000	$2,000,000	$3,000,000	$4,000,000	**$11,000,000**	Operational
	LNG - POLB	$1,000,000	$1,000,000	$2,000,000	$3,000,000	$4,000,000	**$11,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/y
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$8,000,000	**$8,000,000**	**$10,000,000**	**$12,000,000**	**$14,000,000**	**$52,000,000**	
	Measure FY Totals	**$40,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$192,000,000**	
SBP-HDV2	Alternate Fuel Infrastructure	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	$0	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$42,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$194,000,000**	

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 1 - Funding Focused on Greatest DPM Emissions Reductions

Budget Scenario 1 - Options for Clean Diesel (CD)

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$32,000,000	**$30,000,000**	**$28,000,000**	**$26,000,000**	**$24,000,000**	**$140,000,000**	

CD Option 1 - Cleaner Diesel Trucks MY2007+

$129,500 /truck ($126k O/Op, $1.3k AVL, $2.2k admin) $126K based on ARB's Por

Number of total trucks/year	**247**	**232**	**216**	**201**	**185**	**1,081**
Total DPM Emis Red tpy	18	34	50	64	77	**243**
Total NOx Emis Red tpy	132	255	371	517	653	**1,928**

CD Option 2 - Purchase of DPFs for 1994+ Trucks

$10,300 /truck ($8k DPF, $1.3k AVL, $500 Installation, $500 Incentive)

Number of total DPFs/year	**1,500**	**1,500**	**1,500**	**1,200**	**0**	**5,700**

Assumes that this would put a DPF on all 1994+ trucks; If ARB rule comes out requiring this then money moves another scenario

Total DPM Emis Red tpy	49	98	147	186	186	**667**

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 1 - Funding Focused on Greatest DPM Emissions Reductions

Budget Scenario 1 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$8,000,000	$8,000,000	$10,000,000	$12,000,000	$14,000,000	$52,000,000	
	Number of total trucks/year	**42**	**42**	**53**	**64**	**74**	**276**	
	Total DPM Emis Red tpy	3.1	6.2	10.1	14.7	20.2	**54**	
	Total NOx Emis Red tpy	23	50	83	123	170	**450**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$8,000,000	$8,000,000	$10,000,000	$12,000,000	$14,000,000	$52,000,000	
	Number of total trucks/year	**47**	**47**	**59**	**71**	**83**	**307**	
	Total DPM Emis Red tpy	3.4	6.9	11.2	16.3	22.4	**60**	
	Total NOx Emis Red tpy	29.7	61.8	101.9	149.9	206.0	**549**	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	**70**	**229**	**342**	**443**	**469**	**1,553**
Total NOx Reduction (tpy)	**155**	**377**	**558**	**735**	**908**	**2,732**
Total SOx Reduction (tpy)	**0.020**	**0.020**	**0.025**	**0.029**	**0.034**	**0.13**

Note

Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 2 - Funding Focused on Quickest POLA Movement to Alt Fuels

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
	Clean Diesel - POLA	$13,000,000	$2,000,000	$0	$0	$0	**$15,000,000**	Operational
	Clean Diesel - POLB	$13,000,000	$2,000,000	$0	$0	$0	**$15,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SC annual $
	Clean Diesel - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$32,000,000	**$4,000,000**	**$0**	**$0**	**$0**	**$36,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$1,000,000	$14,000,000	$16,000,000	$16,000,000	$16,000,000	**$63,000,000**	Operational
	LNG - POLB	$1,000,000	$14,000,000	$16,000,000	$16,000,000	$16,000,000	**$63,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$8,000,000	**$34,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$156,000,000**	
	Measure FY Totals	**$40,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$192,000,000**	
SBP-HDV2	Alternate Fuel Infrastructure	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$42,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$194,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 2 - Funding Focused on Quickest POLA Movement to Alt Fuels

Budget Scenario 2 - Options for Clean Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV1	HDV Incentives (Clean Diesel)	$32,000,000	$4,000,000	$0	$0	$0	$36,000,000	

CD Option 1 - New Cleaner Diesel Trucks

$129,500 /truck ($126k O/Op, $1.3k AVL, $2.2k admin) see note below

Number of total trucks/year	247	31	0	0	0	278
Total DPM Emis Red tpy	18	20	20	20	20	**97**
Total NOx Emis Red tpy	132	148	148	148	148	**725**

CD Option 2 - Purchase of DPFs for 1994+ Trucks

$10,300 /truck ($8k DPF, $1.3k AVL, $500 Installation, $500 Incentive)

Number of total DPFs/year	3,107	388	0	0	0	3,495
Total DPM Emis Red tpy	102	114	114	114	114	**559**

Assumes that this would put a DPF on all 1994+ trucks; If ARB rule comes out requiring this then money moves another scenario

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 2 - Funding Focused on Quickest POLA Movement to Alt Fuels

Budget Scenario 2 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$8,000,000	$34,000,000	$38,000,000	$38,000,000	$38,000,000	$156,000,000	
	Number of total trucks/year	**42**	**180**	**202**	**202**	**202**	**828**	
	Total DPM Emis Red tpy	3.1	16.3	31.0	45.8	60.5	**157**	
	Total NOx Emis Red tpy	23	137	264	391	518	**1,332**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below Based on A

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$8,000,000	$34,000,000	$38,000,000	$38,000,000	$38,000,000	$156,000,000	
	Number of total trucks/year	**47**	**201**	**224**	**224**	**224**	**920**	
	Total DPM Emis Red tpy	3.4	18.1	34.4	50.8	67.1	**174**	
	Total NOx Emis Red tpy	29.7	166.0	318.2	470.5	622.8	**1,607**	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	**122**	**151**	**165**	**180**	**195**	**813**
Total NOx Reduction (tpy)	**155**	**285**	**412**	**539**	**666**	**2,057**
Total SOx Reduction (tpy)	**0.020**	**0.083**	**0.093**	**0.093**	**0.093**	**0.38**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report

Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 3 - Funding Focused on DPM w/Alt Fuel Funding $1M/yr (Replacement, Infrastructure, & R&D)

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
	Clean Diesel - POLA	$13,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	**$73,000,000**	Operational
	Clean Diesel - POLB	$13,000,000	$15,000,000	$15,000,000	$15,000,000	$15,000,000	**$73,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$32,000,000	**$30,000,000**	**$30,000,000**	**$30,000,000**	**$30,000,000**	**$152,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**	Operational
	LNG - POLB	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$8,000,000	**$8,000,000**	**$8,000,000**	**$8,000,000**	**$8,000,000**	**$40,000,000**	
	Measure FY Totals	**$40,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$192,000,000**	
SBP-HDV2	Alternate Fuel Infrastructure	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$42,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$194,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 3 - Funding Focused on DPM w/Alt Fuel Funding $1M/yr (Replacement, Infrastructure, & R&D)

Budget Scenario 3 - Options for Clean Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV1	HDV Incentives (Clean Diesel)	$32,000,000	$30,000,000	$30,000,000	$30,000,000	$30,000,000	$152,000,000	

CD Option 1 - Cleaner Diesel Trucks MY 2007+

66%	**CD Funding**	$129,500	/truck ($126k O/Op, $1.3k AVL, $2.2k admin)					see note below
	Number of total trucks/year	**163**	**153**	**153**	**153**	**153**	**775**	
	Total DPM Emis Red tpy	12	23	34	45	56	**168**	
	Total NOx Emis Red tpy	87	169	250	362	473	**1,341**	
34%	**CD Funding**	$10,300	/truck ($8k DPF, $1.3k AVL, $500 Installation, $500 Incentive)					
	Number of total DPFs/year	**1,056**	**990**	**990**	**990**	**990**	**5,017**	
	Assumes that this would put a DPF on all 1994+ trucks; If ARB rule comes out requiring this then money moves another scenario							
	Total DPM Emis Red tpy	35	67	99	132	164	**497**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 3 - Funding Focused on DPM w/Alt Fuel Funding $1M/yr (Replacement, Infrastructure, & R&D)

Budget Scenario 3 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$40,000,000	
	Number of total trucks/year	42	42	42	42	42	212	
	Total DPM Emis Red tpy	3.1	6.2	9.3	12.4	15.5	47	
	Total NOx Emis Red tpy	23	50	77	103	130	383	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$40,000,000	
	Number of total trucks/year	47	47	47	47	47	236	
	Total DPM Emis Red tpy	3.4	6.9	10.3	13.8	17.2	52	
	Total NOx Emis Red tpy	29.7	61.8	93.9	125.9	158.0	469	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	49	96	142	189	235	711
Total NOx Reduction (tpy)	110	218	327	465	604	1,724
Total SOx Reduction (tpy)	0.020	0.020	0.020	0.020	0.020	0.10

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 4 - Funding Focused on DPM w/Alt Fuel Funding $2M/yr (Replacement, Infrastructure, & R&D)

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$12,000,000	$14,000,000	$14,000,000	$14,000,000	$14,000,000	**$68,000,000**	Operational
	Clean Diesel - POLB	$12,000,000	$14,000,000	$14,000,000	$14,000,000	$14,000,000	**$68,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$30,000,000	**$28,000,000**	**$28,000,000**	**$28,000,000**	**$28,000,000**	**$142,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	**$10,000,000**	Operational
	LNG - POLB	$2,000,000	$2,000,000	$2,000,000	$2,000,000	$2,000,000	**$10,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$10,000,000	**$10,000,000**	**$10,000,000**	**$10,000,000**	**$10,000,000**	**$50,000,000**	
	Measure FY Totals	**$40,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$192,000,000**	
SBP-HDV2	Alternate Fuel Infrastructure	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$42,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$194,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 4 - Funding Focused on DPM w/Alt Fuel Funding $2M/yr (Replacement, Infrastructure, & R&D)

Budget Scenario 4 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV1	HDV Incentives (Clean Diesel)	$30,000,000	$28,000,000	$28,000,000	$28,000,000	$28,000,000	$142,000,000	

CD Option 1 - Clean Diesel Trucks MY2004+ w/DPF & DPFs

64% **CD Funding** $129,500 /truck ($126k O/Op, $1.3k AVL, $2.2k admin) see note below

Number of total trucks/year	**148**	**138**	**138**	**138**	**138**	**702**
Total DPM Emis Red (tpy)	11	21	30	40	50	**152**
Total NOx Emis Red (tpy)	79	153	227	328	429	**1,215**

36% **CD Funding** $10,300 /truck ($8k DPF, $1.3k AVL, $500 Installation, $500 Incentive)

Number of total DPFs/year	**1,049**	**979**	**979**	**979**	**979**	**4,963**

Assumes that this would put a DPF on all 1994+ trucks; If ARB rule comes out requiring this then money moves another scenario

Total DPM Emis Red (tpy)	34	66	98	130	162	**492**

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 4 - Funding Focused on DPM w/Alt Fuel Funding $2M/yr (Replacement, Infrastructure, & R&D)

Budget Scenario 4 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$50,000,000	
	Number of total trucks/year	53	53	53	53	53	265	
	Total DPM Emis Red (tpy)	3.9	7.8	11.6	15.5	19.4	58	
	Total NOx Emis Red (tpy)	29	62	96	129	163	479	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$10,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	$50,000,000	
	Number of total trucks/year	59	59	59	59	59	295	
	Total DPM Emis Red (tpy)	4.3	8.6	12.9	17.2	21.5	64	
	Total NOx Emis Red (tpy)	37.2	77.2	117.3	157.4	197.5	587	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	49	95	140	186	232	702
Total NOx Reduction (tpy)	108	215	322	457	591	1,694
Total SOx Reduction (tpy)	0.025	0.025	0.025	0.025	0.025	0.12

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 5 - Funding Focused Matching SCAQMD Alt Fuel Funding of $6M/yr (Replacement, Infrastructure, & R&D)

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
	Clean Diesel - POLA	$9,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	**$49,000,000**	Operational
	Clean Diesel - POLB	$9,000,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000	**$49,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$24,000,000	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$104,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$5,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$29,000,000**	Operational
	LNG - POLB	$5,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$29,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes no bond $
		$16,000,000	**$18,000,000**	**$18,000,000**	**$18,000,000**	**$18,000,000**	**$88,000,000**	
	Measure FY Totals	**$40,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$192,000,000**	
SBP-HDV2	Alternate Fuel Infrastructure	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$42,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$38,000,000**	**$194,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 5 - Funding Focused Matching SCAQMD Alt Fuel Funding of $6M/yr (Replacement, Infrastructure, & R&D)

Budget Scenario 5 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV1	HDV Incentives (Clean Diesel)	$24,000,000	$20,000,000	$20,000,000	$20,000,000	$20,000,000	$104,000,000	

CD Option 1 - Clean Diesel Trucks MY2004+ w/DPF & DPFs

50%	**CD Funding**	$129,500	/truck ($126k O/Op, $1.3k AVL, $2.2k admin)					see note below
	Number of total trucks/year	**93**	**77**	**77**	**77**	**77**	**402**	
	Total DPM Emis Red tpy	7	12	18	23	29	**89**	
	Total NOx Emis Red tpy	49	91	132	188	245	**705**	
50%	**CD Funding**	$10,300	/truck ($8k DPF, $1.3k AVL, $500 Installation, $500 Incentive)					
	Number of total DPFs/year	**1,165**	**971**	**971**	**971**	**971**	**5,049**	
	Assumes that this would put a DPF on all 1994+ trucks; If ARB rule comes out requiring this then money moves another scenario							
	Total DPM Emis Red tpy	38	70	102	133	165	**508**	

Budget Scenario 5 - Options for Alt Fuels

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 5 - Funding Focused Matching SCAQMD Alt Fuel Funding of $6M/yr (Replacement, Infrastructure, & R&D)

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$16,000,000	$18,000,000	$18,000,000	$18,000,000	$18,000,000	$88,000,000	
	Number of total trucks/year	85	95	95	95	95	467	
	Total DPM Emis Red tpy	6.2	13.2	20.2	27.1	34.1	101	
	Total NOx Emis Red tpy	46	106	167	227	287	833	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$16,000,000	$18,000,000	$18,000,000	$18,000,000	$18,000,000	$88,000,000	
	Number of total trucks/year	94	106	106	106	106	519	
	Total DPM Emis Red tpy	6.9	14.6	22.4	30.1	37.9	112	
	Total NOx Emis Red tpy	59.5	131.6	203.7	275.9	348.0	1,019	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	51	95	139	184	228	698
Total NOx Reduction (tpy)	96	197	298	415	532	1,538
Total SOx Reduction (tpy)	0.039	0.044	0.044	0.044	0.044	0.22

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 6 - Focus on Replacements w/Focus On Alt Fuels + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,575	Semi-Freq Caller Trucks Alt Fuel Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Semi-Freq Caller Trucks CD Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
10,622	**Total Trucks Replaced**			

LNOxC - Lean NOx Catalyst

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$0	$0	$0	$0	$0	**$0**	Operational
	Clean Diesel - POLB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - Bond Funding	$0	$66,100,000	$49,800,000	$0	$0	**$115,900,000**	Assumes Bond Funding
		$6,000,000	**$66,100,000**	**$49,800,000**	**$0**	**$0**	**$121,900,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$16,000,000	$16,000,000	$18,000,000	$18,000,000	$18,000,000	**$86,000,000**	Operational
	LNG - POLB	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - Bond Funding	$0	$453,000,000	$451,000,000	$451,000,000	$442,300,000	**$1,797,300,000**	Assumes Bond Funding
		$38,000,000	**$491,000,000**	**$491,000,000**	**$491,000,000**	**$482,300,000**	**$1,993,300,000**	
	Measure FY Totals	**$44,000,000**	**$557,100,000**	**$540,800,000**	**$491,000,000**	**$482,300,000**	**$2,115,200,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 6 - Focus on Replacements w/Focus On Alt Fuels + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**		**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**
7,000	Frequent Caller Trucks Alt Fuel Replaced		5,112	LNOxC + Chip Reflash — 1993 to 1998 MY trucks; 4 to 5 years useful life
3,575	Semi-Freq Caller Trucks Alt Fuel Replaced	←	844	LNOxC — 1999 to 2003 MY trucks; to 5 years useful life
46	Semi-Freq Caller Trucks CD Replaced	←	3,622	Cannot be retrofitted — Pre 1993 MY trucks
10,622	**Total Trucks Replaced**			LNOxC - Lean NOx Catalyst

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV2	Alternate Fuel Infrastructure							
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$557,100,000**	**$540,800,000**	**$491,000,000**	**$482,300,000**	**$2,117,200,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 6 - Focus on Replacements w/Focus On Alt Fuels + Retrofits

7,000 Frequent Trucks (preliminary 2005 EI data)		**9,800 Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks Alt Fuel Replaced	5,112 LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,575	Semi-Freq Caller Trucks Alt Fuel Replaced	844 LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Semi-Freq Caller Trucks CD Replaced	3,622 Cannot be retrofitted	Pre 1993 MY trucks
10,622	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst	

Budget Scenario 6 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
SBP-HDV1	HDV Incentives (Clean Diesel)	**$6,000,000**	**$66,100,000**	**$49,800,000**	**$0**	**$0**	**$121,900,000**	

CD Option 1 - Clean Diesel Trucks MY2007+

50% CD Funding		**$129,500** /truck ($126k O/Op, $1.3k AVL, $2.2k admin)						see note below
	Number of total trucks/year	**46**	**0**	**0**	**0**	**0**	**46**	
	Total DPM Emis Red tpy	3	3	3	3	3	**17**	
	Total NOx Emis Red tpy	25	25	25	25	25	**124**	
50% CD Funding		**$19,500** /truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)						
	# of LNOxC + Chip Units/year	**0**	**2,556**	**2,556**	**0**	**0**	**5,112**	
	Total DPM Emis Red tpy	0	41	82	82	82	**285**	
	Total NOx Emis Red tpy	0	353	705	705	705	**2,468**	
	# of LNOxC	**0**	**844**	**0**	**0**	**0**	**844**	
	Total DPM Emis Red tpy	0	7	7	7	7	**30**	
	Total NOx Emis Red tpy	0	45	45	45	45	**182**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 6 - Focus on Replacements w/Focus On Alt Fuels + Retrofits

7,000 Frequent Trucks (preliminary 2005 EI data)		**9,800 Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks Alt Fuel Replaced	5,112 LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,575	Semi-Freq Caller Trucks Alt Fuel Replaced	844 LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Semi-Freq Caller Trucks CD Replaced	3,622 Cannot be retrofitted	Pre 1993 MY trucks
10,622	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst	

Budget Scenario 6 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	**Measure Description**	**Budget by Measure**						
SBP-HDV1	HDV Incentives (Alt Fuel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$38,000,000	**$491,000,000**	**$491,000,000**	**$491,000,000**	**$482,300,000**	**$1,993,300,000**	
	Number of total trucks/year	**202**	**2,605**	**2,605**	**2,605**	**2,559**	**10,575**	
	Total DPM Emis Red tpy	13	185	357	529	697	**1,781**	
	Total NOx Emis Red tpy	90	1,434	2,779	4,123	5,444	**13,870**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	**Measure Description**	**Budget by Measure**						
SBP-HDV1	HDV Incentives (Alt Fuel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$34,200,000	**$441,600,000**	**$441,600,000**	**$441,600,000**	**$433,700,000**	**$1,792,700,000**	
	Number of total trucks/year	**202**	**2,605**	**2,605**	**2,605**	**2,559**	**10,575**	
	Total DPM Emis Red tpy	13	185	356	527	696	**1,777**	
	Total NOx Emis Red tpy	104	1,553	3,002	4,451	5,874	**14,984**	

SBP-HDV1	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**
Total DPM Reduction (tpy)	**17**	**236**	**449**	**621**	**789**	**2,112**
Total NOx Reduction (tpy)	**115**	**1,857**	**3,554**	**4,899**	**6,219**	**16,644**
Total SOx Reduction (tpy)	**0.1**	**1.2**	**1.2**	**1.2**	**1.2**	**5**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 7 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
3,500	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,500	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
1,811	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
1,811	Semi-Freq Caller Trucks CD Replaced		LNOxC - Lean NOx Catalyst	
10,622	**Total Trucks Replaced**			

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$8,000,000	$8,000,000	$9,000,000	$9,000,000	$9,000,000	**$43,000,000**	Operational
	Clean Diesel - POLB	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - Bond/Other Funding	$0	$213,800,000	$196,500,000	$152,200,000	$152,200,000	**$714,700,000**	
		$22,000,000	**$229,800,000**	**$213,500,000**	**$169,200,000**	**$169,200,000**	**$803,700,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$8,000,000	$8,000,000	$9,000,000	$9,000,000	$9,000,000	**$43,000,000**	Operational
	LNG - POLB	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - Bond/Other Funding	$0	$222,800,000	$221,800,000	$221,800,000	$221,800,000	**$888,200,000**	Assumes Bond Funding
		$22,000,000	**$244,800,000**	**$244,800,000**	**$244,800,000**	**$244,800,000**	**$1,001,200,000**	
	Measure FY Totals	**$44,000,000**	**$474,600,000**	**$458,300,000**	**$414,000,000**	**$414,000,000**	**$1,804,900,000**	

SBP-HDV2	Alternate Fuel Infrastructure	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	POLA	$1,000,000	$1,000,000	$0	$0	$0	**$2,000,000**	
	POLB	$1,000,000	$1,000,000	$0	$0	$0	**$2,000,000**	
	SCAQMD	TBD	TBD	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$2,000,000**	**$0**	**$0**	**$0**	**$4,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$476,600,000**	**$458,300,000**	**$414,000,000**	**$414,000,000**	**$1,808,900,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 7 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
3,500	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,500	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
1,811	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
1,811	Semi-Freq Caller Trucks CD Replaced			
10,622	**Total Trucks Replaced**			

LNOxC - Lean NOx Catalyst

Budget Scenario 7 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Cleaner Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$22,000,000	**$229,800,000**	**$213,500,000**	**$169,200,000**	**$169,200,000**	**$803,700,000**	
CD Option 1 - Clean Diesel Trucks MY2007+								
50%	**CD Funding**	**$129,500**	/truck ($126k O/Op, $1.3k AVL, $2.2k admin)					see note below
	Number of total trucks/year	**85**	**1,306**	**1,306**	**1,306**	**1,306**	**5,311**	
	Baseline DPM in tpy	6	92	178	264	350	**888**	
	Total DPM Emis Red tpy	5	90	174	259	344	**873**	
	Baseline NOx in tpy	54	884	1,714	2,544	3,373	**8,568**	
	Total NOx Emis Red tpy	37	613	1,188	1,969	2,750	**6,557**	
50%	**CD Funding**	**$19,500**	/truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)					
	# of LNOxC + Chip Units/year	**564**	**2,274**	**2,274**	**0**	**0**	**5,112**	
	Baseline DPM in tpy	11	53	96	96	96	**352**	
	Total DPM Emis Red tpy	9	45	82	82	82	**299**	
	Baseline NOx in tpy	178	895	1,612	1,612	1,612	**5,908**	
	Total NOx Emis Red tpy	78	392	705	705	705	**2,585**	
	# of LNOxC	**0**	**844**	**0**	**0**	**0**	**844**	
	Total DPM Emis Red tpy	0	7	7	7	7	**30**	
	Total NOx Emis Red tpy	0	45	45	45	45	**182**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 7 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
3,500	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,500	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
1,811	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
1,811	Semi-Freq Caller Trucks CD Replaced			
10,622	**Total Trucks Replaced**			

LNOxC - Lean NOx Catalyst

Budget Scenario 7 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
SBP-HDV1	HDV Incentives (Alt Fuel)	**$22,000,000**	**$244,800,000**	**$244,800,000**	**$244,800,000**	**$244,800,000**	**$1,001,200,000**	
	Number of total trucks/year	**117**	**1,299**	**1,299**	**1,299**	**1,299**	**5,311**	
	Baseline DPM in tpy	7.7	93.2	178.7	264.3	349.8	**894**	
	Total DPM Emis Red tpy	7.7	93.2	178.7	264.3	349.8	**894**	
	Baseline NOx in tpy	74	899	1724	2549	3373	**8,619**	
	Total NOx Emis Red tpy	52	721	1390	2059	2728	**6,949**	

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Heavy-Duty Vehicles (Trucks)

Budget Scenario 7 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
3,500	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,500	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
1,811	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
1,811	Semi-Freq Caller Trucks CD Replaced	LNOxC - Lean NOx Catalyst		
10,622	**Total Trucks Replaced**			

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$19,800,000	**$220,100,000**	**$220,100,000**	**$220,100,000**	**$220,100,000**	**$900,200,000**	
	Number of total trucks/year	**117**	**1,299**	**1,299**	**1,299**	**1,299**	**5,311**	
	Baseline DPM tpy	7.7	93.2	178.7	264.3	349.8	**894**	
	Total DPM Emis Red tpy	7.7	93.0	178.3	263.6	349.0	**892**	
	Baseline NOx in tpy	74	899	1724	2549	3373	**8,619**	
	Total NOx Emis Red tpy	60	781	1604	2325	3148	**7,918**	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	**22**	**236**	**442**	**612**	**782**	**2,095**
Total NOx Reduction (tpy)	**167**	**1,771**	**3,329**	**4,778**	**6,228**	**16,273**
Total SOx Reduction (tpy)	**0.1**	**0.7**	**1.3**	**1.9**	**2.5**	**6**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 8 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000 Frequent Trucks (preliminary 2005 EI data)		**9,800 Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks CD Fuel Replaced	5,112 LNOxC + Chip Reflash	1994 to 1998 MY trucks; 4 to 5 years useful life
3,463	Semi-Freq Caller Trucks CD Replaced	844 LNOxC	1999 to 2002 MY trucks; to 5 years useful life
159	Semi-Freq Caller Trucks Alt Replaced	3,622 Cannot be retrofitted	Pre 1994 MY trucks
10,622	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst	

Budget Overview

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
SBP-HDV1	HDV Incentives (Clean Diesel)							
	Clean Diesel - POLA	$16,000,000	$16,000,000	$18,000,000	$18,000,000	$18,000,000	**$86,000,000**	Operational
	Clean Diesel - POLB	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - ARB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - EPA	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - Bond Funding	$0	$356,900,000	$338,600,000	$298,300,000	$298,300,000	**$1,292,100,000**	Assumes Bond Funding
		$38,000,000	**$388,900,000**	**$372,600,000**	**$332,300,000**	**$332,300,000**	**$1,464,100,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$0	$0	$0	$0	$0	**$0**	Operational
	LNG - POLB	$0	$0	$0	$0	$0	**$0**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - ARB	$0	$0	$0	$0	$0	**$0**	
	LNG - EPA	$0	$0	$0	$0	$0	**$0**	
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes No Bond Funding
		$6,000,000	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$30,000,000**	
	Measure FY Totals	**$44,000,000**	**$394,900,000**	**$378,600,000**	**$338,300,000**	**$338,300,000**	**$1,494,100,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 8 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**		**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**
7,000	Frequent Caller Trucks CD Fuel Replaced		5,112	LNOxC + Chip Reflash — 1994 to 1998 MY trucks; 4 to 5 years useful life
3,463	Semi-Freq Caller Trucks CD Replaced		844	LNOxC — 1999 to 2002 MY trucks; to 5 years useful life
159	Semi-Freq Caller Trucks Alt Replaced		3,622	Cannot be retrofitted — Pre 1994 MY trucks
10,622	**Total Trucks Replaced**			LNOxC - Lean NOx Catalyst

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV2	Alternate Fuel Infrastructure							
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	ARB	$0	$0	$0	$0	$0	**$0**	
	EPA	$0	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$394,900,000**	**$378,600,000**	**$338,300,000**	**$338,300,000**	**$1,496,100,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 8 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000 Frequent Trucks (preliminary 2005 EI data)		**9,800 Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000 Frequent Caller Trucks CD Fuel Replaced		5,112 LNOxC + Chip Reflash	1994 to 1998 MY trucks; 4 to 5 years useful life
3,463 Semi-Freq Caller Trucks CD Replaced	←	844 LNOxC	1999 to 2002 MY trucks; to 5 years useful life
159 Semi-Freq Caller Trucks Alt Replaced	←	3,622 Cannot be retrofitted	Pre 1994 MY trucks
10,622 Total Trucks Replaced		LNOxC - Lean NOx Catalyst	

Budget Scenario 8 - Options for Clean Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
SBP-HDV1	HDV Incentives (Clean Diesel)	**$44,900,000**	**$388,900,000**	**$372,600,000**	**$332,300,000**	**$332,300,000**	**$1,471,000,000**	

CD Option 1 - Cleaner Diesel Trucks MY2007+

50%	**CD Funding**	**$129,500**	/truck ($126k O/Op, $1.3k AVL, $2.2k admin)					see note below
	Number of total trucks/year	**200**	**2,566**	**2,566**	**2,566**	**2,566**	**10,463**	
	Total DPM Emis Red tpy	13	179	346	512	679	**1,730**	
	Total NOx Emis Red tpy	89	1,225	2,362	3,906	5,450	**13,032**	
	50% CD Funding	**$19,500**	/truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)					
	# of LNOxC + Chip Units/year	**974**	**2,069**	**2,069**	**0**	**0**	**5,112**	
	Total DPM Emis Red tpy	16	49	82	82	82	**309**	
	Total NOx Emis Red tpy	134	420	705	705	705	**2,670**	
	# of LNOxC	**0**	**844**	**0**	**0**	**0**	**844**	
	Total DPM Emis Red tpy	0	7	7	7	7	**30**	
	Total NOx Emis Red tpy	0	45	45	45	45	**182**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 8 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000 Frequent Trucks (preliminary 2005 EI data)		9,800 Semi-Frequent Trucks (preliminary 2005 EI data)	
7,000 Frequent Caller Trucks CD Fuel Replaced		5,112 LNOxC + Chip Reflash	1994 to 1998 MY trucks; 4 to 5 years useful life
3,463 Semi-Freq Caller Trucks CD Replaced	←	844 LNOxC	1999 to 2002 MY trucks; to 5 years useful life
159 Semi-Freq Caller Trucks Alt Replaced	←	3,622 Cannot be retrofitted	Pre 1994 MY trucks
10,622 Total Trucks Replaced		LNOxC - Lean NOx Catalyst	

Budget Scenario 8 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$30,000,000	
	Number of total trucks/year	**32**	**32**	**32**	**32**	**32**	**159**	
	Total DPM Emis Red tpy	2	4	6	8	11	**32**	
	Total NOx Emis Red tpy	14	31	47	64	80	**236**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$30,000,000	
	Number of total trucks/year	**35**	**35**	**35**	**35**	**35**	**177**	
	Total DPM Emis Red tpy	2	5	7	9	12	**35**	
	Total NOx Emis Red tpy	18	38	58	78	97	**290**	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	**31**	**38**	**50**	**60**	**70**	**247**
Total NOx Reduction (tpy)	**237**	**1,722**	**3,160**	**4,721**	**6,281**	**16,120**
Total SOx Reduction (tpy)	**0.015**	**0.015**	**0.015**	**0.015**	**0.015**	**0.074**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Heavy-Duty Vehicles (Trucks)

Budget Scenario 9 - Focus on Replacements w/Focus On Alt Fuels

7,000 Frequent Trucks (preliminary 2005 EI data)		**9,800 Semi-Frequent Trucks (preliminary 2005 EI data)**	
5,252	Frequent Caller Trucks Alt Fuel Replace	5,112 LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
		844 LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Frequent Caller Trucks CD Replaced	3,622 Cannot be retrofitted	Pre 1993 MY trucks
5,298	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst	

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$0	$0	$0	$0	$0	**$0**	Operational
	Clean Diesel - POLB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - ARB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - EPA	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes No Bond Funding
		$6,000,000	**$0**	**$0**	**$0**	**$0**	**$6,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	Operational
	LNG - POLB	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - ARB	$0	$0	$0	$0	$0	**$0**	
	LNG - EPA	$0	$0	$0	$0	$0	**$0**	
	LNG - Bond Funding	$0	$200,000,000	$200,000,000	$200,000,000	$200,000,000	**$800,000,000**	Assumes Bond Funding
		$38,000,000	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$990,000,000**	
	Measure FY Totals	**$44,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$996,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 9 - Focus on Replacements w/Focus On Alt Fuels

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
5,252	Frequent Caller Trucks Alt Fuel Replace	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
		844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Frequent Caller Trucks CD Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
5,298	**Total Trucks Replaced**		LNOxC - Lean NOx Catalyst	

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV2	Alternate Fuel Infrastructure							
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	ARB	$0	$0	$0	$0	$0	**$0**	
	EPA	$0	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$998,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 9 - Focus on Replacements w/Focus On Alt Fuels

7,000 Frequent Trucks (preliminary 2005 EI data)		9,800 Semi-Frequent Trucks (preliminary 2005 EI data)	
5,252	Frequent Caller Trucks Alt Fuel Replace	5,112 LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
		844 LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Frequent Caller Trucks CD Replaced	3,622 Cannot be retrofitted	Pre 1993 MY trucks
5,298	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst	

Budget Scenario 9 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$6,000,000	**$0**	**$0**	**$0**	**$0**	**$6,000,000**	

CD Option 1 - Clean Diesel Trucks MY2007+

100%	**CD Funding**	**$129,500** /truck ($126k O/Op, $1.3k AVL, $2.2k admin)						see note below
	Number of total trucks/year	**46**	**0**	**0**	**0**	**0**	**46**	
	Total DPM Emis Red tpy	3	3	3	3	3	**17**	
	Total NOx Emis Red tpy	25	25	25	25	25	**124**	
0%	**CD Funding**	**$19,500** /truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)						
	# of LNOxC + Chip Units/year	**0**	**0**	**0**	**0**	**0**	**0**	Assumed no funding available
	Total DPM Emis Red tpy	0	0	0	0	0	**0**	
	Total NOx Emis Red tpy	0	0	0	0	0	**0**	
	# of LNOxC	**0**	**0**	**0**	**0**	**0**	**0**	
	Total DPM Emis Red tpy	0	0	0	0	0	**0**	
	Total NOx Emis Red tpy	0	0	0	0	0	**0**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 9 - Focus on Replacements w/Focus On Alt Fuels

7,000 Frequent Trucks (preliminary 2005 EI data)		9,800 Semi-Frequent Trucks (preliminary 2005 EI data)	
5,252	Frequent Caller Trucks Alt Fuel Replace	5,112 LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
		844 LNOxC	1999 to 2003 MY trucks; to 5 years useful life
46	Frequent Caller Trucks CD Replaced	3,622 Cannot be retrofitted	Pre 1993 MY trucks
5,298	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst	

Budget Scenario 9 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$38,000,000	$238,000,000	$238,000,000	$238,000,000	$238,000,000	$990,000,000	
	Number of total trucks/year	**202**	**1,263**	**1,263**	**1,263**	**1,263**	**5,252**	
	Total DPM Emis Red tpy	15	107	199	292	384	**997**	
	Total NOx Emis Red tpy	110	797	1,485	2,172	2,860	**7,424**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$38,000,000	$238,000,000	$238,000,000	$238,000,000	$238,000,000	$990,000,000	
	Number of total trucks/year	**224**	**1,404**	**1,404**	**1,404**	**1,404**	**5,841**	
	Total DPM Emis Red tpy	16	118	221	323	425	**1,103**	
	Total NOx Emis Red tpy	141	1,026	1,911	2,796	3,681	**9,555**	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	**18**	**110**	**203**	**295**	**387**	**1,013**
Total NOx Reduction (tpy)	**134**	**822**	**1,510**	**2,197**	**2,885**	**7,548**
Total SOx Reduction (tpy)	**0.093**	**0.583**	**0.583**	**0.583**	**0.583**	**2.427**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 10 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
2,706	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,273	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
0	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
0	Semi-Freq Caller Trucks CD Replaced	LNOxC - Lean NOx Catalyst		
5,979	**Total Trucks Replaced**			

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**	Operational
	Clean Diesel - POLB	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - ARB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - EPA	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - Bond Funding	$0	$100,000,000	$100,000,000	$100,000,000	$100,000,000	**$400,000,000**	Assumes Bond Funding
		$22,000,000	**$116,000,000**	**$116,000,000**	**$116,000,000**	**$116,000,000**	**$486,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**	Operational
	LNG - POLB	$8,000,000	$8,000,000	$8,000,000	$8,000,000	$8,000,000	**$40,000,000**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - ARB	$0	$0	$0	$0	$0	**$0**	
	LNG - EPA	$0	$0	$0	$0	$0	**$0**	
	LNG - Bond Funding	$0	$100,000,000	$100,000,000	$100,000,000	$100,000,000	**$400,000,000**	Assumes Bond Funding
		$22,000,000	**$122,000,000**	**$122,000,000**	**$122,000,000**	**$122,000,000**	**$510,000,000**	
	Measure FY Totals	**$44,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$996,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 10 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**		**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
2,706	Frequent Caller Trucks Alt Fuel Replaced		5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,273	Frequent Caller Trucks CD Replaced		844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
0	Semi-Freq Caller Trucks Alt Fuel Replaced		3,622	Cannot be retrofitted	Pre 1993 MY trucks
0	Semi-Freq Caller Trucks CD Replaced			LNOxC - Lean NOx Catalyst	
5,979	**Total Trucks Replaced**				

SBP-HDV2	Alternate Fuel Infrastructure	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	ARB	$0	$0	$0	$0	$0	**$0**	
	EPA	$0	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$998,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 10 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
2,706	Frequent Caller Trucks Alt Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
3,273	Frequent Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
0	Semi-Freq Caller Trucks Alt Fuel Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
0	Semi-Freq Caller Trucks CD Replaced	LNOxC - Lean NOx Catalyst		
5,979	**Total Trucks Replaced**			

Budget Scenario 10 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
SBP-HDV1	HDV Incentives (Clean Diesel)	**$22,000,000**	**$118,800,000**	**$116,000,000**	**$116,000,000**	**$116,000,000**	**$488,800,000**	

CD Option 1 - Cleaner Diesel Trucks MY2007+

90% CD Funding **$129,500** /truck ($126k O/Op, $1.3k AVL, $2.2k admin) see note below

Number of total trucks/year	**153**	**702**	**806**	**806**	**806**	**3,273**
Total DPM Emis Red tpy	11	61	119	177	234	**602**
Total NOx Emis Red tpy	82	456	886	1,316	1,746	**4,486**

10% CD Funding **$19,500** /truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)

# of LNOxC + Chip Units/year	**113**	**595**	**595**	**595**	**595**	**2,492**
Total DPM Emis Red tpy	2	11	21	30	40	**104**
Total NOx Emis Red tpy	16	98	180	262	344	**898**
# of LNOxC	**0**	**844**	**0**	**0**	**0**	**844**
Total DPM Emis Red tpy	0	7	7	7	7	**30**
Total NOx Emis Red tpy	0	45	45	45	45	**182**

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 10 - Focus on Replacements w/Focus on 50/50 Alt Fuels & Clean Diesel (CD) + Retrofits

	7,000 Frequent Trucks (preliminary 2005 EI data)
2,706	Frequent Caller Trucks Alt Fuel Replaced
3,273	Frequent Caller Trucks CD Replaced
0	Semi-Freq Caller Trucks Alt Fuel Replaced
0	Semi-Freq Caller Trucks CD Replaced
5,979	**Total Trucks Replaced**

	9,800 Semi-Frequent Trucks (preliminary 2005 EI data)	
5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
3,622	Cannot be retrofitted	Pre 1993 MY trucks

LNOxC - Lean NOx Catalyst

Budget Scenario 10 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$22,000,000	$122,000,000	$122,000,000	$122,000,000	$122,000,000	$510,000,000	
	Number of total trucks/year	**117**	**647**	**647**	**647**	**647**	**2,706**	
	Total DPM Emis Red tpy	9	56	103	150	198	**516**	
	Total NOx Emis Red tpy	64	416	768	1,121	1,473	**3,842**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
		$22,000,000	$122,000,000	$122,000,000	$122,000,000	$122,000,000	$510,000,000	
	Number of total trucks/year	**130**	**720**	**720**	**720**	**720**	**3,009**	
	Total DPM Emis Red tpy	9	62	114	167	219	**571**	
	Total NOx Emis Red tpy	82	535	989	1,443	1,896	**4,945**	

SBP-HDV1	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total
Total DPM Reduction (tpy)	**21**	**136**	**250**	**365**	**479**	**1,251**
Total NOx Reduction (tpy)	**161**	**1,015**	**1,880**	**2,744**	**3,609**	**9,408**
Total SOx Reduction (tpy)	**0.054**	**0.299**	**0.299**	**0.299**	**0.299**	**1.250**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 11 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks CD Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
1,900	Semi-Freq Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
159	Semi-Frequentr Trucks Alt Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
9,059	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst		

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	Operational
	Clean Diesel - POLB	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	
	Clean Diesel - SCAQMD	$6,000,000	$0	$0	$0	$0	**$6,000,000**	Assumes SCAQMD 1 Time $6M
	Clean Diesel - ARB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - EPA	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - Bond Funding	$0	$200,000,000	$200,000,000	$200,000,000	$200,000,000	**$800,000,000**	Assumes Bond Funding
		$38,000,000	**$232,000,000**	**$232,000,000**	**$232,000,000**	**$232,000,000**	**$966,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$0	$0	$0	$0	$0	**$0**	Operational
	LNG - POLB	$0	$0	$0	$0	$0	**$0**	
	LNG - SCAQMD	$6,000,000	$6,000,000	$6,000,000	$6,000,000	$6,000,000	**$30,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - ARB	$0	$0	$0	$0	$0	**$0**	
	LNG - EPA	$0	$0	$0	$0	$0	**$0**	
	LNG - Bond Funding	$0	$0	$0	$0	$0	**$0**	Assumes No Bond Funding
		$6,000,000	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$30,000,000**	
	Measure FY Totals	**$44,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$996,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 11 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks CD Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
1,900	Semi-Freq Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
159	Semi-Frequentr Trucks Alt Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
9,059	**Total Trucks Replaced**	LNOxC - Lean NOx Catalyst		

		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV2	Alternate Fuel Infrastructure							
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	ARB	$0	$0	$0	$0	$0	**$0**	
	EPA	$0	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$238,000,000**	**$998,000,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 11 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks CD Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
1,900	Semi-Freq Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
159	Semi-Frequentr Trucks Alt Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
9,059	**Total Trucks Replaced**		LNOxC - Lean NOx Catalyst	

Budget Scenario 11 - Options for Clean Diesel (CD)

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$38,000,000	**$234,800,000**	**$232,000,000**	**$232,000,000**	**$531,700,000**	**$1,268,500,000**	

CD Option 1 - Cleaner Diesel Trucks MY2007+

50% CD Funding **$129,500** /truck ($126k O/Op, $1.3k AVL, $2.2k admin) see note below

Number of total trucks/year	**147**	**1,376**	**1,480**	**1,792**	**4,106**	**8,900**
Total DPM Emis Red tpy	10	102	202	323	599	**1,236**
Total NOx Emis Red tpy	70	723	1,427	2,586	5,244	**10,050**

50% CD Funding **$19,500** /truck ($14.5k Retrofit, $2.2kAdmin, $1k Installation, $1.3k AVL, $500 Incentive)

# of LNOxC + Chip Units/year	**974**	**2,069**	**2,069**	**0**	**0**	**5,112**
Total DPM Emis Red tpy	16	49	82	82	82	**309**
Total NOx Emis Red tpy	134	420	705	705	705	**2,670**
# of LNOxC	**0**	**844**	**0**	**0**	**0**	**844**
Total DPM Emis Red tpy	0	7	7	7	7	**30**
Total NOx Emis Red tpy	0	45	45	45	45	**182**

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 11 - Focus on Replacements w/Focus On Clean Diesel (CD) + Retrofits

	7,000 Frequent Trucks (preliminary 2005 EI data)		**9,800 Semi-Frequent Trucks (preliminary 2005 EI data)**	
7,000	Frequent Caller Trucks CD Fuel Replaced	5,112	LNOxC + Chip Reflash	1993 to 1998 MY trucks; 4 to 5 years useful life
1,900	Semi-Freq Caller Trucks CD Replaced	844	LNOxC	1999 to 2003 MY trucks; to 5 years useful life
159	Semi-Frequentr Trucks Alt Replaced	3,622	Cannot be retrofitted	Pre 1993 MY trucks
9,059	**Total Trucks Replaced**		LNOxC - Lean NOx Catalyst	

Budget Scenario 11 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks **$188,500** /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$6,000,000	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$30,000,000**	
	Number of total trucks/year	**32**	**32**	**32**	**32**	**32**	**159**	
	Total DPM Emis Red tpy	2	4	7	9	11	**33**	
	Total NOx Emis Red tpy	15	33	51	69	86	**254**	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
		$6,000,000	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$6,000,000**	**$30,000,000**	
	Number of total trucks/year	**35**	**35**	**35**	**35**	**35**	**177**	
	Total DPM Emis Red tpy	2	5	7	10	12	**36**	
	Total NOx Emis Red tpy	20	41	62	84	105	**312**	

SBP-HDV1		**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**
	Total DPM Reduction (tpy)	**28**	**163**	**297**	**420**	**699**	**1,607**
	Total NOx Reduction (tpy)	**219**	**1,222**	**2,228**	**3,406**	**6,081**	**13,157**
	Total SOx Reduction (tpy)	**0.015**	**0.015**	**0.015**	**0.015**	**0.015**	**0.074**

Notes

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 12 - Focus on Replacements all FF and SFF trucks 50:50 CD and Alt Fuel

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
4,200	Frequent Caller Trucks Alt Fuel Replaced	0	LNOxC + Chip Reflash (Semi-Frequent)	1993 to 1998 MY trucks; 4 to 5 years useful life
4,200	Semi-Frequent Caller Alt Fuel Replaced	0	LNOxC + Chip Reflash (Frequent Callers)	1993 to 1998 MY trucks; 4 to 5 years useful life
4,200	Semi Frequent Caller Trucks CD Replaced	0	LNOxC (Frequent Callers)	
4,200	Frequent Caller Trucks CD Replaced	0	LNOxC (Semi-Frequent)	1999 to 2003 MY trucks; to 5 years useful life
16,800	**Total Trucks Replaced**	**0**	**Total Trucks Retrofitted**	LNOxC - Lean NOx Catalyst
		0	Semi-Frequent Trucks Cannot be LNOxCd	

Budget Overview

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Clean Diesel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Clean Diesel - POLA	$0	$0	$0	$0	$0	**$0**	Operational
	Clean Diesel - POLB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - SCAQMD	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - ARB	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - EPA	$0	$0	$0	$0	$0	**$0**	
	Clean Diesel - Bond Funding	$0	$272,000,000	$272,000,000	$272,000,000	$272,000,000	**$1,088,000,000**	
		$0	**$272,000,000**	**$272,000,000**	**$272,000,000**	**$272,000,000**	**$1,088,000,000**	
	HDV Incentives (Alt Fuels)							
	LNG - POLA	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	Operational
	LNG - POLB	$16,000,000	$16,000,000	$16,000,000	$16,000,000	$16,000,000	**$80,000,000**	
	LNG - SCAQMD	$12,000,000	$12,000,000	$12,000,000	$12,000,000	$12,000,000	**$60,000,000**	Assumes SCAQMD $6M/yr Match
	LNG - ARB	$0	$0	$0	$0	$0	**$0**	
	LNG - EPA	$0	$0	$0	$0	$0	**$0**	
	LNG - Bond Funding	$0	$340,900,000	$340,900,000	$340,900,000	$340,900,000	**$1,363,600,000**	
		$44,000,000	**$384,900,000**	**$384,900,000**	**$384,900,000**	**$384,900,000**	**$1,583,600,000**	
	Measure FY Totals	**$44,000,000**	**$656,900,000**	**$656,900,000**	**$656,900,000**	**$656,900,000**	**$2,671,600,000**	
SBP-HDV2	Alternate Fuel Infrastructure	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	POLA	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	POLB	$1,000,000	$0	$0	$0	$0	**$1,000,000**	
	SCAQMD	TBD	$0	$0	$0	$0	**$0**	
	ARB	$0	$0	$0	$0	$0	**$0**	
	EPA	$0	$0	$0	$0	$0	**$0**	
	Bond Funding	$0	$0	$0	$0	$0	**$0**	
	Measure FY Totals	**$2,000,000**	**$0**	**$0**	**$0**	**$0**	**$2,000,000**	
	TOTAL HDV COSTS	**$46,000,000**	**$656,900,000**	**$656,900,000**	**$656,900,000**	**$656,900,000**	**$2,673,600,000**	

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 12 - Focus on Replacements all FF and SFF trucks 50:50 CD and Alt Fuel

7,000	**Frequent Trucks (preliminary 2005 EI data)**	**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
4,200	Frequent Caller Trucks Alt Fuel Replaced	0	LNOxC + Chip Reflash (Semi-Frequent)	1993 to 1998 MY trucks; 4 to 5 years useful life
4,200	Semi-Frequent Caller Alt Fuel Replaced	0	LNOxC + Chip Reflash (Frequent Callers)	1993 to 1998 MY trucks; 4 to 5 years useful life
4,200	Semi Frequent Caller Trucks CD Replaced	0	LNOxC (Frequent Callers)	
4,200	Frequent Caller Trucks CD Replaced	0	LNOxC (Semi-Frequent)	1999 to 2003 MY trucks; to 5 years useful life
16,800	**Total Trucks Replaced**	**0**	**Total Trucks Retrofitted**	LNOxC - Lean NOx Catalyst
		0	Semi-Frequent Trucks Cannot be LNOxCd	

Budget Scenario 12 - Options for Cleaner Diesel (CD)

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV1	HDV Incentives (Clean Diesel)							
	Bond Funding	$0	$272,000,000	$272,000,000	$272,000,000	$272,000,000	$1,088,000,000	

CD Option 12 - Clean Diesel Trucks MY2007+

Bond Funding		$129,500 /truck ($126k O/Op, $1.3k AVL, $2.2k admin)					see note below
Number of FF+SF trucks/year	**0**	**2,100**	**2,100**	**2,100**	**2,100**	**8,400**	
Total DPM Emis Red tpy	0	106	212	319	425	**1,062**	
Total NOx Emis Red tpy	0	791	1,581	2,664	3,455	**8,491**	

Budget Scenario 12 - Options for Alt Fuels

Alt Fuel Option 1 - Purchase of New LNG Trucks $188,500 /truck ($185k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
		FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	Total	Notes
SBP-HDV1	HDV Incentives (Alt Fuel)							
	Ports/SCAQMD Funding	$44,000,000	$384,900,000	$384,900,000	$384,900,000	$384,900,000	$1,583,600,000	

Number of total trucks/year	**233**	**2,042**	**2,042**	**2,042**	**2,042**	**8,400**
Total DPM Emis Red tpy	12.0	117.4	222.8	328.1	433.5	**1,114**
Total NOx Emis Red tpy	90	998	1,906	2,814	3,723	**9,531**

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Clean Diesel & Alt Fuel Options for Policy Discussion

Heavy-Duty Vehicles (Trucks)

Budget Scenario 12 - Focus on Replacements all FF and SFF trucks 50:50 CD and Alt Fuel

7,000	**Frequent Trucks (preliminary 2005 EI data)**		**9,800**	**Semi-Frequent Trucks (preliminary 2005 EI data)**	
4,200	Frequent Caller Trucks Alt Fuel Replaced		0	LNOxC + Chip Reflash (Semi-Frequent)	1993 to 1998 MY trucks; 4 to 5 years useful life
4,200	Semi-Frequent Caller Alt Fuel Replaced		0	LNOxC + Chip Reflash (Frequent Callers)	1993 to 1998 MY trucks; 4 to 5 years useful life
4,200	Semi Frequent Caller Trucks CD Replaced		0	LNOxC (Frequent Callers)	
4,200	Frequent Caller Trucks CD Replaced		0	LNOxC (Semi-Frequent)	1999 to 2003 MY trucks; to 5 years useful life
16,800	**Total Trucks Replaced**		**0**	**Total Trucks Retrofitted**	LNOxC - Lean NOx Catalyst
			0	Semi-Frequent Trucks Cannot be LNOxCd	

Alt Fuel Option 2 - Purchase of Westport LNG Trucks **$169,500** /truck ($166k O/Op, $1.3k AVL, $2.2k admin) see note below

Measure #	Measure Description	Budget by Measure						
SBP-HDV1	HDV Incentives (Alt Fuel)	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**	**Notes**
	Ports/SCAQMD Funding	**$44,000,000**	**$345,000,000**	**$345,000,000**	**$345,000,000**	**$345,000,000**	**$1,424,000,000**	
	Number of total trucks/year	**260**	**2,035**	**2,035**	**2,035**	**2,035**	**8,400**	
	Total DPM Emis Red tpy	13.3	118.1	222.9	327.7	432.5	**1,114**	
	Total NOx Emis Red tpy	115	1,091	2,067	3,042	4,018	**10,334**	

SBP-HDV1		**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**	**Total**
	Total DPM Reduction (tpy)	**12**	**224**	**435**	**647**	**858**	**2,176**
	Total NOx Reduction (tpy)	**90**	**1,789**	**3,488**	**5,478**	**7,177**	**18,021**
	Total SOx Reduction (tpy)	**0.108**	**0.944**	**0.944**	**0.944**	**0.944**	**3.882**

Notes:

Diesel Truck Cost - Based on ARB's Ports Truck Report, page B-16

LNG Truck Cost - Based on April 18, 2006 meeting between Westport, POLA, POLB and Starcrest

Implementation Schedule for the San Pedro Bay Ports Clean Air Action Plan Measures (Lease plus Phase In)

Measure	Description	Implementation Strategy	Overall Implementation				
			2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
					POLA		
SPBP-HDV1	All FF and SFF HDVs	Incentive Funding by Ports, SCAQMD and Bonds	5%	39%	68%	83%	100%
SPBP-OGV1	VSR speed to 20 nm	Voluntary, Incentive and Lease Requirement	100%	100%	100%	100%	100%
	VSR speed to 40 nm		0%	50%	100%	100%	100%
SPBP-OGV2	Reduction at Berth for container, liquid bulk and cruise terminals	Infrastructure-Ports OGV retrofit cost by OGV owners	2%	3%	7%	16%	27%
SPBP-OGV3	OGV Auxiliary Engine Fuel Improvement	Lease Based	1%	5%	28%	40%	48%
SPBP-OGV4	OGV Main Engine Fuel Improvement	Lease Based	1%	5%	28%	40%	48%
SPBP-OGV5	Slide Valve Retrofits for Main Engine OGVs	Lease Based	1%	5%	28%	40%	48%
SPBP-CHE1	Yard Tractors, Side Picks and Top Handlers	Lease Based	1%	5%	30%	45%	57%
	Other CHE	Lease Based	0%	0%	0%	0%	57%
					POLB		
SPBP-HDV1	All FF and SFF HDVs	Funding by Ports, SCAQMD and Bonds	5%	39%	68%	83%	100%
SPBP-OGV1	All ships VSR speed to 20 nm	Voluntary, Incentive and Lease Requirement	100%	100%	100%	100%	100%
	All Ships VSR speed to 40 nm		0%	50%	100%	100%	100%
SPBP-OGV2	Reduction at Berth for container and liquid bulk terminals	Infrastructure-Ports OGV retrofit cost by OGV owners	0%	0%	0%	0%	14%
SPBP-OGV3	OGV Auxiliary Engine Fuel Improvement	Lease Based	2%	12%	20%	24%	25%
SPBP-OGV4	OGV Main Engine Fuel Improvement	Lease Based	2%	12%	20%	24%	25%
SPBP-OGV5	Slide Valve Retrofits for Main Engine OGVs	Lease Based	2%	12%	20%	24%	25%
SPBP-CHE1	Yard Tractors, Side Picks and Top Handlers	Lease Based	2%	12%	21%	27%	28%
	Other CHE	Lease Based	0%	0%	0%	0%	28%

	Year 1	Year 2	Year 3	Year 4	Year 5
Lease Required phase in (SPBP-OGV3,4 and 5)	50%	70%	90%	90%	90%
Lease Required phase in (SPBP-CHE1)	50%	70%	100%	100%	100%

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2001 OGV Baseline Emissions in tpyfor POLA

[1] Applicable to all OGV measures

Tons Per Year Type	NOx_{Main}	NOx_{Aux}	DPM_{Main}	DPM_{Aux}	SOx_{main}	SOx_{Aux}
Auto Carrier	125	31	13	1	72	17
Bulk	171	99	18	4	99	66
Containership	2,968	1,290	320	44	1,824	663
Cruise	839	604	86	14	500	201
General Cargo	60	27	6	1	35	20
Miscellaneous	5	10	1	1	3	8
Other Tug	11	1	1	0	8	0
Reefer	45	6	5	0	26	4
RoRo	10	25	3	1	63	21
Tanker	232	342	26	14	174	207
Totals	4,464	2,434	478	81	2,804	1,206
Total Main plus Auxiliary Engines		6,898		558		4,010

[1] VSR speeds not included

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2002 OGV Baseline Emissions in tpy for POLB

[1] Applicable to all OGV measures

Tons Per Year						
Type	**NOx_{Main}**	**NOx_{Aux}**	**DPM_{Main}**	**DPM_{Aux}**	**SOx_{main}**	**SOx_{Aux}**
Auto	91.9	43.0	12.1	2.0	45.0	28.1
Container	2518.3	1729.7	335.8	78.9	1140.2	1128.2
Other	500.4	434.1	69.6	19.8	292.1	139.8
RoRo	62.4	135.6	8.8	6.2	32.9	87.9
Reefer	42.8	90.2	6.7	4.1	26.3	58.6
Tanker	646.2	381.8	110.8	17.4	512.1	247.9
Totals	3862.1	2814.3	543.9	128.4	2048.7	1690.5
Total Main plus Auxiliary Engines		6,676		672		3,739

[1] VSR speeds not included

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Emission Reductions Achieved by Fuel Substitutions

The following tables present emission reduction percentages potentially achieved by switching fuels
Applied to calculate emissions reductions from CARB's Marine Auxiliary Engine regulation, SPBP-OGV3 and SPBP-OGV4

NOx

Current Fuel Type	Designation	Substituted Fuel Type: 2.7% S IFO	1.5% S IFO	1.5% S MDO	0.5% S MGO	0.2% S MGO	0.1% S MGO	500 ppm S EPA	500 ppm S CARB	15 ppm S CARB
		NOx Reduction from Switching								
Residual	2.7% S IFO	0%	0%	10%	10%	10%	10%	10%	15%	15%
Residual	1.5% S IFO		0%	10%	10%	10%	10%	10%	15%	15%
Distillate	1.5% S MDO			0%	0%	0%	0%	0%	7%	7%
Distillate	0.5% S MGO				0%	0%	0%	0%	7%	7%
Distillate	0.2% S MGO					0%	0%	0%	7%	7%
Low S Distillate	0.1% S MGO						0%	0%	7%	7%
EPA Onroad	500 ppm S EPA							0%	7%	7%
CARB Onroad	500 ppm S CARB								0%	0%
CARB Onroad	15 ppm S CARB									0%

Note: The 10% NOx redn. is based on lower N in distillate fuel per EPA420-D-02-002, 4/02, Table 8.3-4.

Note: The 7% reduction for CARB diesel is estimated based on the lower aromatic content.

Note: Entec reported a 6% NOx reduction for the residual to distillate switch (rather than 10%).

DPM

Current Fuel Type	Designation	Substituted Fuel Type: 2.7% S IFO	1.5% S IFO	1.5% S MDO	0.5% S MGO	0.2% S MGO	0.1% S MGO	500 ppm S EPA	500 ppm S CARB	15 ppm S CARB
		PM Reduction from Switching								
Residual	2.7% S IFO	0%	18%	53%	61%	64%	65%	68%	74%	75%
Residual	1.5% S IFO		0%	42%	51%	53%	54%	61%	68%	69%
Distillate	1.5% S MDO			0%	15%	20%	21%	61%	68%	69%
Distillate	0.5% S MGO				0%	5%	6%	7%	10%	10%
Distillate	0.2% S MGO					0%	2%	8%	25%	28%
Low S Distillate	0.1% S MGO						0%	4%	21%	25%
EPA Onroad	500 ppm S EPA							0%	20%	23%
CARB Onroad	500 ppm S CARB								0%	4%
CARB Onroad	15 ppm S CARB									0%

Assumption: Reduction due to S and Distillate are calculated using multiplicative CFs

SOx

Current Fuel Type	Designation	Substituted Fuel Type: 2.7% S IFO	1.5% S IFO	1.5% S MDO	0.5% S MGO	0.2% S MGO	0.1% S MGO	500 ppm S EPA	500 ppm S CARB	15 ppm S CARB
		SO2 Reduction from Switching								
Residual	2.7% S IFO	0%	44%	44%	81%	93%	96%	98%	98%	99%
Residual	1.5% S IFO		0%	0%	67%	87%	93%	97%	97%	99%
Distillate	1.5% S MDO			0%	67%	87%	93%	97%	97%	99%
Distillate	0.5% S MGO				0%	60%	80%	90%	90%	97%
Distillate	0.2% S MGO					0%	50%	75%	75%	93%
Low S Distillate	0.1% S MGO						0%	50%	50%	85%
EPA Onroad	500 ppm S EPA							0%	0%	97%
CARB Onroad	500 ppm S CARB								0%	97%
CARB Onroad	15 ppm S CARB									0%

Note: Gray color areas represent no emission reductions.

Note: Sulfur oxide reductions directly proportional to reductions in fuel sulfur content.

DPM Reduction Calculations

% S	% Rdn from 2.7%	
2.7	0%	
1.5	18%	From EPA420-D-02-002
0.5	56%	
0.3	63%	From EPA420-D-02-002,switching from 2.7% IFO to 0.3 % S distillate

	Reduction	CF
DPM reduction per 1% S reduction	15%	**85%**
DPM reduction due to S from 2.7 to 1.5 (2.7-1.5)	18%	**82%**
DPM reduction due to S from 2.7 to 0.5 (2.7-0.5)	33%	**67%**
DPM reduction due to S from 2.7 to 0.3 (2.7-0.3)	36%	**64%**
DPM reduction due to S from 2.7 to 0.2 (2.7-0.2)	38%	**63%**
DPM reduction due to S from 2.7 to 0.1 (2.7-0.1)	39%	**61%**
DPM reduction due to S from 1.5 to 0.5 (1.5-0.5)	15%	**85%**
DPM reduction due to S from 1.5 to 0.2 (1.5-0.2)	20%	**81%**
DPM reduction due to S from 1.5 to 0.1 (1.5-0.1)	21%	**79%**
DPM reduction due to S from .5 to 0.2 (1.5-0.2)	5%	**96%**
DPM reduction due to S from .5 to 0.1 (1.5-0.1)	6%	**94%**
DPM reduction due to S from .2 to 0.1 (.2-0.1)	2%	**99%**
DPM reduction due to switch from residual to distillate fuel	42%	**58%**

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CARB's Adopted Marine Auxiliary Engines Regulation Adopted in December of 2005

Assumption: Ships utilizing AMP/Cold Ironing are also meeting CARB's Marine Auxiliary Engine regulation
Port of Los Angeles

Requirements for all OGV auxiliary engines operating within 24 nautical miles:
Starting January 1, 2007, use MGO 0.5% or less S content
Starting January 1, 2010, use MGO with 0.1% or less S content

Emission Reduction (tpy)	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
[1] Baseline OGV NOx emissions (tpy)	6,898	6,898	6,898	6,898	6,898	6,898
NOx Emissions Reduced 24 nm	0	35	69	69	69	69
NOx CF (Total OGV)	1.000	0.995	0.990	0.990	0.990	0.990
[1] Baseline OGV PM emissions (tpy)	558	558	558	558	558	558
DPM Emissions Reduced 24 nm	0	12	23	23	24	25
DPM CF (Total OGV)	1.000	0.979	0.958	0.958	0.957	0.956
[1] Baseline SOx Emissions (tpy)	4010	4010	4010	4010	4010	4010
SOx Emissions Reduced 24 nm	0	373	747	747	747	747
SOx CF (Total OGV)	1.000	0.907	0.814	0.814	0.814	0.814

[1] Includes Main and Auxiliary Engine Emissions

Percent of total POLA auxilairy and main OGV emissions within 24 nm 82%

	Fuel Use Distribution[2]		% Emissions			% of Emissions from IFO380 in all Auxiliary Engines		
	% IFO380	%MDO	Aux NOx	Aux PM	AuxSOx	NOx	PM	SOx
Containership	37.4%	62.6%	53.0%	54.8%	54.98%	20.5%	33.6%	34.7%
Tanker	54.8%	45.2%	14.0%	17.0%	17.19%	7.9%	13.0%	13.3%
Cruise Ship	4.1%	95.9%	24.8%	17.2%	16.64%	1.1%	1.8%	1.8%
Other	60.7%	39.3%	8.2%	11.0%	11.19%	5.1%	8.9%	9.1%
Composite			100.0%	100.0%	100.0%	34.5%	57.2%	59.0%

(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
Reduction in tpy =
Total Aux Emissions x % Emissions from IFO 380 in Aux x % Red due to fuel switch x % Emissions within 24 nm

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CARB's Adopted Marine Auxiliary Engines Regulation Adopted in December of 2005

Assumption: Ships utilizing AMP/Cold Ironing are also meeting CARB's Marine Auxiliary Engine regulation
Port of Long Beach

Requirements for all OGV auxiliary engines operating within 24 nautical miles:
Starting January 1, 2007, use MGO with 0.5% or less sulfur content
Starting January 1, 2010, use MGO with 0.1% or less sulfur content

Emission Reduction (tpy)

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
[1] **Baseline OGV NOx emissions (tpy)**	6,676	6,676	6,676	6,676	6,676	6,676
NOx Emissions Reduced 24 nm	0	97	194	194	194	194
NOx CF (Total OGV)	1.000	0.985	0.971	0.971	0.971	0.971
[1] **Baseline OGV PM emissions (tpy)**	672	672	672	672	672	672
DPM Emissions Reduced 24 nm	0	33	65	65	67	69
DPM CF (Total OGV)	1.000	0.952	0.903	0.903	0.900	0.898
[1] **Baseline SOx Emissions (tpy)**	3739	3739	3739	3739	3739	3739
SOx Emissions Reduced 24 nm	0.000	640	1,279	1,279	1,279	1,279
SOx CF (Aux OGV) 24 nm	1.000	0.622	0.243	0.243	0.243	0.243
SOx CF (Total OGV)	1.000	0.829	0.658	0.658	0.658	0.658

[1] Includes Main and Auxiliary Engine Emissions

Percent of total POLB auxilairy and main
OGV emissions within 24 nm 95%

	Fuel Use Distribution[2]		% Emissions			% of Emissions from IFO380 in all Auxiliary Engines		
	% IFO380	%MDO	Aux NOx	Aux PM	Aux SOx	NOx	PM	SOx
Containership	71.0%	29.0%	66.7%	66.7%	66.7%	48.1%	57.9%	58.4%
Tanker	71.0%	29.0%	14.7%	14.7%	14.7%	10.6%	12.7%	12.8%
Cruise Ship	71.0%	29.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	71.0%	29.0%	18.6%	18.6%	18.6%	13.4%	16.1%	16.3%
Composite			100.0%	100.0%	100.0%	72.1%	86.7%	87.5%

Sample Calc:
% Emissions from IFO380 in Aux =
((%IFO x IFO EF) / ((%IFO x IFO EF)+(%MDO x MDO EF))) x % Emissions
Reduction in tpy =
Total Aux Emissions x % Emissions from IFO 380 in Aux x % Red due to fuel switch x % Emissions within 24 nm

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SPBP-OGV 1 - Vessel Speed Reduction (VSR) based on Tariff and Inventives

Applicable to all OGVs

Port of Los Angeles

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Participation rate @ 20 nm from Pt. Fermin	70%	100%	100%	100%	100%	100%
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%

Emission Reduction Percentages [1]

	Main Engine	Auxiliaries	
NO_x	57.6%	-6.7%	Auxiliary engine emissions increase because
PM_{10}	0.0%	-8.1%	of increased time in transit (due to lower speeds)

Speed assumptions:

w/out VSR	22 knots
with VSR	12 knots

20-mile VSR

	FY 2005/2006	FY 2006/200	FY 2007/200	FY 2008/200	FY 2009/201	FY 2010/2011
Distance of Compliance Zone (nm)	20	20	20	20	20	20
Participation Rate [2] (at 12 kts)	70%	100%	100%	100%	100%	100%

Main Engine (relative to current VSR distance & emissions)	2005/2006	2006/200	2007/200	2008/200	2009/201	2010/2011
NO_x % reduction	20%	29%	29%	29%	29%	29%
NO_x tons reduction per year	900	1,286	1,286	1,286	1,286	1,286
DPM_{10}	(credit only taken for NOx reductions pending evaluation of effect on PM emissions)					
Increase in Auxiliary Engine Emissions due to longer transit times						
NO_x % increase	2.3%	3.4%	3.4%	3.4%	3.4%	3.4%
NO_x tons increase per year	11	16	16	16	16	16
DPM, % increase	2.8%	4.1%	4.1%	4.1%	4.1%	4.1%
DPM, tons increase per year	0.5	0.6	0.5	0.5	0.5	0.5
Net Decrease, tons NOx:	888	1,269	1,270	1,270	1,270	1,270

Expanded Distance VSR [3]

DO NOT DOUBLE COUNT with current 20 nm program	FY 2005/2006	FY 2006/200	FY 2007/200	FY 2008/200	FY 2009/201	FY 2010/2011
Additional Distance of Compliance Zone (nm)	20	20	20	20	20	20
Participation Rate [2] (at 12 kts)	0%	0%	50%	100%	100%	100%

Main Engine Emission Decreases (Only enhanced VSR distance)	FY 2005/2006	FY 2006/200	FY 2007/200	FY 2008/200	FY 2009/201	FY 2010/2011
NO_x % reduction	0%	0%	14%	29%	29%	29%
NO_x tons reduction per year	0	0	643	1,286	1,286	1,286
DPM	(credit only taken for NOx reductions pending evaluation of effect on PM emissions)					
Increase in Auxiliary Engine Emissions due to longer transit times						
NO_x % increase	0.0%	0.0%	1.7%	3.4%	3.4%	3.4%
NO_x tons increase per year	0	0	8	16	16	16
DPM, % increase	0.0%	0.0%	2.0%	4.1%	4.1%	4.1%
DPM, tons increase per year	0.0	0.0	0.2	0.3	0.3	0.3
Net Decrease, tons NOx:	0	0	635	1,270	1,270	1,270
Net Decrease, tons NOx, only expanded VSR:	0	0	635	1,270	1,270	1,270
Nox CF for current plus expanded VSR	**0.871**	**0.815**	**0.721**	**0.628**	**0.628**	**0.628**

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.
3 - Percent reductions and increases are relative to emissions within the expanded VSR zone. Tons of reductions and increases have been estimated using the ratio of expanded VSR distance to current (20 nm) VSR distance to adjust for the greater emissions basis of the expanded program.

Information Used to Estimate Emissions Reductions From VSR Program

1. BLEI Speed Emissions Total, tpy for POLA

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, t

Tons Per Year	$NO_{x\ Main}$	$NO_{x\ Aux}$	PM_{Main}	PM_{Aux}
	64.7	32.4	6.9	1.2
	137.3	103.3	14.5	4.8
	1,068.6	1,356.0	117.0	47.4
	353.6	687.6	36.6	15.9
	41.9	28.3	4.5	1.4
	4.0	9.9	0.4	0.6
	10.6	1.1	0.6	0.0
	20.1	7.5	2.1	0.4
	7.6	25.4	2.2	1.4
	183.6	345.7	20.7	14.1
	1,892.0	2,597.3	205.6	87.0

3. Reduction between Corrected & 12 Knot Scenario, tpy Based on POLA emissions

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

4. Percentage Reduction by Vessel Type

	$NO_{x\ Main}$	$NO_{x\ Aux}$	PM_{Main}	PM_{Aux}
	48%	-6%	48%	-9%
	20%	-5%	19%	-9%
	64%	-5%	63%	-7%
	58%	-14%	57%	-14%
	30%	-4%	30%	-8%
	24%	-3%	17%	-20%
	0%	0%	0%	0%
	55%	-15%	54%	-100%
	22%	-2%	24%	0%
	21%	-1%	20%	-3%
	57.6%	**-6.7%**	**57.0%**	**-8.1%**

Notes:
1 - Adjusted Speeds: 2001 Baseline OGV transit emissions modeled with speed correction factors used by the Port in estimating reductions from the VSR program
2 - 12-Knot Scenario: Modeled corrected speed emissions from all OGVs transiting at 12 knots; auxiliary engine emissions increased because of longer transit times

Percent of auxiliary emissions during transit: 20%

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SPBP-OGV 1 - Vessel Speed Reduction (VSR) based on Tariff and Inventives

Applicable to all OGVs

Port of Long Beach

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Participation rate @ 20 nm from Pt. Fermin	0%	100%	100%	100%	100%	100%
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%

Emission Reduction Percentages[1]

	Main Engine	Auxiliaries	
NO_x	23.4%	-1.1%	Auxiliary engine emissions increase because
PM_{10}	0.0%	-1.1%	of increased time in transit (due to lower speeds)

Speed assumptions: w/out VSR 22 knots; with VSR 12 knots

20-mile VSR

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Distance of Compliance Zone (nm)	20	20	20	20	20	20
Participation Rate[2] (at 12 kts)	78%	100%	100%	100%	100%	100%
Main Engine Emission Decreases (relative to current VSR distance & emissions)	**FY 2005/2006**	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**
NO_x % reduction	9%	12%	12%	12%	12%	12%
NO_x tons reduction per year	353	453	453	453	453	453
DPM_{10}	(credit only taken for NOx reductions pending evaluation of effect on PM emissions					
Increase in Auxiliary Engine Emissions due to longer transit times						
NO_x % increase	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
NO_x tons increase per year	2	2	2	2	2	2
DPM, % increase	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
DPM, tons increase per year	0.1	0.1	0.0	0.0	0.0	0.0
Net Decrease, tons NOx:	352	451	451	451	451	451

Expanded Distance VSR[3]

DO NOT DOUBLE COUNT with current 20 nm program	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Additional Distance of Compliance Zone (nm)	20	20	20	20	20	20
Participation Rate[2] (at 12 kts)	0%	0%	50%	100%	100%	100%
Main Engine Emission Decreases (Only enhanced VSR distance)	**FY 2005/2006**	**FY 2006/2007**	**FY 2007/2008**	**FY 2008/2009**	**FY 2009/2010**	**FY 2010/2011**
NO_x % reduction	0%	0%	6%	12%	12%	12%
NO_x tons reduction per year	0	0	226	453	453	453
DPM	(credit only taken for NOx reductions pending evaluation of effect on PM emissions					
Increase in Auxiliary Engine Emissions due to longer transit times						
NO_x % increase	0.0%	0.0%	0.3%	0.5%	0.5%	0.5%
NO_x tons increase per year	0	0	1	2	2	2
DPM, % increase	0.0%	0.0%	0.3%	0.5%	0.5%	0.5%
DPM, tons increase per year	0.0	0.0	0.0	0.0	0.0	0.0
Net Decrease, tons NOx:	0	0	225	451	451	451
Net Decrease, tons NOx, only expanded VSR:	0	0	225	451	451	451
Nox CF for current plus expanded VSR	**0.947**	**0.931**	**0.896**	**0.861**	**0.861**	**0.861**

Notes:
1 - Reductions calculated using 20-mile VSR applicability distance @ 100% participation (12 knots)
2 - Participation Rate: 2002 baseline emissions inventory assumes before VSR speeds.
3 - Percent reductions and increases are relative to emissions within the expanded VSR zone. Tons of reductions and increases have been estimated using the ratio of expanded VSR distance to current (20 nm) VSR distance to adjust for the greater emissions basis of the expanded program.

Information Used to Estimate Emissions Reductions From VSR Program

2002 POLB, Emissions in TPY

NO VSR

Type	NOx_{Main}	NOx_{Aux}	NOx	PM_{Main}	PM_{Aux}	PM
Auto Carrier	91.94	43.03	134.97	12.11	1.96	14.07
Bulk	293.96	259.66	553.62	41.60	11.84	53.45
Containership	2,518.34	1,729.68	4,248.02	335.83	78.89	414.73
General Cargo	97.02	66.95	163.98	13.31	3.05	16.37
ITB	85.06	29.71	114.78	11.19	1.36	12.54
MISC	24.31	77.75	102.06	3.51	3.55	7.06
RORO	62.44	135.60	198.04	8.84	6.19	15.03
Reefer	42.82	90.19	133.01	6.73	4.11	10.84
Tanker	646.18	381.76	1,027.94	110.78	17.41	128.19
	3,862.08	2,814.35	6,676.43	543.91	128.37	672.27

VSR to 20 Miles - 12 Knots

Type	NOx_{Main}	NOx_{Aux}	NOx	PM_{Main}	PM_{Aux}	PM
Auto Carr	69.87	43.81	113.68	9.09	2.00	11.09
Bulk	270.45	260.24	530.69	38.11	11.87	49.98
Container	1,762.79	1,754.72	3,517.51	229.13	80.04	309.16
General C	86.11	67.25	153.36	11.79	3.07	14.85
ITB	77.02	29.83	106.86	10.10	1.36	11.46
MISC	23.00	77.80	100.80	3.31	3.55	6.86
RORO	49.62	136.12	185.74	6.96	6.21	13.17
Reefer	35.92	91.01	126.93	5.61	4.15	9.76
Tanker	581.87	383.88	965.74	99.16	17.51	116.67
	2,956.64	2,844.67	5,801.31	413.26	129.75	543.01

Reductions

Type	NOx_{Main}	NOx_{Aux}	NOx	PM_{Main}	PM_{Aux}	PM
Auto Carrier	22.08	-0.78	21.29	3.02	-0.04	2.98
Bulk	23.51	-0.58	22.93	3.49	-0.03	3.47
Containership	755.55	-25.04	730.51	106.71	-1.14	105.56
General Cargo	10.92	-0.30	10.62	1.53	-0.01	1.51
ITB	8.04	-0.12	7.92	1.09	-0.01	1.08
MISC	1.31	-0.05	1.26	0.20	0.00	0.20
RORO	12.82	-0.52	12.30	1.88	-0.02	1.86
Reefer	6.90	-0.82	6.08	1.11	-0.04	1.08
Tanker	64.32	-2.12	62.20	11.61	-0.10	11.52
	905.44	-30.32	875.12	130.65	-1.38	129.26

Percentage Reductions

Type	NOx_{Main}	NOx_{Aux}	NOx	PM_{Main}	PM_{Aux}	PM
Auto Carr	24.0%	-1.8%	15.8%	24.9%	-1.8%	21.2%
Bulk	8.0%	-0.2%	4.1%	8.4%	-0.2%	6.5%
Container	30.0%	-1.4%	17.2%	31.8%	-1.4%	25.5%
General C	11.3%	-0.4%	6.5%	11.5%	-0.4%	9.3%
ITB	9.5%	-0.4%	6.9%	9.7%	-0.4%	8.6%
MISC	5.4%	-0.1%	1.2%	5.8%	-0.1%	2.9%
RORO	20.5%	-0.4%	6.2%	21.3%	-0.4%	12.4%
Reefer	16.1%	-0.9%	4.6%	16.6%	-0.9%	9.9%
Tanker	10.0%	-0.6%	6.1%	10.5%	-0.6%	9.0%
	23.4%	-1.1%	**13.1%**	24.0%	-1.1%	**19.2%**

Notes:
1 - Adjusted Speeds: 2001 Baseline OGV transit emissions modeled with speed correction factors used by the Port in estimating reductions from the VSR program
2 - 12-Knot Scenario: Modeled corrected speed emissions from all OGVs transiting at 12 knots; auxiliary engine emissions increased because of longer transit times

Percent of auxiliary emissions during transit: 13%

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SPBP-OGV 2 - Reduction of At-Berth OGV Emissions through Lease requirement, Incentives and Capital Funding
Assumption: Ships utilizing AMP are also meeting CARB's Marine Auxiliary Engine regulation

Port of Los Angeles

	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Annual kW-hrs - Containerships	6,264,000	7,020,000	7,020,000	22,032,000	50,220,000
Annual kW-hrs - Tanker	0	0	0	648,000	648,000
Annual kW-hrs - Cruise Ships	0	0	6,400,000	12,800,000	12,800,000
NOx Reductions, tons, containerships	92	101	101	318	725
NOx Reductions, tons, Tankers	0	0	0	9	9
NOx Reductions, tons, cruise ships	0	0	91	181	181
Combined NOx Reductions, tons	**92**	**101**	**192**	**509**	**915**
NOx CF	**0.987**	**0.985**	**0.972**	**0.926**	**0.866**
DPM Reductions, tons, containerships	3	3	3	8	18
DPM Reductions, tons, Tankers	0.0	0.0	0.0	0.3	0.3
DPM Reductions, tons, cruise ships	0.0	0.0	1.5	3.0	3.0
Combined DPM Reductions, tons	**3**	**3**	**4**	**11**	**21**
DPM CF	**0.995**	**0.995**	**0.992**	**0.979**	**0.961**
SOx Reductions, tons, containerships	43	43	43	136	310
SOx Reductions, tons, Tankers	0	0	0	5	5
SOx Reductions, tons, cruise ships	0	0	25	50	50
Combined SOx Reductions, tons	**43**	**43**	**69**	**191**	**366**
SOx CF	**0.987**	**0.986**	**0.977**	**0.937**	**0.880**

Auxiliary Engine Emission Factors, g/kW-hr	Residual	Distillate	Container	Tanker	Cruise
NOx	14.70	13.90	14.20	14.34	13.93
PM	0.8	0.3	0.49	0.57	0.32
SOx	12.3	4.3	7.26	8.68	4.62
Percentage fuel used, Container	37%	63%			
Percentage fuel used, Tanker	55%	45%			
Percentage fuel used, Cruise	4%	96%			

From Table 2.3:Summary of Mono-Fuel or Dual-Fuel by Vessel Type, page 56 from report "Port of Los Angeles Baseline Air Emissions Inventory-2001"

Percentage of hoteling emissions eliminated: 95%

Assumed Schedule for Containership AMP Participation - POLA

	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
B212-218 (YTI)	4	11	0	36	52
B224-236 (Evergreen)	0	0	11	36	52
Pier 400 APM	0	0	0	0	10
B136-147 (Trapac)	0	0	0	40	106
Pier 300 (APL)	0	0	0	0	72
B100-102 (CS)	54	54	54	92	131
B206-209 (LTF)	0	0	0	0	6
B121-131 (Yang Ming or WBCT)	0	0	0	0	36
Total container calls	58	65	65	204	465
5-year	**857**				
kW-HR	6,264,000	7,020,000	7,020,000	22,032,000	50,220,000

108,000 kW per call (72 hrs/ container&tanker call, 1,500 kW load during hoteling)

Assumed Schedule for Liquid Bulk (tanker) AMP Participation					
Pier 400 (Liquid Bulk)	0	0	0	6	6
kW-HR	0	0	0	648000	648000

Assumed Schedule for Cruise Ship AMP Participation					
B90-93Cruise	0	0	100	200	200
kW-HR	0	0	6400000	12800000	12800000
Total Calls	**58**	**65**	**165**	**410**	**671**
% of tot calls	2%	3%	7%	16%	27%

kW/hrs per call: 64,000 (8 hrs per cruise call, 8,000 kW load during hoteling)

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SPBP-OGV 2 - Reduction of At-Berth OGV Emissions through Lease requirement, Incentives and Capital Funding
Assumption: Ships utilizing cold ironing are also meeting CARB's Marine Auxiliary engines regulation

Port of Long Beach

	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Annual kW-hrs - Containerships	0	0	0	0	39,852,000
Annual kW-hrs - Tanker	0	324,000	1,296,000	1,296,000	1,296,000
Annual kW-hrs - Cruise Ships	0	0	0	0	0
NOx Reductions, tons, containerships	0	0	0	0	562
NOx Reductions, tons, Tankers	0	5	18	18	18
NOx Reductions, tons, cruise ships	0	0	0	0	0
Combined NOx Reductions, tons	**0**	**5**	**18**	**18**	**580**
NOx CF	**1.000**	**0.999**	**0.997**	**0.997**	**0.911**
DPM Reductions, tons, containerships	0.0	0.0	0.0	0.0	12.7
DPM Reductions, tons, Tankers	0.0	0.2	0.6	0.6	0.4
DPM Reductions, tons, cruise ships	0.0	0.0	0.0	0.0	0.0
Combined DPM Reductions, tons	**0.0**	**0.2**	**0.6**	**0.6**	**13.1**
DPM CF	**1.000**	**1.000**	**0.999**	**0.999**	**0.978**
SOx Reductions, tons, containerships	0	0	0	0	274
SOx Reductions, tons, Tankers	0	2	9	9	9
SOx Reductions, tons, cruise ships	0	0	0	0	0
Combined SOx Reductions, tons	0	2	9	9	283
SOx CF	**1.000**	**0.999**	**0.996**	**0.996**	**0.885**

Auxiliary Engine Emission Factors, g/kW-I	Residual	Distillate	Container	Tanker Tanker	Cruise
NOx	14.70	13.90	14.47	14.47	14.47
PM	0.8	0.3	0.66	0.66	0.66
SOx	12.3	4.3	9.98	9.98	9.98
Percentage used, Container	71%	29%			
Percentage used, Tanker	71%	29%			
Percentage used, Cruise	71%	29%			
Percentage of hoteling emissions eliminated:		95%			

Assumed Schedule for Containership Shore Power Participation-POLB

Site	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	
Pier G (ITS K-Line - Three berths)	0	0	0	0	150	50 calls per berth
Pier C (Matson -Two berths)	0	0	0	0	52	
Piers D, E, F (Middle Harbor, 1 berth)	0	0	0	0	17	
Pier S (Three berths)	0	0	0	0	150	
Total container calls	**0**	**0**	**0**	**0**	**369**	
5-year	**369**					
kW-HR	0	0	0	0	39,852,000	
108,000	kW per call (72 hrs/ container&tanker call, 1,500 kW load during hoteling)					

Assumed Schedule for Liquid Bulk (tanker) Cold Ironing Participation

Pier T 121	0	3	12	12	12	12 vessels per year, 3 utilizing shore power in 4 qtr of 2007 Construction finishes in August of 2007
kW-HR	0	324,000	1,296,000	1,296,000	1,296,000	

Assumed Schedule for Cruise Ship Cold Ironing Participation

B90-93Cruise	0	0	0	0	0
kW-HR	0	0	0	0	0
Total Calls	**0**	**3**	**12**	**12**	**381**
% of total call	0.0%	0.1%	0.4%	0.4%	14%

kW/hrs per call: 64,000 (8 hrs per cruise call, 8,000 kW load during hoteling)

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SPBP-OGV 3 - Lease Required Auxiliary Engine Fuel Improvement (0.2% S Fuel)

Applicable to all OGVs

Port of Los Angeles

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Participation rate @ 20 nm from Pt. Fermin	0%	100%	100%	100%	100%	100%
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%

Emission Reduction Estimates (tpy)	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	
Implementation Schedule	0%	1%	5%	28%	40%	48%	Based on Lease Renewal
NOx Emissions Reduced	0	0	1	7	10	12	
[1] NOx CF (Total OGV)	**1.000**	**1.000**	**1.000**	**0.999**	**0.999**	**0.998**	
DPM Emissions Reduced	0	0	0	2	3	2	
[1] DPM CF (Total OGV)	**1.000**	**1.000**	**0.999**	**0.996**	**0.995**	**0.995**	
SOx Emissions Reduction	0	3	15	80	66	21	
[1] SOx Emissions CF	**1.000**	**0.999**	**0.995**	**0.975**	**0.980**	**0.994**	

[1] CARB's Marine Auxiliary Engine Regulation Adopted in December of 2005 is included in the CF calculations
2001 BLEI info on 40-mile radius

Percent of auxiliary emissions during transit	20%		
Percent of auxiliary emissions during transit within 20 nm plus hotelling::		90%	
Percent of auxiliary emissions during transit within40 nm plus hotelling::			100%

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SPBP-OGV 3 - Lease Required Auxiliary Engine Fuel Improvement (0.2% S Fuel)

Applicable to all OGVs

Port of Long Beach

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Participation rate @ 20 nm from Pt. Fermin	0%	100%	100%	100%	100%	100%
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%

Emission Reduction Estimates (tpy)	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	
Implementation Schedule	0%	2%	12%	20%	24%	25%	Based on Lease Renewal
Total NOx reduced	0.0	0.0	0.7	2.6	3.1	3.2	
[1] NOx CF (Total OGV)	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	
Total DPM Reduced	0.0	0.3	1.1	2.1	1.8	0.9	
[1]DPM CF (Total OGV)	**1.000**	**1.000**	**0.998**	**0.996**	**0.997**	**0.998**	
Total SOx Reduced	0.0	19.8	37.0	62.7	44.5	4.5	
[1] SOx CF (Total OGV)	**1.000**	**0.994**	**0.985**	**0.975**	**0.982**	**0.998**	

[1] CARB's Marine Auxiliary Engine Regulation Adopted in December of 2005 is included in the CF calculations

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SPBP-OGV 4 -Main Engine Fuel Improvement

Fuel Switch from IFO 380 to 0.2% S MGO

Assumption: Applicable to all OGVs; Based on Lease Renewal

Port of Los Angeles

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Participation rate @ 20 nm from Pt. Fermin	0%	100%	100%	100%	100%	100%
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%

Fuel Implementation	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	
IFO 380 to 0.2% S MGO participation rate	0%	1%	5%	28%	40%	48%	**Lease based**
Participation rate @ 20 nm from Pt. Fermin	0%	100%	100%	100%	100%	100%	
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%	

Emission Reduction (tpy) Estimates

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
NOx Emissions Reduced , MGO	0	1	18	123	177	213
NOx CF (Total OGV)	**1.000**	**1.000**	**0.997**	**0.982**	**0.974**	**0.969**
DPM Emissions Reduced, MGO	0	1	13	84	121	146
DPM CF (Total OGV)	**1.000**	**0.998**	**0.977**	**0.842**	**0.774**	**0.727**
SOx Emissions Reduced, MGO	0.000	8	106	718	1,027	1,240
SOx CF	**1.000**	**0.998**	**0.967**	**0.780**	**0.685**	**0.620**

2006 Final San Pedro Bay Ports Clean Air Action Plan Technical Report
SPBP-OGV 4 -Main Engine Fuel Improvement

Fuel Switch from IFO 380 to 0.2% S MGO

Assumption: Applicable to all OGVs; Based on Lease Renewal

Port of Long Beach
Apply to all Ship Types

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	
Participation rate @ 20 nm from Pt. Fermin	0%	100%	100%	100%	100%	100%	
Participation rate @ 40 nm from Pt. Fermin	0%	0%	50%	100%	100%	100%	
IFO 380 to 0.2% S MGO participation rate	0%	2%	12%	20%	24%	25%	**Lease based**

Emission Reduction (tpy) Estimates

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
NOx Emissions Reduced , MGO	0	4	34	78	94	98
NOx CF (Total OGV)	**1.000**	**0.999**	**0.995**	**0.988**	**0.985**	**0.985**
DPM Emissions Reduced , MGO	0	4	30	70	85	88
DPM CF (Total OGV)	**1.000**	**0.994**	**0.950**	**0.884**	**0.860**	**0.854**
SOx Emissions Reduction, MGO	0.000	21	165	384	462	482
SOx CF (Total OGV)	**1.000**	**0.993**	**0.933**	**0.844**	**0.812**	**0.804**

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SPBP-OGV 5 - Slide Valve Retrofit-Main Engine

Assumption: Applicable to all OGVs; Based on Lease Renewal

Port of Los Angeles

Reductions due to Slide Valve-Main Engine	
NOx	**30%**
PM	**25%**

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	
Slide Valve Retrofit Implementation Rate	0%	1%	5%	28%	40%	48%	**Lease based**

Emission Reduction (tpy) Estimates

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Total NOx Emissions Reduced	0	9	73	370	530	640
NOx CF (Total OGV)	**1.000**	**0.999**	**0.989**	**0.946**	**0.922**	**0.906**
Total DPM Emissions Reduced	0	1	7	33	47	57
DPM CF (Total OGV)	**1.000**	**0.999**	**0.988**	**0.938**	**0.912**	**0.893**
Total SOx Emissions Reduced	0	0	0	0	0	0
SOx CF (Total OGV)	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

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SPBP-OGV 5 - Slide Valve Retrofit-Main Engine

Assumption: Applicable to all OGVs;
Based on Lease Renewal

Port of Long Beach

Reductions due to Slide Valve-Main Engine	
NOx	**30%**
PM	**25%**

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011	
Slide Valve Retrofit Implementation Rate	**0%**	**2%**	**12%**	**20%**	**24%**	**25%**	Lease Based

Emission Reduction (tpy) Estimates

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Total NOx Emissions Reduced	0	26	134	234	282	294
NOx CF (Total OGV)	**1.000**	**0.996**	**0.979**	**0.964**	**0.956**	**0.955**
Total DPM Emissions Reduced	0	3	16	27	33	35
DPM CF (Total OGV)	**1.000**	**0.995**	**0.974**	**0.955**	**0.945**	**0.943**
Total SOx Emissions Reduced	**0**	**0**	**0**	**0**	**0**	**0**
SOx CF (Total OGV)	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

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Implementation and Reduction Estimates Used to Calculate Emissions Reduction Due to CARB's Cargo Handling Equipment Regulation Adopted in December of 2005 and SPBP-CHE 1

Implementation Schedule for Yard Tractors per CARB's Regulation

	Off-Road YT with no VDEC					Off-Road YT with VDEC				
[5] MY	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
pre-2003	50%	100%	100%	100%	100%		50%	100%	100%	100%
2003				25%	50%					25%
2004					25%					

	On-Road YT with no VDEC					On-Road YT with VDEC				
[5] MY	2007	2008	2009	2010	2011	2007	2008	2009	2010	2011
pre-2000	25%	50%	100%	100%	100%		25%	50%	100%	100%
2000		25%	50%	100%	100%			25%	50%	100%
2001			25%	50%	100%				25%	50%
2002				25%	50%					25%
2003					25%					

Following emissions reduction estimates were used to calculate control factors for CARB's cargo handling equipment regulation adopted in December of 2005.

Emissions Reduction Table for Diesel Yard Tractors

Off-Road Diesel	[1] NOx	[1] PM	[2] NOx	[2] PM
Tier 0 (Pre 1996)	87%	97%	98%	97%
Tier 1(1996-2001)	84%	98%	97%	98%
Tier 2 (2002-2005)	76%	93%	96%	93%
Tier 3 (2006-2010)	59%	93%	93%	93%
Tier 4 (2011-2013)	87%	33%	87%	33%
Tier 4 (2013+)	33%	33%	33%	33%

[1] **Reduction (%) due to 2007-2009 on-road hdv replacement**

[2] **Reduction (%) due to 2010 + MY on-road hdv replacement**

On-Road HDV Diesel Emission Rate (gm/hp-hr)

2007-2009	1.1	0.01
2010+	0.2	0.01

On-Road HDV LNG Emissions Rate (gm/hp-hr)

2007-2009	0.2	0.01

No adjustment for the off-road duty cycle was made when considering replacement with on-road engines

Implementation Schedule for Non-Yard Tractors

[5] MY	2007	2008	2009	2010	2011	2012	2013
Pre 1988	25%	50%	75%	100%	100%	100%	100%
1988-1995	0%	25%	50%	75%	100%	100%	100%
1996-2002	0%	0%	25%	50%	75%	100%	100%
2003-2006	0%	0%	0%	25%	50%	75%	100%

Emissions Reduction Table for Diesel Yard Tractors

	Cranes	Cranes	Excavator	Excavator	Forklift	Forklift	Loader	Loader
% Affected	91%	91%	100%	100%	100%	100%	100%	100%
[4] Technology	Passive DPF		DOC		Active DPF		DOC	
% Reduction	0%	85%	0%	25%	0%	85%	0%	25%

	RTG	RTG	Sweeper	Sweeper	Other	Other	Other
% Affected	100%	100%	100%	100%	100%	100%	100%
[4] Technology	DPF		DOC		[3] DOC or DOC w. Emulsified		
% Reduction	0%	85%	0%	25%	20%	50%	25%

[3] **Except for pre 2003 where it is only DOC**

Source:

Implementation schedule from CARB's staff report obtained from CARB's website under board reports dated Jan 28, 2006.

[4] **Technology assumption from appendix D @**

http://www.arb.ca.gov/regact/cargo2005/appd.pdf

[5] **Implementation for remaining model years not applicable within FY 2006/2007 to 2010/2011**

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CARB's Cargo Handling Equipment Regulation Adopted in December of 2005

Port of Los Angeles

Emission Reduction (tpy)	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Baseline CHE NOx emissions (tpy)	2,106	2,106	2,106	2,106	2,106	2,106
NOx Emissions Reduced	0	95	449	708	713	755
NOx CF	**1.000**	**0.955**	**0.787**	**0.664**	**0.661**	**0.642**
Baseline CHE DPM emissions (tpy)	86	86	86	86	86	86
DPM Emissions Reduced	0	6	25	40	45	50
DPM CF	**1.000**	**0.930**	**0.709**	**0.535**	**0.477**	**0.419**
Baseline CHE SOx Emissions (tpy)	3	3	3	3	3	3
SOx Emissions Reduced	0	0	0	0	0	0
SOx CF	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

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CARB's Cargo Handling Equipment Regulation Adopted in December of 2005

Port of Long Beach

Emission Reduction (tpy)

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Baseline CHE NOx emissions (tpy)	1,810	1,810	1,810	1,810	1,810	1,810
NOx Emissions Reduced	0	29	323	588	588	622
NOx CF	**1.000**	**0.984**	**0.822**	**0.675**	**0.675**	**0.656**
Baseline CHE DPM emissions (tpy)	67	67	67	67	67	67
DPM Emissions Reduced	0	4	21	36	40	43
DPM CF	**1.000**	**0.940**	**0.687**	**0.463**	**0.403**	**0.358**
Baseline CHE SOx Emissions (tpy)	5	5	5	5	5	5
SOx Emissions Reduced	0	0	0	0	0	0
SOx CF	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

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SPBP-CHE 1 Performance Standards for CHE

Port of Los Angeles

Emission Reduction (tpy)

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
NOx Emissions Reduced (tpy)	0	90	126	179	199	225
[1] NOx CF	**1.000**	**0.955**	**0.924**	**0.872**	**0.857**	**0.833**
DPM Emissions Reduced (tpy)	0	2	3	5	5	6
[1] DPM CF	**1.000**	**0.971**	**0.946**	**0.898**	**0.885**	**0.836**
SOx Emissions Reduced (tpy)	**0**	**0**	**0**	**0**	**0**	**0**
SOx CF	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

[1] CARB's Cargo Handling Equipment Regulation Adopted in December of 2005 is included in the baseline for the CF calculation

Emissions Reduction Calculations Basis for SPBP-CHE 1:

50% of the 2003+ MY Yard Tractors, Top Handlers and Side Handlers not covered by CARB's regulation within next five years with those equipped with cleanest available 2007+ MY on-road diesel and remaning
50% with 2007+ MY LNG engines meeting 0.01 g/hp-hr PM and 0.2 g/hp-hr NOx standards.
CHE other than Yard Tractors, Top Handlers and Side Handlers will be replaced with those meeting Tier 4 standards in FY 2010

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SPBP-CHE 1 Performance Standards for CHE

Port of Long Beach

Emission Reduction (tpy)

	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
NOx Emissions Reduced (tpy)	0	37	69	110	136	151
NOx CF	**1.000**	**0.979**	**0.954**	**0.910**	**0.889**	**0.873**
DPM Emissions Reduced (tpy)	0	2	3	4	5	5
DPM CF	**1.000**	**0.973**	**0.938**	**0.861**	**0.831**	**0.786**
SOx Emissions Reduced (tpy)	0	0	0	0	0	0
SOx CF	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**

[1] CARB's Cargo Handling Equipment Regulation Adopted in December of 2005 is included in the baseline for the CF calculations

Emissions Reduction Calculations Basis for SPBP-CHE 1:
50% of the 2003+ MY Yard Tractors, Top Handlers and Side Handlers not covered by CARB's regulation within next five years will be with those equipped with cleanest available 2007+ MY on-road diesel and remaning
50% with 2007+ MY LNG engines meeting 0.01 g/hp-hr PM and 0.2 g/hp-hr NOx standards.
CHE other than Yard Tractors, Top Handlers and Side Handlers will be replaced with those meeting Tier 4 standards in FY 2010/2011

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SPBP - RL1 PHL Agreement Reductions

Port of Los Angeles

[1] Emission Reduction (tpy)	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Baseline NOx emissions (tpy)	2,466	2,466	2,466	2,466	2,466	2,466
NOx Emissions Reduced	0	163	163	163	163	163
NOx CF	**1.000**	**0.934**	**0.934**	**0.934**	**0.934**	**0.934**
BaselineDPM emissions (tpy)	60	60	60	60	60	60
DPM Emissions Reduced	3	3	3	3	3	3
DPM CF	**0.950**	**0.950**	**0.950**	**0.950**	**0.950**	**0.950**
Baseline SOx Emissions (tpy)	90	90	90	90	90	90
SOx Emissions Reduced	0.2	0.2	0.2	0.2	0.2	0.2
SOx CF	**0.998**	**0.998**	**0.998**	**0.998**	**0.998**	**0.998**

[1] Estimated in August 2005 based on MOU terms and on data associated with baseline emissions inventories:

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SPBP - RL1 PHL Agreement

Port of Long Beach

[1]Emission Reduction (tpy)	FY 2005/2006	FY 2006/2007	FY 2007/2008	FY 2008/2009	FY 2009/2010	FY 2010/2011
Baseline NOx emissions (tpy)	2,067	2,067	2,067	2,067	2,067	2,067
NOx Emissions Reduced	0	137	137	137	137	137
NOx CF	**1.000**	**0.934**	**0.934**	**0.934**	**0.934**	**0.934**
BaselineDPM emissions (tpy)	51	51	51	51	51	51
DPM Emissions Reduced	2.6	2.6	2.6	2.6	2.6	2.6
DPM CF	**0.949**	**0.949**	**0.949**	**0.949**	**0.949**	**0.949**
Baseline SOx Emissions (tpy)	86	86	86	86	86	86
SOx Emissions Reduced	0.2	0.2	0.2	0.2	0.2	0.2
SOx CF	**0.998**	**0.998**	**0.998**	**0.998**	**0.998**	**0.998**

[1] Estimated using POLA and POLB baseline emissions inventories ratio applied to POLAemissions reduction benefit