PORT OF OAKLAND

Maritime Air Quality Improvement Plan (MAQIP)

June 2008

DRAFT

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FOREWORD

Since long before the current policy and regulatory emphasis on air emissions reduction, the Board of Port Commissions has been committed to environmental stewardship and protecting the health and welfare of workers and communities alike, as part of its operations. This Maritime Air Quality Improvement Plan (MAQIP) provides a master plan for the Port's long-term commitment to reducing the air quality impacts of its maritime operations.

This document embodies the primary power and obligation of the Port under the Oakland City Charter and as trustee of state tidelands: to ensure the proper management and administration of the Port Area for the purpose of navigation and commerce. As such, the strategies and goals outlined in the MAQIP reflect the careful balance between the needs for sustained economic viability in a competitive business environment and for environmental responsibility and justice. The document also describes the past, current and future efforts of the Port to initiate, monitor, finance and be accountable for its fair share of reducing air emissions in our communities.

The MAQIP also reflects the need for cooperative efforts among the Port, regulatory, enforcement and funding agencies, tenants, business stakeholders and the community. As one of many parties in a chain of international and interstate commerce and goods movement that operates across international and federal jurisdictions, the Port alone cannot realize all of the goals expressed in the MAQIP due to limitations imposed by its legal authority, jurisdiction, and resources. Only in the spirit of true partnership will these goals be realized.

ACRONYMS AND ABBREVIATIONS

AFV	Alternative Fuel Vehicle
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railroad
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CHE	Cargo Handling Equipment
CIP	Capital Improvement Program
CNG	Compressed Natural Gas
CO	Carbon Monoxide
DOC	Diesel Oxidation Catalyst
DPF	Diesel Particulate Filter
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	(United States) Environmental Protection Agency
Genset	Generator Set
GHG	Greenhouse Gas
GMAP	Goods Movement Action Plan
GMERP	Goods Movement Emission Reduction Plan
HC	Hydrocarbon
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MAQIP	Maritime Air Quality Improvement Plan
MARPOL	(International Convention for the Prevention of Pollution from Ships)
NEPA	National Environmental Policy Act
NM	Nautical Mile
NO	Nitric Oxide
NOx	Oxides of Nitrogen (consists of NO and NO_2)
NO_2	Nitrogen Dioxide
NGV	Natural Gas Vehicle
OGV	Ocean-going Vessel
PM	Particulate Matter
PM_{10}	Particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	Particulate matter less than 2.5 micrometers in aerodynamic diameter
PPB	Parts per billion
PPM	Parts per million
ROG	Reactive Organic Gas (see also VOC)
SO_2	Sulfur Dioxide
SOx	Sulfur Oxide
TEU	Twenty-Foot Equivalent Unit
TOG	Total Organic Gases
UP	Union Pacific Railroad
VDEC	Verified Diesel Emission Control (verified by CARB)
VOC	Volatile Organic Compound
ULSD	Ultra-low Sulfur Diesel

WOEIP	West Oakland Environmental Indicators Project
WOTRC	West Oakland Toxics Reduction Collaborative

EXECUTIVE SUMMARY

[To be completed]

1 INTRODUCTION

The Maritime Air Quality Improvement Plan (MAQIP) was born out of community engagement on behalf of air quality in West Oakland. Discussions with community groups, regulatory agencies and other interested parties in 2006 led to the formal initiation of the Port's air quality plan and the establishment of the MAQIP Task Force. For much of 2007 and through early 2008, this 35-member group met to create this air quality master plan that sets goals and will guide air quality efforts in the seaport for years to come, with the goal of reducing health risk from Port operations through emissions reductions.

1.1 Purpose of the Maritime Air Quality Master Plan

The Maritime Air Quality Improvement Plan (MAQIP) is the master plan of air quality goals and policies covering all seaport-related development and operations at the Port of Oakland (Port). From the Port's perspective, all development projects must be scoped with an eye to meeting the MAQIP air quality goals. All grant funding opportunities should be reviewed as opportunities to meet the MAQIP goals. All seaport operations should consider opportunities for air quality improvement.

The essential elements of a master plan are included in this document, which:

- describes the current environment,
- reviews the goals and values that should guide Port operations and development,
- presents a vision of the future, and
- outlines how that future will be achieved.

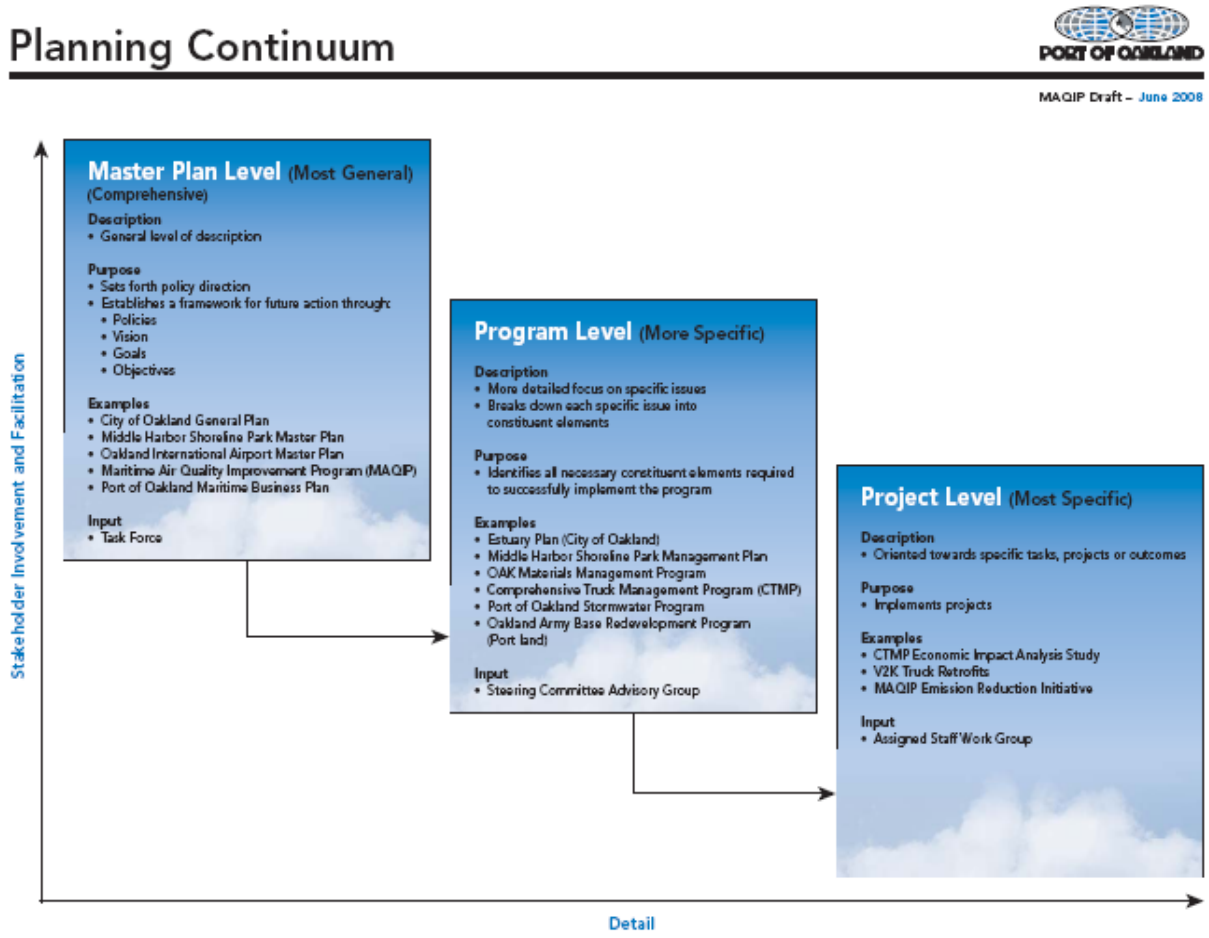

Figure 1-1. Hierarchy of planning activities. The Maritime Air Quality Improvement Plan (MAQIP) is at the Master Plan level and includes elements leading into the Program Level. Implementation of the MAQIP will require developing specific Programs and Projects that are consistent with the MAQIP.

The Port turned to its community, tenant, environmental, business and regulatory stakeholders for guidance in preparing the plan, which:

a) describes the Port's operations, emissions and past air quality improvement efforts, along with the current and future air quality regulatory settings (Sections 2, 3, 4, and 5);
b) sets an overall community cancer health risk reduction goal related to exposure to diesel particulate matter emissions from Port operations, including interim emissions reduction goals (Section 6);
c) outlines specific air pollutant reduction goals (Section 6) and general strategies to meet those goals (Section 7);
d) provides a set of "screening criteria" for prioritizing air emission reduction measures that the Port could implement when such measures become practicable and feasible (Section 8);
e) lists air quality improvement initiatives, along with programs and projects that may help the Port, its maritime tenants and related businesses in reaching the MAQIP goals over the next decade (Section 8);
f) discusses implementation and monitoring of emissions reduction programs and projects (Sections 9 and 10); and
g) establishes the next steps for plan implementation and oversight (Section 10).

As a first solid step to using this plan to guide the Port's activities, the Board of Port Commissioners approved a resolution on March 18, 2008 that set a goal of an 85% reduction from 2005 to 2020 in community cancer health risks related to exposure to diesel particulate matter emissions from the Port's maritime operations. The baseline data that will be used to measure the Port's progress toward this goal are the "Port of Oakland 2005 Seaport Air Emissions Inventory" (2007, revised 2008) and the California Air Resources Board's "Diesel Particulate Matter Exposure Assessment Study for the West Oakland Community: Preliminary Summary of Results" (March 2008 and subsequent revisions).

Since seaport activities are not directly controlled by the Port, which leases property to marine terminal operators, the full cooperation of the Port's tenants and maritime business partners will be needed to reduce emissions from activities on the San Francisco Bay, in the Port area, and on nearby freeways to reduce health risks to West Oakland residents and workers.

1.2. Plan Methodology

1.2.1. Planning Continuum

The Port normally approaches planning through a continuum, starting with a conceptual strategic or master plan that provides a framework for how to achieve the goals delineated in the plan. The next step is to develop the comprehensive programs that manage how the goals will be reached. Finally, the specific projects that contribute to the goal are implemented. As illustrated in Figure 1-1, the MAQIP is at the highest master plan level, and provides policy direction for the Port's current and future maritime air quality activities.

As the Port pursues solutions to environmental and other planning concerns and issues, it follows a methodology of interrelated steps. This methodology - called the "Planning Continuum" - is oriented towards the achievement of the planning goals.
The Planning Continuum organizes specific planning activities into discrete phases: the master plan phase, the program development phase, and the project implementation phase. Each phase

focuses on its own goals and objectives. Careful adherence to the character of each planning phase promotes completion of tasks, efficiency of resource use, and progress towards the next stage of the planning process. Stakeholder involvement is a key component of the Port Planning Continuum, but the nature and focus of stakeholder involvement and facilitation change with each planning phase.

- Stakeholder involvement and facilitation is the highest in the Master Plan phase, since preparation of a comprehensive master plan typically includes soliciting a wide spectrum of viewpoints on a particular issue and developing a set of common goals and principles for the plan. The involvement of trained facilitators during this phase may be very high because stakeholders often hold widely divergent perspectives, and because reconciling those perspectives is frequently painstaking.
- Once the Master Plan phase is completed, the focus of stakeholder input turns to program design and development. During the program development phase, facilitators may be used to orient stakeholder dialogue towards identifying specific program components and elements.
- Finally, the specific projects that achieve the planning goal are identified and implemented. At the project phase of the Planning Continuum, stakeholder involvement focuses on promoting Implementation of specific projects and monitoring and reporting activities and facilitation, if required, is oriented towards constructive feedback and adaptive management activities.

1.2.2. Opportunities and Challenges

The benefits to the Port of developing a long-range maritime air quality plan are clear. Unambiguous goals provide direction for the organization and for its tenants and customers. With support and policy direction from the Board of Port Commissioners for the MAQIP and its goals, Port staff will place a higher priority on working towards cleaner air in the seaport operations. The West Oakland community, including Port staff, will benefit through lower cancer health risk from maritime-related diesel emissions.

Reaching those goals, however, is only possible with strong statewide – and preferably national and international – regulations. This plan counts on the benefits of regulations to reduce emissions to levels close to the MAQIP goals. Therefore, the Port must rely on its agency partners, especially the California Air Resources Board, the San Francisco Bay Area Air Quality Management District and the U.S. Environmental Protection Agency, to establish regulations that apply uniformly to the maritime industry. The reality of the economic climate is that cargo customers look for the lowest cost transportation services, and the shipping lines and terminal operators look for the least expensive way to provide those services. The more uniformly a regulation is applied throughout a wide region, the less likely air quality improvements will be seen as a financial burden.

The Port must also rely on the agencies to ensure that their regulations are feasible: that exhaust retrofits will work without damaging equipment, that the fuel needed to satisfy regulatory requirements is plentiful, that companies providing necessary services will be able to afford new equipment on a reasonable schedule, and that the regulations themselves can stand up to legal scrutiny, for example.

Finally, the Port must rely on the agencies to ensure that their regulations are having the anticipated effect. As a landlord port, the Port's jurisdiction is limited to the provision of property and, in some cases, facilities to its tenants. The Port has neither the authority nor the

resources to monitor its tenants and their business partners to enforce compliance with all of the changes in equipment, fuel, and practices called for by current and anticipated regulations. However, the Port will continue its partnership with tenants, other maritime businesses and regulatory agencies to share information, funding sources, and strategies to support the full regulatory compliance and additional measures that will be needed to achieve the goals of this plan: dramatic reductions in emissions and health risk in the West Oakland community.

1.3 Background

Air quality has long been a concern to the West Oakland community. Over the last decade, the Port has worked with and participated in many community air quality efforts, including the Vision 2000 Air Quality Program, the West Oakland Environmental Indicators Project, the West Oakland Toxic Reduction Program, Ditching Dirty Diesel, and others. Many of the community efforts benefited from the support of staff at the Pacific Institute and the United States Environmental Protection Agency (EPA).

Over the last decade, residents living in neighborhoods adjacent to the seaport have become more concerned about the potential impacts of air emissions from goods movement. Local air districts, such as the Bay Area Air Quality Management District (BAAQMD), and the State of California Air Resources Board (CARB) have responded to these concerns and are developing and enforcing regulations to substantially reduce emissions from port-related sources.

Since seaport activities are not directly controlled by the Port, which leases property to marine terminal operators, the full cooperation of the Port's tenants and maritime business partners will be needed to reduce emissions from activities on the San Francisco Bay, in the Port area, and on nearby freeways and thus reduce health risks to West Oakland residents and workers.

In 2005, the Port decided to prepare a comprehensive air emissions inventory of seaport operations to provide baseline emissions data for future planning activities, such as this air quality master plan, and to enable the Port to track its tenants' progress in reducing harmful emissions.

During development of the inventory, CARB announced that, in response to concerns expressed by residents of the West Oakland neighborhood, it intended to carry out a human health risk assessment of the potential health effects of diesel particulate matter, or soot. The study focus was on the diesel emissions from maritime sources at the Port and the Union Pacific Railyard, and from other sources that could affect West Oakland residents (e.g, freeways, ferries, local industries, etc.). To assist CARB, the Port adapted its emissions inventory to agree with CARB's current methodologies. Through weekly calls, the Port, along with the BAAQMD, participated in the development of the health risk assessment. The Port's emissions inventory was released in August 2007, and finalized in March 2008[1]; CARB's report "Diesel Particulate Matter Exposure Assessment Study for the West Oakland Community: Preliminary Summary of Results" was made available in March 2008[2].

This plan relies on the emissions inventory and health risk assessment results to model future emissions and to help set its ambitious goals for emissions reductions.

[1] http://www.portofoakland.com/environm/airEmissions.asp
[2] http://www.arb.ca.gov/ch/communities/ra/westoakland/westoakland.htm

1.4 Plan Overview and Development

The MAQIP was designed through a year-long facilitated participatory process, with the MAQIP Task Force establishing guiding principles, adopting goals, proposing air quality improvement initiatives, and providing guidance for the preparation of this master plan.

Two broad planning goals to reduce the Port's impacts on public health and on ambient air quality were adopted by the MAQIP Task Force. The Port presented supporting quantitative goals that propose explicit emission reduction targets for specific air pollutants in future years.

In support of the adopted goals, the Task Force explored two types of strategies to reduce emissions and health risk:

- Measures that comply with current and anticipated regulations, and
- Measures that go beyond regulatory requirements.

The Task Force prepared an extensive list of possible initiatives that could potentially help the Port, tenants, customers and related businesses go beyond regulatory requirements in achieving emissions and risk reductions. Those proposed initiatives are intended to go above and beyond regulations to help the Port and its maritime partners reach the 85% reduction goal adopted by the Board.

1.4.1 Public Participation

The MAQIP was developed through an extensive public stakeholder participation process led by Port staff with the assistance of facilitators from CONCUR, Inc. The MAQIP Task Force of 35 stakeholders, selected through a nomination process and appointed by the Port's Executive Director, was established in June 2007 to guide the development of the air quality master plan. Planning activities for the Task Force were led by a team of four co-chairs.

While the Board of Port Commissioners is responsible for approving the final content of the MAQIP through formal approval of the plan, the policy direction and content were shaped by the Port's planning partners. Key stakeholders and their roles in the creation of the MAQIP are described here, and a complete roster is provided in Table 1-1.

Task Force Co-Chairs

- Omar Benjamin, Executive Director, Port of Oakland,
- Jack Broadbent, Executive Officer, Bay Area Air Quality Management District,
- Brian Beveridge, Co-Chair, West Oakland Environmental Indicators Project (this position was held by Margaret Gordon until fall 2007, when she was appointed to the Board of Port Commissioners),
- Andy Garcia, Executive Vice President, GSC Logistics Inc.

Task Force Members

The MAQIP Task Force was comprised of representatives from the following stakeholder groups:

- West Oakland residents,
- Commerce, community, and environmental justice organizations based in West Oakland or actively involved in West Oakland studies,

- Terminal operators and shipping companies,
- Trucking enterprises,
- Railroads,
- Other goods movement related industry,
- Labor,
- Elected and appointed officials (including the Office of the Mayor, City of Oakland),
- Environmental regulatory and health agencies, and
- Energy and utility companies.

Following a MAQIP kickoff meeting held on April 10, 2007, the MAQIP Task Force was formed and met seven times at roughly one to two month intervals. The role of the Task Force included proposing or reviewing meeting topics, prioritizing air emission reduction measures, deliberating the merits of proposed actions, contributing to strategies for implementation, monitoring, and adaptive management, and generally shaping plan content. Stakeholder deliberations routinely included brainstorming sessions, break-out group exercises, and roundtable discussions following various presentations by select stakeholder groups. Task Force members and other stakeholders worked together with Port staff to develop broad-based agreement on the elements of the MAQIP, although no formal voting procedure was used to decide on the final MAQIP content. All Task Force meetings were open to the public and comment was solicited from both Task Force and non-Task Force members.

A Key Outcomes Memorandum was prepared after each meeting to summarize major points of the discussion and any decisions made. All meeting materials, including presentations and the Key Outcomes memoranda, were posted on the Port's MAQIP web site (http://www.portofoakland.com/environm/prog_04c.asp). To further record its decisions, the Task Force formally or provisionally adopted the following documents during the course of the MAQIP development:

Ground Rules, adopted on June 11, 2007. Describes the composition of the MAQIP Task Force and the roles and responsibilities of members (Appendix A).

Guiding Principles and Goals, provisionally adopted on August 14, 2007. Identifies the values guiding the development of the MAQIP and the two overarching goals of the MAQIP. Outlines topics to be covered in the plan (Appendix B).

Screening Criteria for Air Quality Initiatives, adopted on September 27, 2007. Characterizes the criteria used to screen the potential emission and risk reduction initiatives suggested by the Task Force (Appendix C).

Proposed Lists of Primary Interest and Secondary Interest Air Quality Initiatives for Potential Implementation, revised by the MAQIP Task Force on January 30, 2008. Describes the selection process and presents the final MAQIP air quality initiatives as of January 30, 2008. (Appendix D).

1.4.2 Guiding Principles

The MAQIP was prepared in accordance with seven guiding principles that were identified by the Port and stakeholders to articulate values that drive the planning process. These principles were provisionally adopted by the Task Force on August 14, 2007:

1. **Seek Economic Growth:** The Port of Oakland is an economic engine for the City of Oakland and the region. As such it is vital that the seaport remain strong and grow in a fiscally responsible manner. The Port recognizes that its ability to operate, grow, and be a good neighbor will depend on its ability to address potentially adverse environmental impacts resulting from activities occurring at the seaport, at the same time remaining a viable and competitive organization.
2. **Promote Environmental Stewardship:** The Port of Oakland holds environmental stewardship as one of its core organizational goals. The Port is committed to ensuring that seaport activities are carried out in an environmentally responsible manner, minimizing adverse impacts on our neighbors and the environment, and striving to improve the environmental conditions in the seaport area, for the benefit of both present and future generations.
3. **Apply Concept of "Fair Share":** The Port of Oakland seaport commits to achieving its fair share of air emission reductions, while recognizing that it alone does not have the resources needed to subsidize the entire cost of emission reductions. Therefore, the seaport will count on the support of its private industry and government partners, and on the commitment of all companies engaged in goods movement at, to, and from the Port of Oakland, to achieve and fund their fair share of emission reductions in an equitable manner.
4. **Exercise Authority:** The Port of Oakland seaport commits to using its authority and influence to achieve air quality improvement within market and legal constraints. Seaport operations produce emissions, but the Port does not own or operate the sources that produce those emissions. Where the Port may not have authority over an emission source, the Port will strive to develop voluntary partnerships or agreements aimed at reducing emissions. The Port will pursue emission reduction measures in conjunction with and relying upon local, state, and federal regulations.
5. **Engage Stakeholders:** The Port of Oakland seaport commits to actively engage and partner with its diverse stakeholder community in developing, implementing, and monitoring the MAQIP. The Port recognizes the need to especially collaborate and partner with those who are most affected by seaport operations, including, but not limited to labor, tenants, customers, and neighboring residents.
6. **Promote Environmental Justice:** The Port of Oakland seeks to prevent and address adverse impacts to communities that experience disproportionate environmental and economic effects.
7. **Build Knowledge:** The Port of Oakland believes that good planning builds knowledge and educates, and thus results in informed decisions. To this end, the Port strives to create a plan that educates and adds value and in which knowledge is built, shared, and used by all participants as a basis for informed and accountable decision-making. The Port and its stakeholders will rely on the best available information, science, and technology in all aspects of maritime air quality planning. The Port and its stakeholders will remain flexible in their approaches to improving air quality, in order to respond to,

adapt to, and incorporate new advancements, information, and evolving regulatory programs.

1.4.3 MAQIP Goals and Strategies

Early in the MAQIP planning process, Task Force members agreed on two planning goals (see Section 6):

1. Reduce the adverse public health impacts of the Port of Oakland's seaport-related air emissions at the seaport area and in neighboring communities that are most affected by goods movement at the seaport (in particular West Oakland) and on workers in the maritime area, as expeditiously as feasible.

2. Reduce the adverse impacts of the Port of Oakland's seaport-related air emissions on ambient air quality in West Oakland and more generally in the San Francisco Bay Area Air Basin, as expeditiously as feasible.[3]

For the Port, its tenants, customers and related businesses to reach these goals, the Task Force realized that it would be necessary to rely largely on federal and state regulations to reduce emissions, but that additional emissions reductions could also help. Therefore, in support of the adopted goals, the Task Force explored two types of strategies, or "functions", to reduce emissions and health risk:

- Measures that comply with current and anticipated federal and state regulations, and
- Measures that go beyond federal and state regulatory requirements.

Emissions Reductions Through Regulatory Compliance

With the adoption in 2006 of the "Emission Reduction Plan for Ports and Goods Movement in California" as a state-wide air quality master plan, CARB embarked on an ambitious effort to regulate the major sources of port-related emissions, especially diesel particulate matter (DPM). The plan contained a goal of reducing DPM emissions back to 2001 levels by 2010 and reducing statewide DPM health risk 85 percent by 2020, compared to 2001 levels.

Compliance by the maritime industry with adopted and planned regulations has the potential to yield large emissions and risk reductions at the Port's seaport as well as elsewhere in the state. However, full compliance is not guaranteed since existing and proposed regulations are complex, costly to implement, and affect maritime sources and activities well into the future.

Additional Emissions Reductions

The other approach to reaching the Port's MAQIP goals is to seek additional emissions reductions beyond those expected to accrue from timely compliance with regulatory requirements. Many of the regulations are extremely aggressive, so they do not leave much room for voluntary actions that produce additional emissions reductions. All of the MAQIP initiatives described in Section 8 fall in this additional reduction category, and each will require a feasibility analysis to ensure that the measure is financially, technologically and legally feasible.

[3] Source: Guiding Principles and Goals, provisionally adopted on August 14, 2007. The entire document is included in Appendix B.

1.4.4 MAQIP Elements

Since the purpose of the year-long MAQIP effort was to produce a written maritime air quality master plan, the MAQIP Task Force members proposed that the Port's plan include at least the following elements:[4]

1. Geographic and jurisdictional boundaries of seaport emission sources and the affected neighboring areas to which air quality improvement efforts will be primarily targeted.
2. Pollutants that will be targeted for reductions, and the impacts of those pollutants on the environment and public health;
3. Regulations affecting seaport operations;
4. Quantification of baseline and projected emissions, and the linkage between emissions and risk;
5. Quantitative objectives or "goals" for reducing the adverse public health and environmental impacts of seaport air emissions;
6. Potential measures and related initiatives for reducing emissions from seaport operations that build upon the regulatory and voluntary efforts of others to reduce emissions and the health impacts associated with these emissions. These potential measures may also be included in specific mitigation plans that may be adopted as part of CEQA review for future development projects at the Port of Oakland seaport;
7. Timelines, standards, and strategies for implementing the Plan, monitoring and measuring the progress of such implementation, performing adaptive management, and addressing progress shortfalls; and
8. Public health and regulatory agency leadership and coordination to assist the Port in tracking risk reduction, by providing routine updates to risk studies.

All of the above elements were incorporated in the plan, except for the last, which is being managed through a separate but related effort: the MAQIP Interagency Group. Composed of representatives of the public agencies that participated in the MAQIP development (CARB, EPA, Bay Area Air Quality Management District, City of Oakland, Port of Oakland, Alameda County Department of Health, et al.), the group meets periodically to coordinate on air quality and health risk reduction concerns and issues.

Additional elements were added by the Port to flesh out the plan, including:

- Master plan purpose and planning approach,
- Information about the Port history, organization and its maritime operations,
- Overview of the MAQIP development process and Task Force roles,
- Relationship of Port air quality programs and projects to the proposed initiatives.

[4] Source: Guiding Principles and Goals, provisionally adopted on August 14, 2007. The entire document is included in Appendix B.

Table 1-1. Members and Alternates on the MAQIP Task Force as of December, 2008.

Co-Chairs	Alternate(s)	Affiliation
Omar Benjamin	Joe Wong, Bernida Reagan, Richard Sinkoff	Port of Oakland
Brian Beveridge		West Oakland Environmental Indicators Project (formerly held by Margaret Gordon)
Jack Broadbent	Jean Roggenkamp, Jack Colbourn	Bay Area Air Quality Management District
Andy Garcia	Robert Rodriguez	GSC Logistics, Inc.
Members	**Alternate(s)**	**Affiliation**
Bill Aboudi	Jeff Caldwell (Yolo Enterprises)	AB Trucking
Wendy Alfsen	Kent Lewandowski	Sierra Club, Northern California
Marisa Arrona		Office of Councilmember Nancy Nadel
John Berge	John McLaurin	Pacific Merchant Shipping Association
Ted Blanckenburg		American Navigation Maritime Services
Doug Bloch	Zach Goldman	Change to Win
George M. Bolton	Steve Lowe (West Oakland Commerce Association)	WOCAG
Washington Burns MD		Prescott Joseph Center
Miguel Bustos	Steve Lautze, VaShone Huff	City of Oakland, Office of the Mayor
Sharon Cornu	Wendall Chin	Alameda Labor Council
Chris Ferrara	Mike Trevino	Pacific Gas and Electric (PG&E)
Eric Goodman	Mike Stanfill	BNSF Railway Company
Carol A. Harris	Darcy Wheeles, Peter Okurowski (CA Environmental Association, for Assoc.of American Railroads)	Union Pacific Railroad Co.
Ginny Hessenauer	Scott Smith	American President Lines (APL)
Robyn Hodges		Office of Supervisor Nate Miley
Maha Ibrahim	Leslie Littleton	Office of Congresswoman Barbara Lee
Jerry Jackson	Kevin Williams	JC Penney
Ellen Joslin Johnck	Richard Rhoads (Moffatt and Nichol)	Bay Planning Coalition
Deborah Jordan	Mike Bandrowski, Richard Grow, Amy Zimpfer	U.S. Environmental Protection Agency
Andy Katz	Amy De Reyes	Office of Supervisor Keith Carson
Ray Kidd	David de Korsak	West Oakland Neighbors (WON)
Ken Larson		SSA Terminals
Kenneth Levin	Fran Black	San Francisco Bar Pilots
Ellen Parkinson	Marcus Johnson	West Oakland Resident
Michael Porte	Dave O'Neill	TraPac, Inc.
Swati Prakash	Jamie Fine (USF)	Pacific Institute
Kurt Sulzbach	Jim Flanagan	APM Terminals Pacific Ltd.
Queen Thurston		West Oakland Resident and Economic Council for West Oakland Revitalization
David Weinreich	Maurice Williams	Office of Senator Don Perata
Veronica Williams		Office of Assemblymember Sandre Swanson
Sandra Witt	Pamela Evans	Alameda County Public Health Dept.

2 PORT OF OAKLAND AND ITS SEAPORT OPERATIONS

As an independent department of the City of Oakland, the Port, operating through its Board of Port Commissioners, manages property stretching along 19 miles of Oakland waterfront. This "Port Area" encompasses property from Oakland International Airport to Jack London Square, in addition to the seaport area. However, this maritime air quality master plan applies only to the seaport area and operations.

2.1 History of the Port of Oakland

The history of harbor development in Oakland dates to the mid-nineteenth century, when Oakland was first incorporated as a city. Oakland's shallow harbor was a port of call for bay and river vessels, such as ferries and scow schooners, but it was the city's designation as the terminus of the transcontinental railroad in 1869 that brought fundamental change to the Oakland waterfront. The railroad, which had gained control of Oakland's waterfront, was a magnet for industry. A vast railyard, adjoined by factories and canneries, spread over the marshes of West Oakland, and the Oakland Long Wharf, which extended nearly three miles into deep water, soon became one of the most important shipping terminals on the Pacific Coast. Large-scale federal harbor improvements to make Oakland more accessible to ocean-going vessels began in 1874. By the late 19th century, wooden hulled schooners could discharge their cargo into dockside warehouses, known as transit sheds, and longshoremen moved cargo between shore and vessel with hand trucks, shipboard derricks, and cargo nets.

The transition from wind-powered wood hulls to fuel-powered steel hulls in the early 1900s required new facilities and greater depths for increasingly larger vessels. Municipal waterfront development in the Oakland Estuary began shortly after the city regained title to the waterfront in 1909. These early municipal facilities were reconfigured, and additional wharves and transit sheds were added, after the Port of Oakland was established as an independent department of the City of Oakland in 1927 with the passage of a City Charter amendment. By the mid-1930s, the Port was a regular port of call for more than forty international steamship lines. World War II transformed Oakland into one of the nation's busiest military ports. Two large military bases covered hundreds of acres of former tidelands on the western waterfront and the military occupied most of the Port's maritime facilities. Wartime shipyards, which employed thousands of people, lined the Estuary. Most East Bay shipyards closed after the war ended in 1945.

The Port introduced large-scale container operations to the Pacific Basin in 1962. Containerized shipping revolutionized the cargo-handling industry and necessitated the conversion of traditional break-bulk facilities. Gradually, private and military-held waterfront land west of Jack London Square was consolidated and redeveloped into marine terminals. Transit sheds and other structures were removed and wharves and storage areas were either reinforced or rebuilt to handle the increased loads from cranes and stacked containers. The Port's maritime area now includes more than 1,210 acres of marine terminal facilities and support areas in the shoreline and water areas.

The most recent changes to the Port have come about through the closure of military bases. The site of the Navy's Fleet and Industrial Supply Center, Oakland (FISCO), reverted to the Port in 1999. The Port developed that property under the Vision 2000 program to construct two new maritime terminals, an intermodal rail facility and a public park. A companion project to deepen channels and berths from -42' to -50' and to create a wildlife habitat in Middle Harbor is nearing

completion. The Oakland Army Base was closed in 2002 and the title to that property transferred from the Army to the Oakland Base Reuse Authority in 2003, and then to the Port and the City of Oakland in 2006. Environmental review of projects proposed for the Port's 182-acre share of the Army Base property was initially completed in 2002.

2.2 Seaport Operations

Located on the eastern shore of San Francisco Bay, one of the great natural harbors of the world, the Port was among the first ports to specialize in intermodal container operations, which revolutionized international trade and helped create today's global economy. Today, the Port maritime facilities (the seaport) accounts for approximately $2 billion annual economic impact in annual trade and 28,000 jobs. In Fiscal Year 2007, the Seaport produced 46% of total Port operating revenues, or approximately $127 million, and 74% of net revenues. The Seaport is the 3rd and 5th largest container port on the West Coast and in the United States, respectively.

Facilities

The Port serves as the principal ocean gateway for container cargo in Northern California. The Port's Maritime Division is responsible for planning, designing, constructing and maintaining marine transportation facilities. The Seaport provides an interface for waterborne international and domestic cargo moving between inland points in the United States and the Pacific Basin, as well as other points in the world.

The Seaport Figure 2-1 comprises four major marine terminal areas: the Outer Harbor Terminal Area, the 7th Street Terminal Area, Middle Harbor Terminal Area and the Inner Harbor Area. The Seaport's 20 deepwater berths and 37 container cranes are backed by a network of local roads and interstate freeways, warehouses and intermodal railyards. One railyard is situated on Port-owned land; the other is on private property adjacent to the Port. The Seaport includes more than 1,210 acres of water area and land-side facilities.

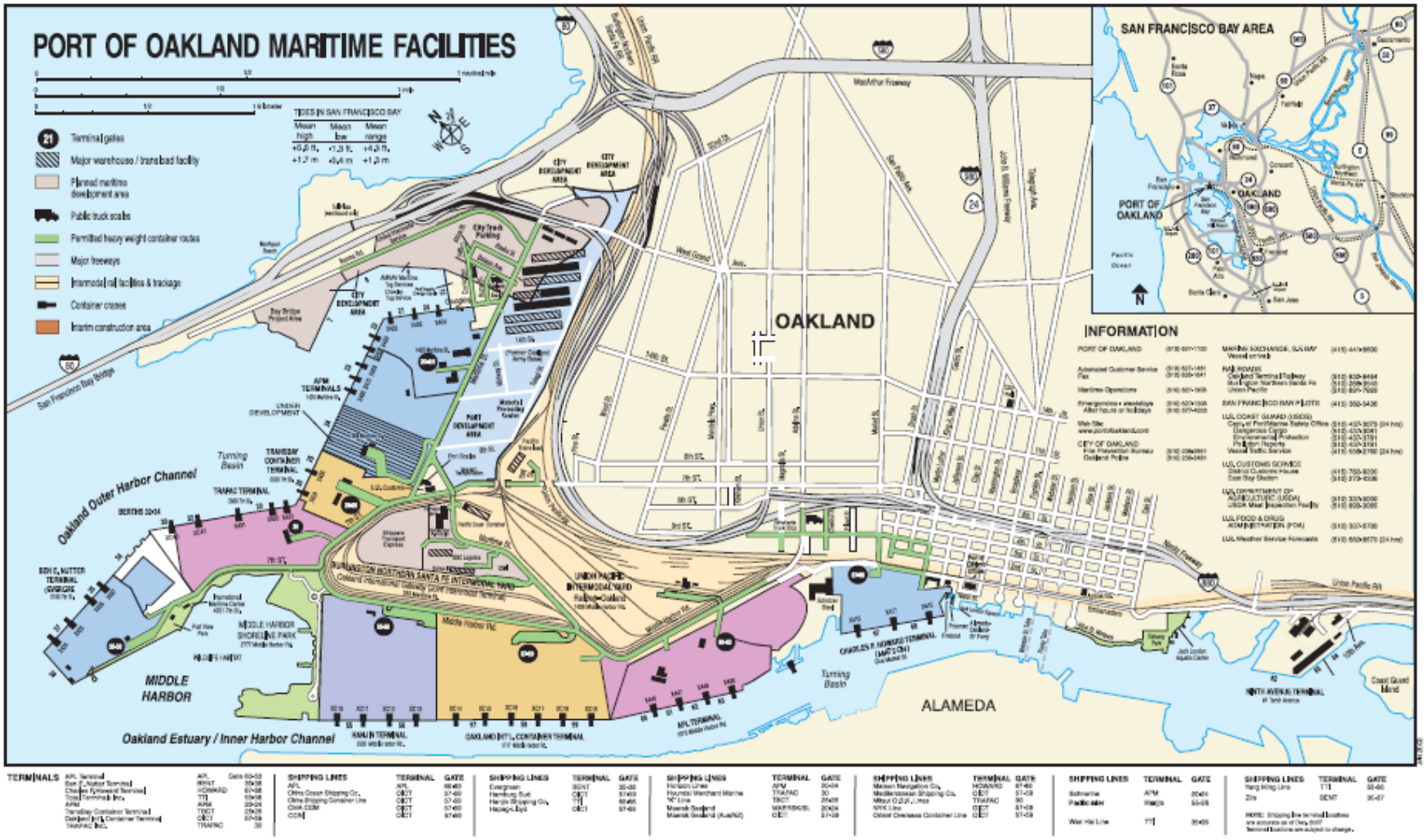

Figure 2-1. Port of Oakland maritime facilities.

The Seaport is a landlord port; it builds terminal facilities and leases them to shipping lines and stevedoring companies. The Seaport does not operate, or employ the people who operate the terminals, ships, cargo handling yard equipment, trucks or trains that move the cargo that passes through the Seaport. Aside from the electric-powered container cranes used to move cargo on and off the ships, all of these pieces of equipment and machinery are almost exclusively powered by diesel engines and, consequently, are sources of diesel particulate matter (DPM), oxides of nitrogen (NOx), oxides of sulfur (SOx) and other pollutants, which are the subject of the MAQIP. While the Seaport does not own or operate these sources of air emissions, the Port is committed to doing its part, working with its community and business partners, to reduce air pollution from goods movement activities.

Trade

The Seaport is one of the four major gateways for international containerized cargo shipments on the North American West Coast, with a market share of 9.7% in calendar year 2007. In that same year, the Seaport handled 2.4 million TEUs, or approximately 1.3 million containers. For comparison, the other two major gateways on the United States West Coast are the Ports of Los Angeles/Long Beach and Seattle/Tacoma, with 2007 market shares of 63% and 16%. The Oakland Seaport handles a diverse range of containerized cargo including both import and export commodities. Principal exports moving through the Port are agricultural products, pulp and waste paper, raw cotton, animal feed, meat, synthetic resins and plastic chemicals, specialized industrial machinery, and wood and lumber. Principal imports are fruits and vegetables, beverages, meat, electronic data processing equipment, auto parts, newsprint, iron and steel, coffee, tea, and spices. The balance of trade at the Port is slightly tipped toward export (outbound), which represents approximately 55% of the cargo handled at the Port. Pacific Rim countries continue to be the principal origination and destination points for cargo through the Port. Of the total cargo traffic at the Seaport, approximately 70% is destined for local markets in Northern and Central California and the remaining 30% is destined for non-local markets elsewhere in the United States.

Competition

In the last 10 years West Coast ports increased their combined share of container traffic relative to all ports in North America by approximately 7%. This gain occurred primarily due to increased imports from Asia. However, over time, future improvements to the Panama Canal and capacity increases at East and Gulf Coast ports will tend to benefit those ports over West Coast ports. Additionally, in the future, Canadian and Mexican ports may capture a growing share of container traffic that originates or terminates in the United States.[1]

Despite the aggregate West Coast port growth over the last 10 years, the Seaport's market share has decreased relative to that of other major West Coast North American ports. In 1997, the Port's share of the West Coast market was 13% of all TEUs; in 2007, it was 9.7%. The Seaport's decrease in market share resulted largely from an increase in the combined market share of the Ports of Los Angeles and Long Beach. The large local market and robust intermodal system serving the southern California ports often make these ports the preferred gateway for North American container imports.[2]

[1] Port of Oakland Feasibility Report for 2007 Bonds, October 2007.
[2] Ibid.

Tideland Trust Properties

Beginning in 1852, the State of California conveyed tideland to the City, as trustee for the people of the State of California, to accommodate and promote harbor commerce and navigation. These tideland grants and trust assets may be subject to amendment or revocation by the State legislature, as grantor of the trust and as representative of the beneficiaries (the people of the State). Most of the property on which the Seaport facilities are located is subject to a trust imposed by more than a dozen tideland grants. Certain requirements and restrictions are imposed by the grants. Generally, the use of lands subject to the trust is limited under the terms of the grants to harbor and airport uses and other uses of statewide interest, such as fishing, public recreation, and enjoyment of the waterfront. The Port may not sell any of the granted lands, nor lease for periods of more than 66 years. There are also certain limitations on the use of funds generated from the lands and trust assets. Trust-generated funds may be used only for trust Purposes as opposed to general municipal purposes. All revenues earned by the Port in effect constitute funds to the State trust.

Seaport Revenue

The Port and all other California public ports control and determine their own rate structures for the use of their facilities. The primary source of Seaport revenue is the assessment of charges to customers of the Seaport for use of its facilities. Charges are assessed in two ways: the Port tariff and negotiated agreements. The tariff sets forth the Seaport's rules and regulations and standard charges for the use of Seaport facilities. In addition, most Seaport customers operate under one of several types of agreements: Preferential Assignments, Lease Agreements, Fixed Revenue Agreements, and Short Term Agreements. With the exception of Short Term Agreements, these agreements are usually negotiated for time periods of no less than 10 years, and most have multi-year options to extend. The Port only enters into agreements with enterprises that conduct business on Port-owned land (e.g., marine terminal operators). Therefore, for example, the Seaport does not have such agreements with shipping lines. All revenues earned by the Port in effect constitute funds to the State trust, and can only be used for trust purposes. Because of the long-term nature of most of its leases and the conditions imposed by the Tidelands Trust, the Port has limited ability to increase its revenues or to use those funds for purposes not specified in the State land grants.

2.3 Future Seaport Growth

During the planning horizon of the MAQIP, the Port or its tenants may construct infrastructure projects, such as the 7th Street Grade Separation, expansion of rail facilities at the former Oakland Army Base, and marine terminal modernization, to improve cargo movement, terminal efficiencies and traffic circulation. All such projects are subject to review under the California Environmental Quality Act (CEQA) prior to the Board of Port Commissioners' approval of construction agreements, building permits or other authorizations. The MAQIP does not pre-empt or replace project review under CEQA, and does not replace project-specific air quality mitigation plans, if required by the CEQA analysis.

3 TECHNICAL AND REGULATORY BACKGROUND

3.1 Pollutants and their Impacts

United States and California air pollution laws establish two types of air pollutants: "criteria" pollutants, and "hazardous" or "toxic" pollutants (U.S.) or contaminants (California).[1] The two types of pollutants are regulated differently.

The U.S. EPA and the California Air Resources Board (CARB) have each established ambient air quality standards for criteria pollutants. The ambient standards prescribe a maximum concentration of each pollutant that is allowed in the air based on public health criteria. In general, pollutant concentrations lower than the standards are considered safe to breathe. State and federal laws require air pollution control agencies to develop regional air quality plans to demonstrate how they will attain ambient air quality standards over time.

There are no comparable ambient standards or planning requirements for toxic air contaminants. Most toxic air contaminants are known or suspected carcinogens, although some are also regulated because exposure can cause other acute or chronic health effects. For carcinogens, regulatory policy assumes that any level of exposure can increase the risk of developing cancer, so no level of exposure is considered safe. Instead of ambient standards or plans, state and federal law require the control of toxic air contaminants at their source with the goal of minimizing public exposure.

The U.S. EPA and CARB both set ambient air quality standards for criteria pollutants. The most common criteria air pollutants are:

- Ozone (O_3),
- Carbon monoxide (CO),
- Sulfur dioxide (SO_2),
- Nitrogen oxides (NO_2),
- Particulate Matter, consisting of PM_{10} (coarse particles 10 μm or less in diameter), and $PM_{2.5}$, (fine particles 2.5 μm or less in diameter).

Diesel engines produce nearly all of the air pollution emitted by goods movement activities associated with the Port of Oakland. Diesel engines emit all major criteria pollutants but some are of more concern than others. Because of their fundamental design, uncontrolled diesel engines are, compared to gasoline engines, "naturally" high emitters of nitrogen oxides (NO_X) and particulate matter and relatively low emitters of carbon monoxide (CO) and reactive organic gases (ROG). In addition, diesel engines burning fuel with a high sulfur content such as is typically used, for example, by large ocean going vessels, will also be high emitters of sulfur dioxide (SO_2). High fuel sulfur content also increases particulate emissions. The particulate matter emitted by diesel engines contributes to ($PM_{2.5}$) and, to lesser extent, PM_{10} concentrations in the air.

Diesel Particulate Matter (DPM), in addition to contributing to $PM_{2.5}$ and PM_{10}, has also been identified by the State of California as a toxic air contaminant. DPM is the particulate portion of diesel engine exhaust. Diesel exhaust is a complex "stew" of pollutants of various chemical

[1] A toxic pollutant is defined as "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health" (CA **Health and Safety Code section 39655**).

species that occur in both solid and gaseous forms. The composition will vary depending on engine design, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. DPM contains carbon particles, which are often coated with various other substances, a soluble organic fraction, and a sulfate fraction. DPM consists of very small particles (over 90% are $PM_{2.5}$ or smaller) that are inhaled and can be absorbed deep into the lungs when breathed. Exposures to DPM are highest at locations closest to sources of DPM emissions.

Nitrogen oxides and ROG emitted by diesel engines and other sources react in the atmosphere with other pollutants to form several important secondary pollutants, especially ozone and various species of secondary particulate matter. Sulfur dioxide also reacts in the atmosphere to form several species of secondary particulate matter. The chemical reactions that transform these gases into other secondary pollutants are complex and take time to occur as winds disperse pollutants and transport them downwind from where they are emitted. As a result, the contributions to ozone and secondary particulate matter formation of the Port's NO_X, ROG and SO_2 emissions are more regional in nature and typically occur well downwind of the Port as the Port's emissions mix with those from numerous other sources.

3.2 Overview of Ambient Air Quality

3.2.1 Regional Perspective

The San Francisco Bay Area Air Basin consists of all or parts of nine counties.[2] The Bay Area Air Quality Management District (BAAQMD) has jurisdiction over the air basin, though it shares regional air quality planning responsibilities with two other regional planning agencies, the Metropolitan Transportation Commission and the Association of Bay Area Governments. A network of air monitoring stations operates throughout the air basin to measure concentrations of criteria pollutants. Data collected from this network show that ambient standards for ozone and particulate matter are exceeded at some locations in the region. As a result, CARB has designated the San Francisco Bay Area Air Basin as "Nonattainment" for ozone and particulate matter and the U.S. Environmental Protection Agency has designated the Air Basin as "Nonattainment" for ozone.[3] The San Francisco Bay Area is designated "Attainment" for other pollutants.

Ozone concentrations in the Bay Area are highest in the summer and fall, particularly during periods of high temperatures and light winds. Peak ozone concentrations tend to occur in warmer, more inland areas like the Livermore Valley and the South Bay. Ozone levels are lower in coastal cities like San Francisco and Oakland.

Bay Area particulate levels are higher in the winter than the summer. Peak concentrations occur throughout the Bay Area during cool, stagnant periods when pollutants from cars, trucks, fireplaces and other sources are trapped near the surface and are poorly dispersed. Because these

[2] Alameda, Contra Costa, San Mateo, Santa Clara, Napa, San Francisco, Marin, and parts of Solano and Sonoma Counties

[3] The official designations are: "Marginal-Nonattainment" for the National 8-hour ozone standard, and "Nonattainment" for the State ozone, PM_{10} and $PM_{2.5}$ standards.

conditions typically occur on a regional scale, when elevated particulate levels occur in Oakland they also occur in other areas.

Toxic air contaminant concentrations are also monitored at several locations in the Bay Area. Though some commonly emitted or ubiquitous toxic air contaminants are measured at these stations, others are not. For example there is as yet no monitoring method for specifically measuring diesel particulate matter (DPM) as distinct from other types of particulate matter in the ambient air so DPM concentrations can only be estimated by indirect means.

3.2.2 Local Perspective

Air pollution potential in northwestern Alameda County is lowest close to the Bay where the Port is located, due largely to two factors: good ventilation from winds and relatively low flux of pollutants from upwind areas.[4] However, numerous sources of pollutants are located close to the Bay shore and ship traffic on the Bay releases emissions which are subsequently blown towards shore. This concentration of sources contributes to pollutant exposures to directly emitted pollutants in communities near the pollutant sources.

Recent air monitoring data collected in Alameda County shows that air quality in the County occasionally exceeds State and national ambient air quality standards for ozone, and the State particulate matter standards, but all other ambient air quality standards are attained[5].

The MAQIP focuses primarily on particulate pollution, more specifically on DPM in the immediate vicinity of the Port of Oakland. As previously noted, current monitoring technology is not capable of measuring DPM concentrations directly in the ambient air. However DPM contributes to ambient concentrations of fine fraction particulate matter ($PM_{2.5}$) and, to a lesser extent, to coarse fraction particulate matter (PM_{10}). Both $PM_{2.5}$ and PM_{10} can be directly measured, although the DPM fractions of $PM_{2.5}$ and PM_{10} can only be roughly estimated.

Neither the CARB or the BAAQMD have traditionally operated a monitoring station to measure PM_{10} or $PM_{2.5}$ in Oakland; the closest monitoring site is in Fremont. From 1997 to 2005 however, the Port of Oakland operated particulate monitoring stations to characterize the existing particulate air quality conditions and to provide baseline data on particulate air pollution prior to and during construction and operation of the Port's Vision 2000 marine terminal and rail yard projects. One station was located on Port property and the other in West Oakland.

While these monitoring stations used approved monitoring equipment and analytical methods, the data collected are not part of the San Francisco Bay Area's official monitoring record because the stations were not operated by the CARB or BAAQMD. Nevertheless, the data provide an indicator of particulate levels at the locations monitored during the approximate eight years of program operation. Neither station recorded any particulate levels exceeding federal $PM_{2.5}$ or PM_{10} standards during this period, although some measurements did exceed the State 24-hour PM_{10} standard.[6]

3.3 Human Health Exposure, Risk and Other Impacts

[4] BAAQMD, 1996 from Oakland Army Base EIR, 2002.
[5] Air Resources Board ADAM data base http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start . The site was accessed March 25, 2008.
[6] Cumulative Final Report, West Oakland Particulate Air Quality Monitoring Program, GAIA Inc., June 2005, p.7.

This section provides a brief discussion of the health impacts of the more important air pollution problems to which maritime sources at the Port of Oakland contribute. Our purpose here is to provide an overview of the public health context in which the MAQIP was developed as well as some perspective on the Port's contribution.

3.3.1 Non-Cancer Effects of Ozone and Particulate Matter

The potential public health consequences of exposure to ozone and particulate matter are significant. According to CARB,

> "Exposure to levels of ozone above the current ambient air quality standard can lead to human health effects such as lung inflammation and tissue damage and impaired lung functioning. Ozone exposure is also associated with symptoms such as coughing, chest tightness, shortness of breath, and the worsening of asthma symptoms. The greatest risk for harmful health effects belongs to outdoor workers, athletes, children and others who spend greater amounts of time outdoors during smoggy periods."[7]

Ozone forms on a regional scale from various precursor pollutants that are emitted over a large area. The primary precursors are reactive ROG and NO_x. The Port contributed <1% of regional (Bay Area) ROG emissions and about 2% of NOx emissions in 2005.[8]

CARB has described the impacts of exposure to particulate matter as follows:

> "Extensive research indicates that exposure to outdoor PM10 and PM2.5 levels exceeding current air quality standards is associated with increased risk of hospitalization for lung and heart-related respiratory illness, including emergency room visits for asthma. PM exposure is also associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between PM exposure and reduced lung function and increased respiratory symptoms and illnesses."[9]

The CARB recently published a report that updated some of the prior estimates of the public health consequences of exposure to particulate matter, with a focus on increased mortality.[10] The report discusses a number of health studies that show an association between long term particulate exposure and increased rates of premature death, even at levels well below current federal and state ambient $PM_{2.5}$ standards. There is still considerable uncertainty as to the number of premature deaths that occur annually, but CARB estimated the number as somewhere between 14,000 and 24,000 statewide in 2005. An estimated 1,800 to 3,700 premature deaths,

[7] ARB website, http://www.arb.ca.gov/research/aaqs/caaqs/ozone/ozone.htm accessed March 26, 2008.
[8] Regional Bay Area emissions from *California Almanac of Emissions and Air Quality-2006 Edition*, http://www.arb.ca.gov/aqd/almanac/almanac06/almanac06iu.htm Table A-25
[9] ARB website, http://www.arb.ca.gov/research/aaqs/caaqs/pm/pm.htm accessed March 26, 2008.
[10] *"Methodology for Estimating Premature Deaths Associated with Long-term Exposures to Fine Airborne Particulate Matter in California"*, Draft Staff Report, CARB, May 2008. The report was presented to the CARB at a public meeting on May 22, 2008.

about 15% of the statewide total, occurs in the San Francisco Bay Area, as defined by the boundaries of the BAAQMD.[11]

These mortality estimates, which are higher than previous estimates, occur from exposure to all types of directly emitted and secondary particulate matter. CARB also updated its estimate of the portion of total particulate exposure and premature deaths that can be attributed to the goods movement industry in California. CARB estimated that 3,700 deaths occurred statewide because of goods movement sources in California in 2005.[12] A little over half of the estimated health impact was due to DPM, while nearly all of the rest was due to exposure to nitrate particulate matter which forms via conversion of NOx emissions from goods movement sources to secondary particulate matter. Goods movement emissions are clearly a major contributor to estimated premature deaths in California.

The CARB has not yet updated its estimate of the non-cancer adverse health effects caused by all goods movement sources in the Bay Area or by the maritime source emissions associated with the Port of Oakland.[13] A very rough estimate of the Port's contribution to regional-scale health impacts can be made by comparing Port DPM and NOx emissions with regional emissions totals. The Port's estimated 2005 DPM emissions were <1% of Bay Area DPM while, as reported above, Port-related NOx emissions are about 2% of the region's total.[14]

3.3.2 Cancer Risk from Diesel Particulate Matter

While DPM contributes to non-cancer impacts it is also a toxic air contaminant and therefore a source of cancer risk. The potential cancer risk from known carcinogens is expressed as the incremental number of potential cancers that could develop per million people, assuming the population is exposed to the carcinogen at a defined concentration continuously over a presumed 70-year lifetime. The potential number of cancers per million people can also be interpreted as the incremental likelihood of an individual exposed to the carcinogen developing cancer from continuous exposure over a lifetime.

The CARB used monitored data for some toxic air contaminants and modeled estimates of DPM concentrations to estimate the background cancer risk in the Bay Area from the combination of toxic air contaminants to which the public is routinely exposed. The CARB estimated that risk to be 660 in a million in 2000, with about 70 percent of that total attributable to DPM exposure.[15] Since risk levels vary from place to place due to a variety of factors, this estimate should be considered a rough estimate of average risk in the San Francisco Bay Area.

The recent health risk assessment conducted by CARB in cooperation with the BAAQMD, the Port of Oakland, and Union Pacific Railroad, estimated cancer risk in West Oakland from all major sources of DPM in the area. The health risk assessment is a complex process that is based

[11] Draft Staff Report as cited, Tables 4a and 4b, p. 34.
[12] Draft Staff Report as cited, Table 6, p. 38.
[13] The draft report on the West Oakland health Risk Assessment contained such estimates, but they will be updated to reflect the new information.
[14] Regional Bay Area emissions from *California Almanac of Emissions and Air Quality-2006 Edition*, http://www.arb.ca.gov/aqd/almanac/almanac06/almanac06iu.htm, Tables A-25 and Table 5-42.
[15] *California Almanac of Emissions and Air Quality-2006 Edition*, http://www.arb.ca.gov/aqd/almanac/almanac06/almanac06iu.htm, Table 5-43.

on current knowledge and a number of assumptions. The study estimated average cancer risk levels from DPM exposure in West Oakland at 1180 in a million in 2005, about 16% (or 192 chances/million) of which was caused by DPM associated with maritime operations at the Port of Oakland.[16] This risk estimate should not be interpreted as a literal prediction of disease incidence in the affected communities but more as a tool for comparison of the relative risk between one facility or location and another.

3.4 Regulatory and Policy Efforts

CARB listed DPM as a toxic air contaminant in 1998 based on its potential to cause cancer, premature death, and other health problems. In September 2000, the CARB followed up the identification of DPM as a toxic air contaminant by adopting a statewide risk reduction strategy it called the Diesel Risk Reduction Plan. The goals were to reduce statewide DPM emissions and average risk from DPM exposure by 75 percent by 2010, and 85 percent by 2020, compared to 2000 levels. The Plan targeted virtually every category of diesel engines.

In 2005, California initiated a broad planning initiative to develop and adopt a "Goods Movement Action Plan" (GMAP) for the state. The GMAP and the various initiatives that stemmed from it are important to the MAQIP for two primary reasons. First, it lead to the CARB setting statewide goals for reducing the air quality impacts of goods movement sources. Those goals, particularly the goal of reducing statewide cancer risk from DPM exposure, became an important marker for the Port of Oakland and the Task Force in setting MAQIP goals. Second, the GMAP lead CARB to adopt a major regulatory initiative to reduce DPM emissions. Compliance with the regulations adopted by CARB and other agencies by the maritime and related industries is essential to meeting the MAQIP emissions and health risk reduction goals.

3.4.1 California Goods Movement Action Plan

The overall goal of the GMAP is "to improve and expand California's goods movement industry and infrastructure in a manner which will:

- generate jobs,
- increase mobility and relieve traffic congestion,
- improve air quality and protect public health,
- enhance public and port safety, and
- improve California's quality of life."[17]

An important offshoot of the focus on improving the goods movement system was the approval by California voters of the "Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006." The impact of the "infrastructure bond," or I-Bond as it came to be called, as a funding source for efficiency improvements and air quality projects at the Port of Oakland is significant.

[16] *Diesel Particulate Matter Health Risk Assessment Study for the West Oakland Community: Preliminary Summary of Results*, Fact Sheet, March 2008.

[17] Emission Reduction Plan for Ports and Goods Movement in California,", CARB, April 2006,

3.4.2 CARB Emission Reduction Plan for Ports and Goods Movement in California

The CARB named its master plan for reducing emissions from goods movement activities throughout the state, the "Emission Reduction Plan for Ports and Goods Movement in California," (GMERP). The plan, which was adopted in 2006, assessed the public health impacts and costs of the contribution made by goods movement sources to public exposure to diesel particulate matter (DPM), ozone and other pollutants. It estimated current and future emissions and proposed a series of regulatory actions for diesel sources under state jurisdiction. The plan focused heavily on DPM and NOx, and contained a number of specific statewide goals, including reducing DPM emissions back to 2001 levels by 2010 and reducing statewide DPM health risk 85 percent by 2020, compared to 2001 levels. The plan also called for a major reduction in NOx emissions by 2020, with specific goals for the Los Angeles area.

Although container ports like the Port of Oakland are an important focus, the CARB's plan has a broader objective. The plan is aimed at reducing emissions from all goods movement activities, both international and domestic, and included sources such as bulk cargo, car carriers and refinery vessels, and rail and cargo truck movements on land. The planned percent reduction in DPM emissions and risk is a statewide goal and benefits will not occur uniformly across the state. In particular, the benefits will vary from port to port.

The CARB resolution adopting the GMERP risk and emissions reduction goals called for the CARB staff to bring a series of regulations to the governing board for consideration in 2007 and 2008. Specifically, the regulations were to address port trucks, privately-owned truck fleets, low sulfur marine propulsion fuel, shore power for ships and harbor craft, harbor craft fleets, new harbor craft engine standards, and upgrading switcher/yard locomotives.[18]

3.4.3 Air Quality Regulations Affecting Seaport Operations

Table 3-1 briefly summarizes regulatory activities affecting emissions sources at the Port of Oakland. While most actions have or will be taken by the CARB because of their legal jurisdiction over port-related sources, the federal EPA has also adopted several important regulations. In addition, the BAAQMD has been a regulatory partner and plans to support the overall emissions reduction effort with a regulatory action of its own in 2008. In the longer term, the International Maritime Organization (IMO) may also adopt standards that will reduce emissions. More details on each of the listed regulations are provided in Appendix E in the summary prepared by members of the MAQIP Interagency Group.

[18] Air Resources Board Resolution 06-14, April 20, 2006

Table 3-1. Summary of State and Federal Air Quality Regulations Affecting the Port of Oakland.

Agency	Rule or Control Measure Description	Pollutants Most Affected	Status
Ocean-Going Vessels (Ships)			
CARB	Use low sulfur fuel in auxiliary engines	DPM, SO_2 & NOx	Adopted 2005, in litigation
CARB	Use low sulfur fuel in main engines	DPM, SO_2 & NOx	Proposed for adoption in 2008
Ocean-Going Vessels (Ships)			
CARB	Auxiliary engines use dockside electrical power while hotelling	DPM & NOx	Adopted 2007, phase-in beginning in 2014
EPA	US large marine engine emissions standards	DPM & NOx	Proposed for adoption in 2009
IMO	International large marine engine emissions standards	DPM & NOx	Unknown
IMO	International small marine engine standards	NOx	In effect, not ratified by US
CARB	Speed reduction during cruise mode	NOx	Under development for possible 2008 adoption
IMO	Use lower sulfur fuel in Western US waters (SECA)	DPM, SO_2	Application under development
Cargo Handling Equipment			
CARB	Retrofit or replace existing equipment with new clean engines	DPM & NOx	Adopted and being phased-in beginning 2007
CARB/EPA	Emissions standards for new off-road engines	DPM & NOx	Adopted and in effect
CARB	Require use of ultra-low sulfur diesel fuel	DPM, SO_2, NOx	Adopted and in effect
Harbor Craft (Tugs)			
EPA	Emissions standards for new & rebuilt marine engines	DPM & NOx	Adopted, effective starting in 2009
CARB	Require use of ultra-low sulfur diesel fuel	DPM, SO_2	Adopted and in effect
CARB	Retrofit or replace existing equipment with new clean engines	DPM & NOx	Adopted in 2007, phase-in beginning late 2009
On-road Trucks & Port Trucks			
CARB	Retrofit or replace existing port trucks with new clean engines	DPM & NOx	Adopted in 2007, phase-in starting in 2009
CARB	Retrofit or replace trucks in all private fleets with clean new engines	DPM & NOx	Proposed for adoption in 2008
CARB	Emissions standards on new truck engines	DPM & NOx	Adopted and phase in starting in 2007
CARB	Require use of ultra-low sulfur diesel fuel	DPM, SO_2	Adopted and in effect
Locomotives			
EPA	Emissions standards on new and remanufactured locomotive engines	DPM & NOx	Adopted, phase-in of most recent rule starting in 2010
CARB	Require use of ultra-low sulfur diesel fuel on “intrastate” locomotives	DPM, SO_2	Adopted and in effect
The CARB and the railroads also have a MOU to reduce locomotive idling in rail yards			
All Port Sources			
BAAQMD	Set port-wide reduction goal and action plan to achieve it	DPM & NOx	Proposed for adoption in 2008

Most of the regulations listed above are "future-effective"; that is they will produce most or all of their emissions reductions in future years as they are phased in. The emissions forecasts used in the MAQIP include the estimated benefits of most, but not all of the regulations listed above. Because future-effective regulations can be delayed, amended or even invalidated by court decisions, their estimated future benefits must be reevaluated periodically.

3.5. Past Seaport Air Quality Improvement Initiatives

The following are examples of maritime air quality improvement efforts previously undertaken by the Port and by its business partners and tenants that have reduced emissions in advance of or beyond regulatory requirements. Current projects are summarized in Section 8.1.3.

Truck Replacement

As part of its $9 million Vision 2000 Air Quality Mitigation Program, the Port launched a Truck Replacement Program in late 2005. The $3 million program provided subsidies to truckers to replace older heavy-duty diesel trucks with newer, cleaner burning vehicles. The Port offered truckers whose trips were mostly within the Port maritime area up to $40,000 per truck (model year 1993 or older) to replace them with 2000 or newer model year trucks that have significantly lower emissions. Approximately 80 trucks were replaced, and close to $2.5 million in incentive funding was awarded. The older trucks are permanently taken off the road and scrapped. It is estimated that more than 72 tons of DPM, ROG, and NOx emissions are being reduced during the five years of the project life. Many replacement trucks will operate beyond five years, making future emissions reductions even greater. The Port is currently seeking additional funding to expand the program.

Truck Parking

In 2005, Port funding enabled the opening of a new Oakland Maritime Support Services facility, which provides overnight parking for about 20 trucking companies, custom-designed dispatching services, and other trucking services.

Shipping

In December 2005, A. P. Moller-Maersk announced a voluntary initiative to switch fuel in both the main and auxiliary engines on all of their vessels calling at California ports. In April 2006, Maersk initiated the plan with the Sine Maersk in Los Angeles, CA, Since its inception, the fuel switch initiative has accounted for a reductions in tons of NOx, SOx, and PM and the sulfur content of the fuel has dropped dramatically.

Tugboat Engine Replacement

In July 2000, the Port approved funding to replace two tugboat engines with new low emission diesel engines. This replacement eliminates .9 tons of PM and 26 tons of NOx annually, or 15.5 tons of PM and 431 tons of NOx over the sixteen year life of the project.

Rail

The Oakland International Gateway (OIG), a near-dock rail terminal constructed in 2002, effectively removed trucks hauling containers off I-80 between the Port of Oakland and BNSF's rail yard in Richmond, reducing both congestion and air emissions.

Terminal Equipment

Beginning in 2000, the Port worked with APL, Maersk Inc., Marine Terminals Corporation, SSAT, TransBay Container Terminal, Inc., and Trans Pacific Container Service Corporation, to repower over 60 pieces of diesel equipment and retrofit nearly 150 pieces, mostly yard trucks.

Electrification Projects

All of the Port's 37 cranes are electric, and electric connections have been provided for refrigerated shipping containers on all of the Port terminals. In addition, the Port installed shoreside connections to power electric dredges engaged in the Port's channel and berth deepening projects.

Other Accomplishments

In 1999, the Port gave $659,000 to AC Transit to help repower and retrofit 28 buses assigned to routes in West Oakland and neighboring communities.

4 PORT OF OAKLAND BASELINE EMISSIONS AND HEALTH RISK

The Port prepared the 2005 seaport air emissions inventory, which was used by CARB to conduct the West Oakland human health risk assessment (HRA) study. This section summarizes the results from these two efforts. Together, the 2005 inventory and the HRA constitute a baseline to assess progress in improving air quality from implementation of the MAQIP.

4.1 Baseline Emissions

The Port's 2005 Seaport Air Emissions Inventory identifies and quantifies air emissions from maritime activities during the 2005 baseline year. The inventory is organized by five major source categories:

- Deep-Draft Ocean-Going Marine Vessels (OGV),
- Commercial Harbor Craft (dredging and assist tugs),
- Cargo Handling Equipment (CHE),
- Trucking (container movements),
- Locomotives.

The Port's baseline inventory provides estimates for emissions of five "criteria" air pollutants:

- Reactive organic gases (ROG),
- Carbon monoxide (CO),
- Nitrogen Oxides (NOx) which consist primarily of NO with some NO_2,
- Particulate matter including diesel particulate matter (PM)[1],
- Sulfur oxides (SOx) which consist almost entirely of SO_2.

The Port voluntarily chose to prepare an air emissions inventory of its seaport in advance of any regulatory directive. The emissions inventory highlighted the Port's commitment to improve understanding of the nature, location and magnitude of emissions from its maritime-related operations. The Port decided to develop this inventory to better understand the emissions from typical Port activities so the Port and stakeholders can better address its impacts on air quality. The inventory provides a technical basis for setting priorities and evaluating the cost-effectiveness and potential benefits of air pollutant control measures outlined in the MAQIP.

The Port and its consultants; ENVIRON and Sierra Nevada Air Quality Group, provided CARB with detailed spatial information on emissions so the inventory could be used as input to the West Oakland health risk assessment study performed by CARB. In January 2007 the Port released to the public a draft working document presenting the Port-proposed methodology for estimating emissions for each source category, along with CARB's comments on the proposed methodology. Public comment on the methodology was accepted through a Port-sponsored meeting on January 31, 2007; no comments directly related to the methodology were received. Preparation of the inventory commenced and a review copy of the completed emissions inventory was released in August 2007 for public comment. Comments were summarized in the "Response to Comments" document completed in November 2007. One of the comments received pointed to the need to include construction equipment emissions in the inventory. In

[1] Nearly 95% of the particulate matter emissions included in the inventory is diesel particulate matter (DPM). Some non-DPM emissions come from boilers on ships and LPG-powered engines on some cargo handling equipment.

response to this, Port staff commissioned a 2005 Seaport Construction Air Emissions Inventory, which was posted on the Port's website in March 2008, along with the finalized emissions inventory for all other sources. Full documentation of the emission inventory data and assumptions used to develop the Port's inventory is available in a separate report (see Appendix F).

The seaport emissions inventory includes air emissions generated by maritime activities conducted by the Port of Oakland's tenants. On the water side, the spatial domain of the inventory includes Port-related marine vessel transit from dockside out through the Golden Gate Bridge, to the first outer buoys beyond the Pilot Buoy, approximately 30 miles away from the Port. On the land side, the spatial scope of the inventory includes nine marine terminals, one rail yard which is situated on Port-owned property (the Oakland Intermodal Gateway) and the road traffic between those facilities and the nearest freeway interchanges. The Port area was defined approximately by the boundaries of I-80, I-880, and the Howard Terminals (Berths 67 and 68) adjacent to Jack London Square. Within this defined geographic area, three significant areas were specifically excluded as they were not controlled or operated by the Port of Oakland in 2005: the Schnitzer Steel terminal, the Union Pacific rail yard, and the former Oakland Army Base located between Maritime Street and I-880.

A summary of the Port emissions inventory is provided in Table 4-1. Port sources are estimated to have released a total of 274 tons of PM in 2005, nearly all of which (262 tons) is diesel PM. To put the Port's emissions in perspective, diesel PM emissions from all sources in the San Francisco Bay Air Basin were estimated to total 4,550 tons in 2005 (CARB, 2006a). Thus the diesel PM emissions from sources at the Port represent less than 6% percent of the total estimated Bay Area diesel PM emissions.

Table 4-1. Port of Oakland emissions summary by emission source category – tons in 2005.

Emission Source Category	ROG	CO	NOx	PM	SO2
Ocean-going vessels (OGV)	117	235	2,484	220[1]	1,413
OGV – Off-shore[2]	*97*	*169*	*1717*	*158*	*950*
OGV – Berth[3]	*21*	*65*	*767*	*61*	*464*
Harbor Craft	22	83	345	13	3
CHE	53	408	766	22[1]	7
Truck[4]	52	154	339	17	2
Locomotive	7	11	76	2	2
Construction	3	12	34	1	0.25
Total	**254**	**903**	**4,044**	**274**	**1,428**

[1] A small portion of the total PM emissions from OGVs and CHE are not classified as diesel particulate matter (DPM) as defined by CARB. This includes PM from OGV diesel fired boilers and CHE liquefied petroleum gas (LPG) engine emissions. DPM emissions from OGVs are 208.5 tons, DPM emissions from CHE are 21.2 tons; PM emissions from all other source categories are 100% DPM. Thus, the Port total DPM emissions equal 262 tons, 12 tons less than the total PM emissions.

[2] Includes emissions from ships while transiting outside the Golden Gate, while operating in the Reduced Speed Zone between the Golden Gate and the Bay Bridge, and while maneuvering between the Bay Bridge and the dock.

[3] Includes only emissions from auxiliary engines and boilers while ship is berthed (hotelling emissions).

[4] Based on EMFAC2007 as used in emission projection analysis; EMFAC2006 was used in the original inventory.

Trucks, harbor craft, and cargo handling equipment each produced 5-10% of the estimated Port-related PM emissions. Locomotives operating at the Oakland Intermodal Gateway produced a small fraction of the total emissions. Ocean-going vessels constitute the largest source category

for all pollutants, producing 80-85% of estimated PM emissions and the major portion of other pollutants included in this emissions inventory.

It is important to keep in mind that the location where emissions are released is often as significant as the total quantity released because emissions occurring close to a community will have a greater effect on human health risk on a per ton basis. Impacts of the various sources on West Oakland air quality will not necessarily be directly proportional to the magnitude of their emissions since some sources are located much closer to West Oakland than others. For example, particulate matter emissions from ocean-going vessels transiting outside the Golden Gate will have less impact to sensitive receptors in West Oakland than emissions that occur closer to shore.

4.2 CARB West Oakland Human Health Risk Assessment

In March 2008, the California Air Resources Board (CARB), working in cooperation with the Port of Oakland, Union Pacific (UP) Railroad, and the Bay Area Air Quality Management District, completed a study designed to help understand the potential health impacts from diesel particulate matter (DPM) emissions on residents of the West Oakland community. The purpose of CARB's study was to:

- Investigate potential cancer risk to residents of West Oakland from various diesel PM emissions from Port maritime operations, from UP railyard operations and from freeway, industrial, construction and other non-Port/non-UP diesel sources in and around West Oakland; and
- Provide information to help evaluate the effectiveness of possible mitigation measures.

CARB examined the impacts of diesel emissions from all major sources in and around West Oakland. These sources were divided into three groups or "parts":

- Part I (Maritime Port of Oakland): ocean-going vessels, commercial harbor craft, cargo handling equipment, on-port locomotives (Oakland Intermodal Gateway) and port drayage trucks operating on Port property, in West Oakland and on local freeways
- Part II (Union Pacific Railyard): locomotives, cargo handling equipment, drayage trucks, and truck refrigeration units and reefer cars
- Part III (Non-port and non-Union Pacific Railyard areas in and adjacent to the West Oakland Community): on-road trucks, ocean-going vessels, commercial harbor craft, ferries, fishing fleets, cargo handling equipment, locomotives, Amtrak Maintenance facility, major construction projects, stationary point sources, truck-based businesses and distribution centers.

CARB estimated the impacts of these parts individually and cumulatively on West Oakland (population 22,200) in 2005. CARB also estimated impacts in 2015 and 2020 based on projected future emission levels. CARB also estimated the impact of just the Part I sources over a much larger area of about 3,800 square miles with a total population of 5 million stretching from Petaluma and Fairfield in the north, to San Jose in the south, and from the Pacific coastal waters in the west, to Livermore and Antioch in the east.

Key findings from CARB's study were:

- Diesel PM ambient concentrations in West Oakland are estimated to be slightly less than three times the background diesel PM concentrations averaged over the entire Bay Area.
- The estimated lifetime potential cancer risk for residents of West Oakland from exposure to all diesel PM emissions included in the study is estimated to be about 1,200 excess cancers per million. This estimate assumes residents are exposed to the estimated 2005 outdoor diesel PM levels continuously for 70 years. By way of comparison, the corresponding background risk from diesel PM emissions over the entire Bay Area is estimated to be 480 excess cancers per million, the corresponding background risk from emissions of all air toxics species in the Bay Area is 660 per million and the expected cancer rate from all causes, including smoking, is about 200,000 to 250,000 per million.
- Of the total West Oakland diesel PM exposure risk noted above (1,200 per million), emissions from Port operations (i.e., Part I sources) contribute 16% (190 per million), Union Pacific railyard (Part II) sources contribute 4% (40 per million) and other (Part III) sources in and around West Oakland contribute the remaining 80%.
- As shown in Figure 4-1, the largest contributors to the potential excess cancer risk levels in the West Oakland community are emissions from non-Port on-road heavy-duty trucks, followed by ocean going vessel (OGV) emissions (representing transiting, maneuvering, anchoring, and hotelling emissions), harbor craft, locomotives, and cargo handling equipment.

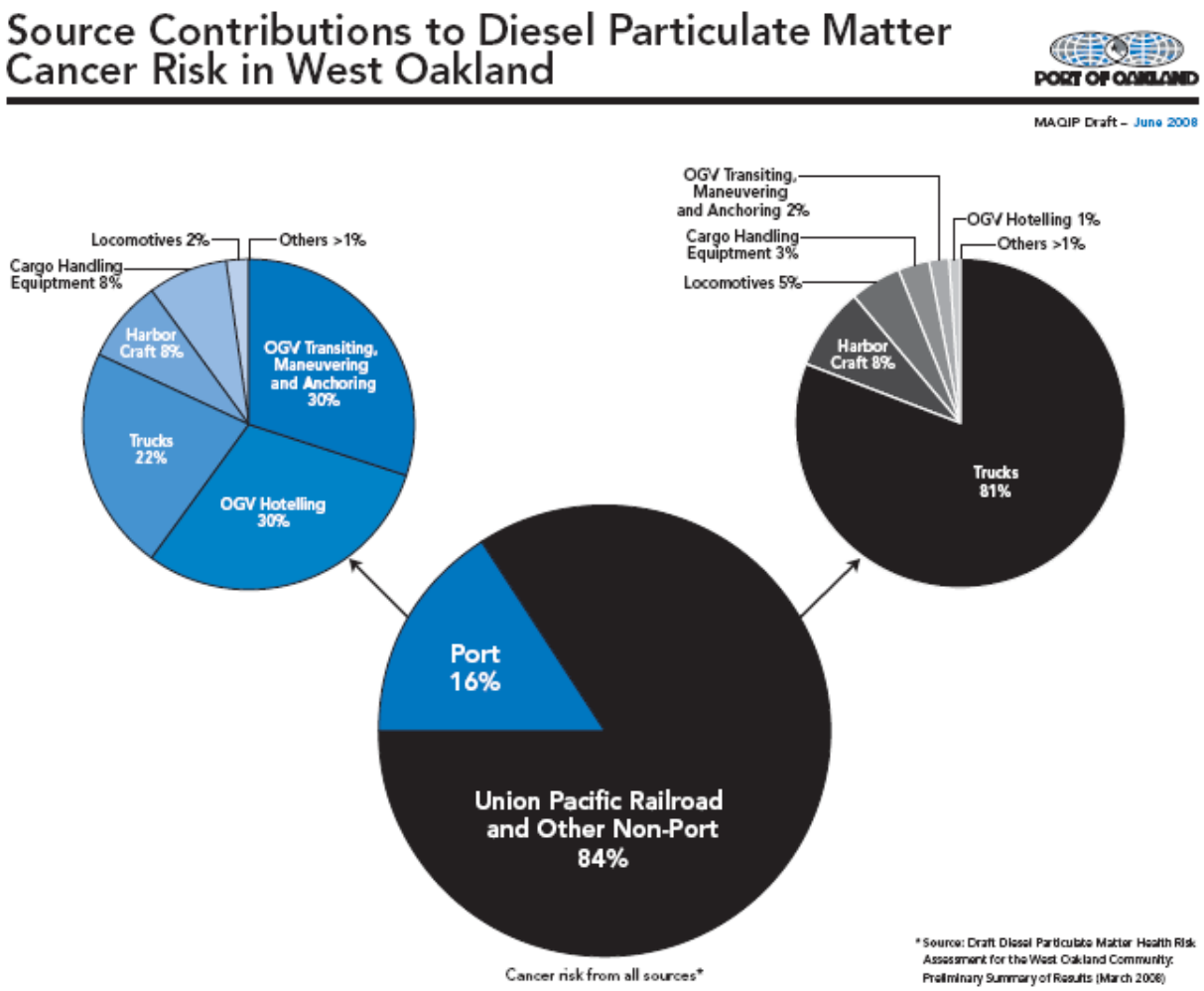

Figure 4-1. Percent Contribution to the West Oakland Community Potential Cancer Risk by Diesel PM Emissions Source Category for Part I (Port of Oakland) sources and Part II and III (UP Railyard and other West Oakland) sources.

CARB's projections of future diesel PM emissions indicate that emissions and associated health risks will be reduced in the West Oakland community by about 80 percent by 2015, reflecting reductions achieved by State and Federal regulations. A more detailed examination prepared by the Port of emission reductions expected in the future from Port sources is presented in Section 5.

5 PORT OF OAKLAND FUTURE EMISSIONS AND HEALTH RISK

While the Port's maritime business will likely grow through 2020 and beyond, some air emissions and health risk to West Oakland residents and workers from seaport activity are projected to decline dramatically due to existing and pending air quality regulations.

Because the expected benefits of regulations were central to the choice of MAQIP goals and to the plan's two-pronged approach (emissions reductions both through regulations and through additional initiatives), it is important to see how those regulations can make a difference in future emissions associated with cargo activity. Projections of future cargo at the Port were analyzed for emissions, taking into account the benefits of existing and likely future regulations. The emissions data were in turn used to estimate future levels of health risk to the community resulting from Port operations. By better understanding the potential reductions, the Port, its tenants and its business partners can more clearly manage the air quality impacts of operations at the seaport over the coming years, and target additional measures, as necessary, to help reach the MAQIP goals.

5.1 Estimating Future Activity Levels

Overall maritime activity at the Port is governed by the market demand for international cargo movement into and out of Northern California and the availability of labor and critical physical assets such as terminal space and rail lines needed to meet the demand. To estimate future emissions, projections of the total annual cargo throughput at the Port resulting from the interplay of these governing factors are needed. The Port chose 2012 and 2020 as the forecast years for seaport activity to:

- Provide an estimate of interim (i.e., 2012) emissions and emissions reductions, and
- Maintain consistency with CARB statewide emission projections, which are based on the year 2020.

Due to uncertainties about future market conditions and development opportunities, four activity forecasts (high, medium, low and no growth) were initially considered, corresponding to different assumptions about future growth in seaport operations between the emissions baseline year of 2005 and 2020 (see Figure 5-1). These scenarios were developed expressly for the purpose of air quality master planning at the seaport, using a range of planning and feasibility assumptions about existing and potential future facilities. Given this planning context, the scenarios were developed using aggressive growth assumptions so as to limit the risk of underestimating future activity levels (and therefore emissions). The growth scenarios range from most aggressive (i.e. high growth) to least aggressive (i.e., low growth), and also include a no-growth alternative for comparison. None of the scenarios were reviewed or approved by the Board of Port Commissioners for purposes of facility development, expenditure of funds or CEQA determinations. Furthermore, the scenarios do not replace or eliminate the need for project-specific forecast analyses or subsequent revisions to forecasts as more information becomes available between now and 2020.

Given the aggressive planning assumptions used for this forecasting effort, even the low growth scenario may somewhat overestimate the likely container cargo or "TEU" throughput in both 2012 and 2020 in the absence of significant new terminal or rail facility construction. Similarly,

the medium growth scenario may overestimate future throughput, even if new cargo facilities are constructed. The high growth scenario of 6 million TEUs is considered an upper bound that is very unlikely to be achieved by 2020, and approximately represents the maximum possible throughput at the Port based on logistical and capacity constraints and assuming construction of all necessary terminal and rail facilities.

Given the need to balance business and public health considerations, the Port chose the medium growth scenario for the MAQIP projections since it is unlikely to underestimate future activity levels and accompanying air emissions. Therefore, all forecasted emissions and reductions throughout the MAQIP are based on the medium growth scenario.

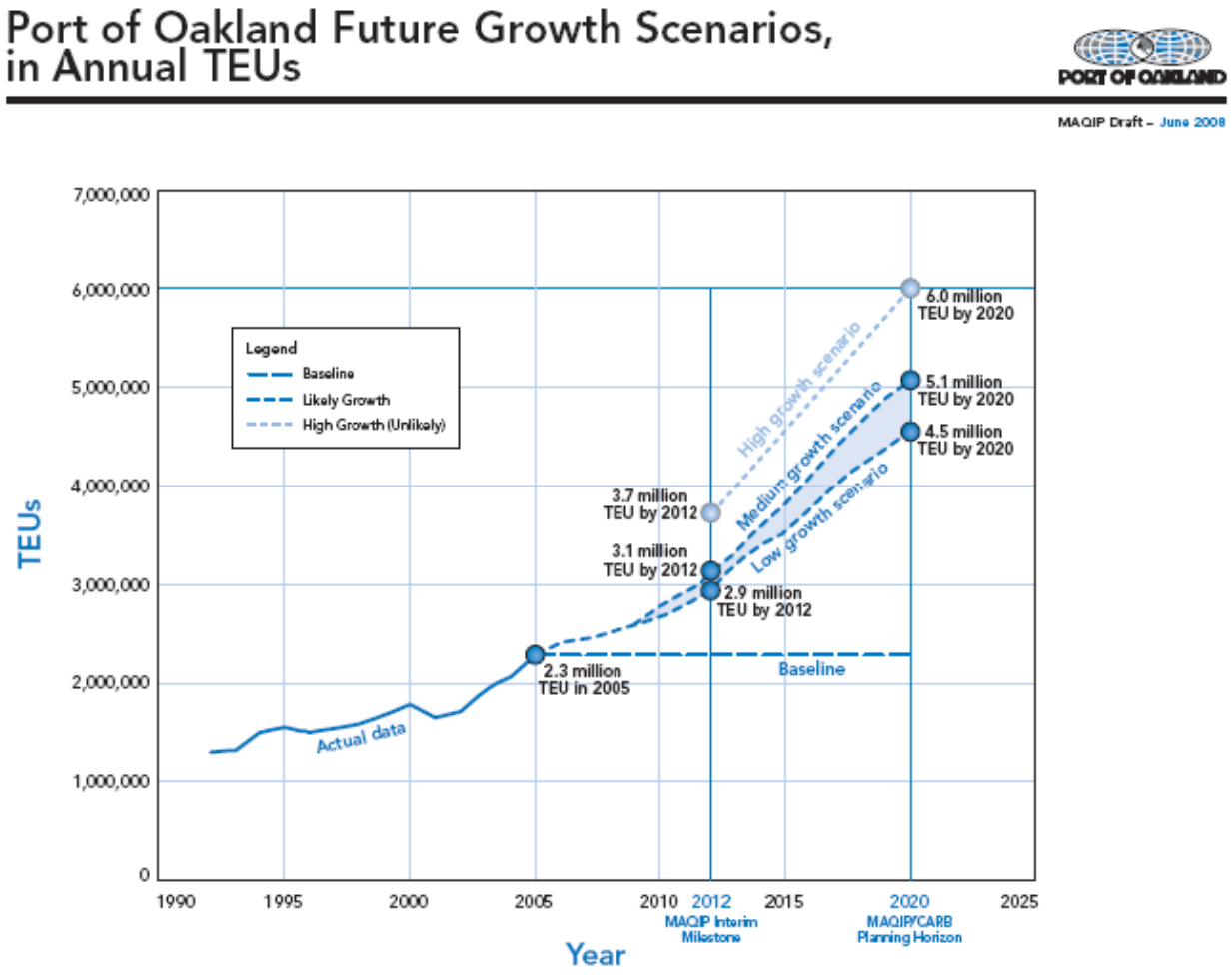

Figure 5-1. Port of Oakland future growth scenarios, in annual TEUs.

While current projections suggest activity levels at the Port may increase until at least 2027, as shown in Figure 5-1, activity projections past 2020 are subject to increasing levels of uncertainty, thus making emission estimates for later years rather speculative and unsuitable for air quality planning at this time. Activity and emission forecasts can be updated at a later date when more accurate information on post-2020 growth projections becomes available.

The growth in cargo throughput will result in increased activity by the various sources or air pollution at the Port. Some categories will grow faster than others. The relative growth of

activity by trucks, rail and the other emissions source categories under the medium growth scenario is shown graphically in Figure 5-2. Although rail activity shows the highest *relative* growth in the years 2012 through 2020, rail shipments accounted for a relatively small fraction of total TEUs in the 2005 base year. Trucks will continue to move most containers to and from markets outside the Port area well into the future, although rail transport of cargo containers between the Port and more distant markets is expected to take an increasing share over the years. The projected market shares for off-port truck and rail movements are provided in Figure 5-3.

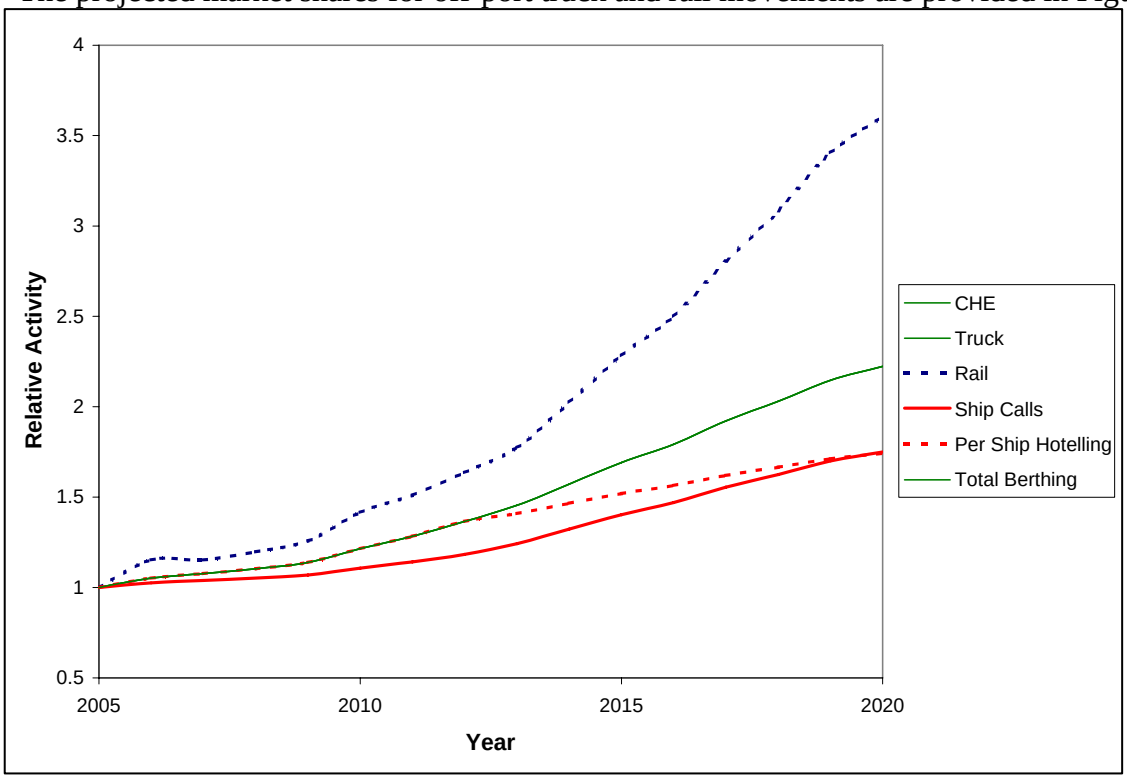

Figure 5-2. Relative growth of seaport activity by source category under the medium growth scenario.

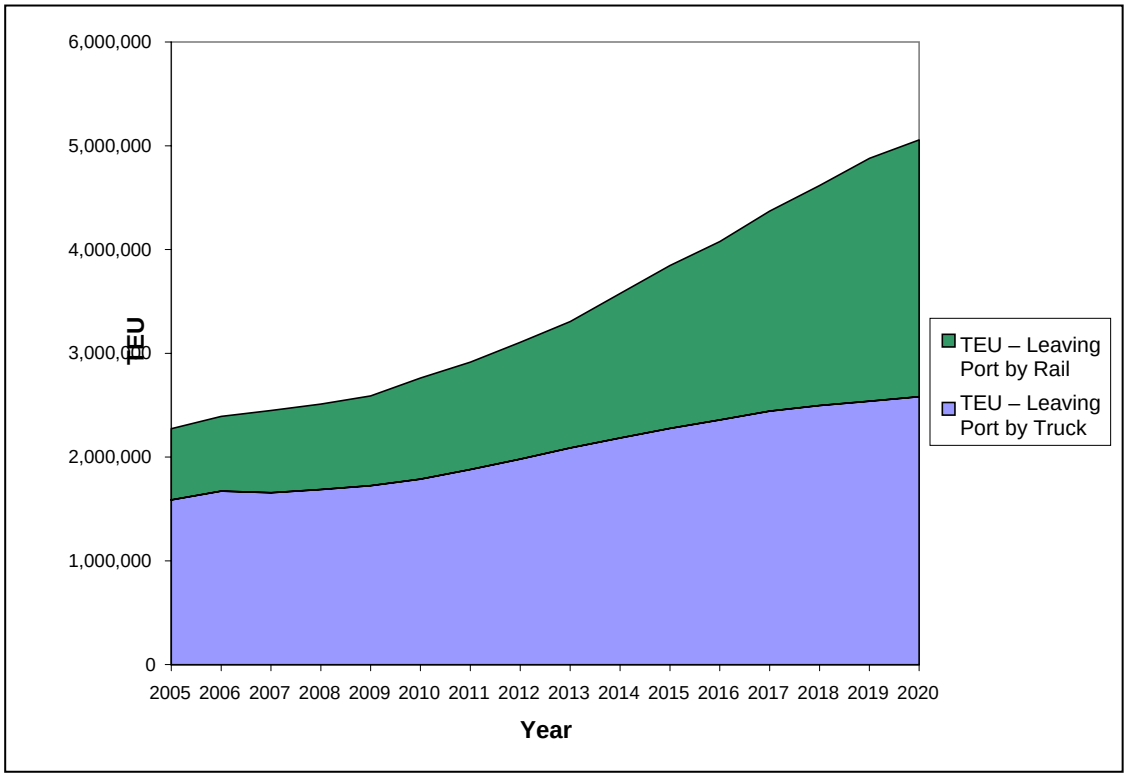

Figure 5-3. Truck and rail annual TEU forecast under the medium growth scenario.

5.2 Future Emissions

Using the activity projections in Section 5.1, the Port developed forecasts of emissions for 2012 and 2020 for each major category of equipment used in seaport related activities (OGVs, harbor craft, cargo handling equipment, trucks and rail), incorporating expected changes due to existing and likely future air quality regulations. The forecasts show that current regulatory efforts are expected to yield substantial PM and SOx emission reductions in 2012 and 2020 relative to 2005 despite the considerable growth in cargo throughput projected under the medium growth scenario for this period.

A summary of estimated future year (2012 and 2020) emissions of NOx, PM, and SOx from the source categories located at the Port of Oakland are presented in Table 5-1. Graphical summaries of projected PM, NOx, and SOx emissions are presented in Figure 5-4. Since emissions from sources located off-shore have less of an impact on communities near the Port than do similar levels of emissions from sources located on or next to the shoreline, all emissions in Table 5-1 are also presented in terms of off-shore and on-shore sources. Off-shore sources include OGV main and auxiliary engine and boiler emissions while transiting between the open ocean and the Bay Bridge, while maneuvering between their berths and the Bay Bridge and while anchoring off-shore of the Port, along with all harbor craft emissions.[1] On-shore sources include OGV auxiliary engine and boiler emissions while hotelling at berth and all cargo handling equipment, truck, and rail sector emissions.

[1] All harbor craft at the Port of Oakland are assumed to have their engines shut off while at berth.

Forecasts for other pollutants of interest (ROG and CO) are provided in Appendix G.

These emission projections were developed by:

- taking emission-generating activities included in the 2005 baseline inventory described in Section 4,
- increasing them in accordance with estimates of future growth in cargo throughput, using the medium growth scenario described in Section 5.1, and
- applying estimates of emission reduction benefits expected from both continued implementation of current regulations (for example, regulations requiring that new replacement trucks use cleaner engines) and implementation of certain future Federal and State rules (such as CARB's proposed ocean-going vessel main engine low sulfur fuel rule) which are likely to be implemented by 2020.

The forecast of future emissions shown in Table 5-1 and Figure 5-4 do not estimate emissions reductions from actions above and beyond regulatory requirements; see Sections 6 and 8 for a discussion of air quality goals and potential initiatives that address reductions beyond those provided by regulations. In addition, the forecasts do not include construction equipment emissions. Construction activity varies from year to year, so there is no reliable means of predicting construction emissions for specific future years. Based on the Port's 2005 Seaport Construction Air Emissions Inventory, those emissions are not expected to be significant.

Table 5-1. Emissions summary (including % change from 2005 levels) under *medium growth* scenario (tons/year) with all existing and likely regulations from Table 5-2 included.[a]

Emission Source	2005			2012			2020		
	NOx	**PM**	**SOx**	**NOx**	**PM**	**SOx**	**NOx**	**PM**	**SOx**
Total Off-Shore	**2062**	**172**	**953**	**2301 (12%)**	**176 (2%)**	**926 (-3%)**	**3031 (47%)**	**48 (-72%)**	**59 (-94%)**
OGV – Off-Shore	*1717*	*158*	*950*	*2013*	*163*	*924*	*2833*	*41*	*59*
Harbor Craft	*345*	*13*	*3*	*287*	*13*	*2*	*198*	*8*	*0*
Total On-Shore	**1982**	**103**	**475**	**1964 (1%)**	**36 (-65%)**	**70 (-85%)**	**1375 (-29%)**	**20 (-81%)**	**82 (-83%)**
OGV – Berth	*767*	*61*	*464*	*1008*	*19*	*68*	*529*	*11*	*80*
CHE	*766*	*22*	*7*	*427*	*11*	*1*	*226*	*4*	*2*
Truck	*339*	*17*	*2*	*422*	*4*	*0.3*	*405*	*2*	*0.4*
Locomotive	*76*	*2*	*2*	*107*	*2*	*0*	*215*	*3*	*0*
Construction	*34*	*1*	*0.25*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Grand Total	**4044**	**274**	**1428**	**4265 (6%)**	**211 (-23%)**	**996 (-30%)**	**4406 (10%)**	**68 (-75%)**	**142 (-90%)**

[a] Results for the medium growth scenario are presented here; results for the no growth, low growth and high growth scenarios, and for ROG and CO for the medium growth scenario can be found in Appendix G.

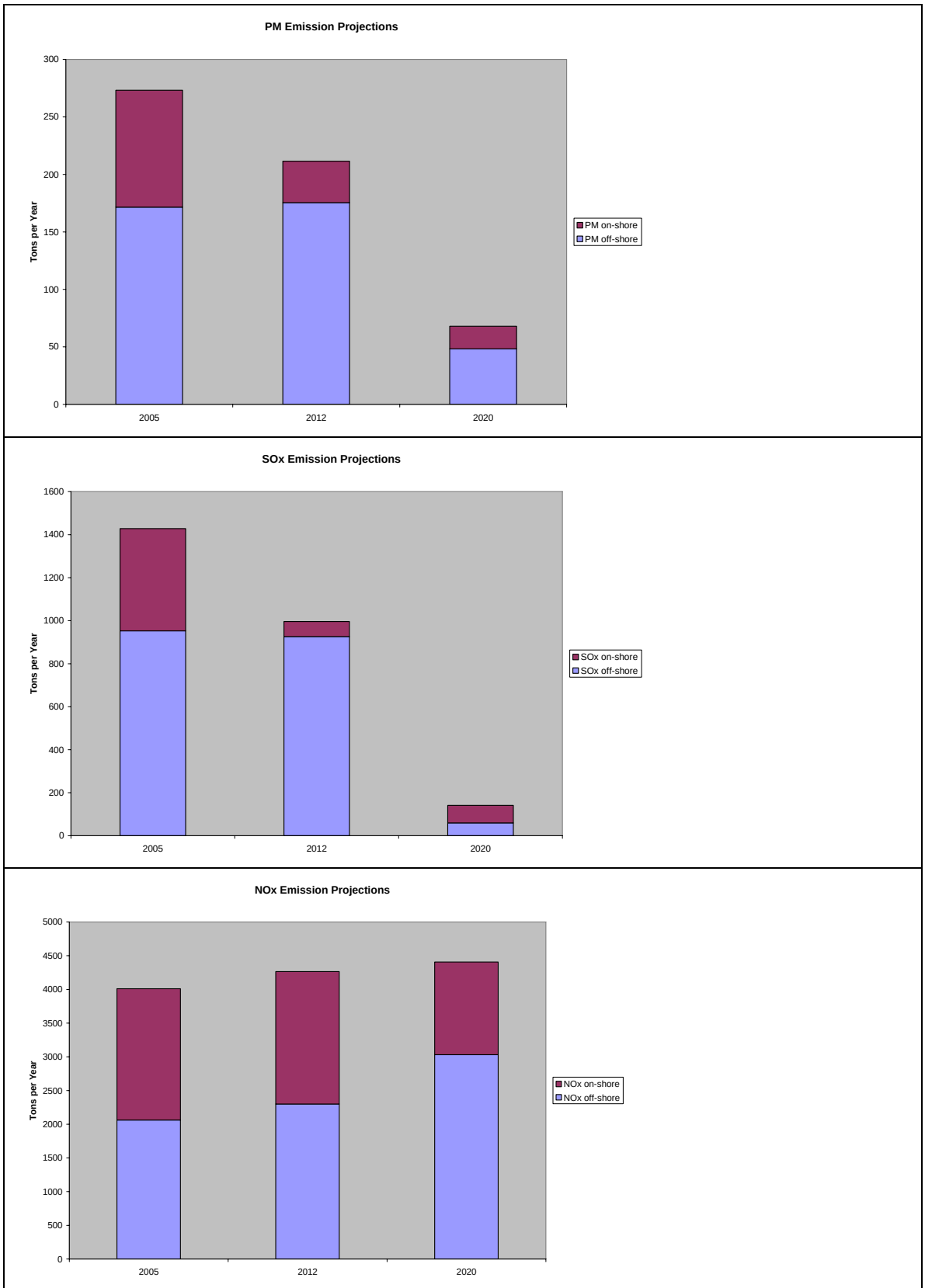

Figure 5-4. Projected PM (top), SOx (middle), and NOx (bottom) emissions for on-shore and off-shore sources at the Port of Oakland under the medium growth scenario.

Major regulations impacting these emission forecasts are listed in Table 5-2. The selection of which upcoming regulations are "likely", and therefore included in the forecasts, is somewhat subjective. With few exceptions, the regulations listed in the table have been adopted into law, though most of them have reduction requirements that will not be fully effective for a number of years. Estimates of the ultimate impact of each regulation on future emissions are subject to uncertainties because some rely on full-scale implementation of new procedures and technologies that have not been applied under "real world" conditions, because regulatory schedules may be adjusted due to changing conditions, because of potential legal challenges, and various other factors.

Table 5-2. Major regulations included in future year emission forecasts.

Source Category	Existing and Likely Regulations	Included in 2012 Forecast	Included in 2020 Forecast
Ocean-Going Vessels (OGV)	California low sulfur limits for fuel in OGV auxiliary engines [a]	✓	✓
	California low sulfur limits for fuel in OGV main engines		✓
	State shoreside power requirements for OGV		✓
Harbor Craft	Federal Tier 3 and 4 emission standards for marine engines		✓
	State harbor craft engine rule	✓	✓
Cargo Handling Equipment (CHE)	State and Federal standards for new off-road engines and fuel	✓	✓
	State rulemaking for cargo handling equipment	✓	✓
Port Container Trucks	Federal and State new engine emission standards	✓	✓
	State port trucks rule	✓	✓
	State Heavy-Duty (In Use) Commercial Trucks rule		✓
Locomotives	Statewide/Railroad agreement to limit locomotive idling (railyard MOU)	✓	✓
	Federal retrofit and new Tier 3 and 4 locomotives engine standards	✓	✓

[a] As of May 7, 2008, enforcement of this rule was suspended pursuant to a federal district court order. Expected benefits of this rule are nevertheless included in the forecasts because CARB may ultimately succeed in overcoming the legal challenges and because some carriers have been and may continue to voluntarily comply with the rule requirements.

As indicated in Table 5-1, the forecasted emission reductions due to regulations for on and near-shore sources are larger than for off-shore sources, reflecting:

(a) the difficulty and uncertainty around the control (including regulation) of some off-shore sources, particularly OGVs, and
(b) the regulatory and public health focus on reducing emissions that occur closest to people and that can be expected to contribute more to health risk than off-shore emissions.

On-shore NOx emissions are forecast to decline by 2020 while off-shore NOx emissions increase due to increases in OGV activity and a lack of OGV NOx control requirements, resulting in an overall increase in total NOx emissions.

The emission projections presented in this section are subject to some uncertainties, including:

- Only existing regulations and those anticipated ("likely") future regulations about which sufficient information is available for analysis, could be incorporated into the projections. It was not possible to estimate benefits from other potential future regulations, including additional proposed regulations described in CARB's Goods Movement Emission Reduction Plan.
- Some regulations included in this analysis may be (and some already have been) subject to legal challenges.
- Interpretation of how "likely" implementation is of the various regulations governing seaport sources of emissions is somewhat subjective. For example, the OGV main engine low sulfur fuel rule was still under development at the time of this analysis and the regulatory language was subject to change.
- Historically, economic forces have resulted in gradual improvements to the efficiency of container movement through the Port (e.g., faster crane movements and increased use of 40-foot containers). Over time, similar gains in efficiency could lead to emission reductions, due, for example, to shorter hotelling times and fewer lifts per TEU. Efficiency gains were not taken into account in the above analysis because the magnitude and timing of the gains are too difficult to predict.

5.3 Relationship between Emissions and Health Risk

As discussed in Section 4.2, CARB released the *Draft Diesel Particulate Matter Health Risk Assessment for the West Oakland Community* in March 2008. A key part of this health risk assessment (HRA) study deals with the estimation of cancer risk associated with emissions from the maritime operations on and around Port property.

Cancer health risk is usually expressed as the estimated number of potential excess cases of cancer per million people exposed. The risk can also be formulated in terms of the incremental cancer risk per ton of DPM emitted from each source category. For example, the HRA results indicate that the 61 tons per year of DPM emitted from ocean going vessel auxiliary engines while vessels are docked at their berths (i.e., hotelling emissions) at the Port result in a population-weighted average excess lifetime cancer risk in West Oakland of 57 per million. Thus, the excess cancer risk per ton of emissions can be expressed as a ratio, 57 cancers divided by 61 tons, which equals 0.9. These incremental risk factors were calculated by CARB for each emissions source category and are shown in Table 5-3.

Incremental risk factors are higher for some categories than for others, reflecting the fact that sources like on-road trucks that typically operate within highly populated urban areas result in greater exposure (and therefore risk) per ton of DPM released than sources like OGVs and harbor craft that are typically located further away from residents. The incremental risk factors from the CARB report provide a basis for comparing the impact of various source categories at

the Port of Oakland both in 2005 and in the future. [2] For example, in 2005 each ton of DPM from on-road trucks serving the Port is estimated to correspond to an increment of about 2 in a million in the potential cancer risk in the West Oakland community. This is more than twice the risk per ton of OGV berthing emissions. Of all the Port sources, on-road trucks generate the greatest potential cancer risk per ton of diesel PM emissions, followed by locomotives, harbor craft, OGV berthing, cargo handling equipment and off-shore OGV activity.

The excess cancer risk resulting from Port operations in 2012 and 2020 can be estimated by applying the incremental risk factors to projected DPM emissions for those years. Results of this calculation are shown in Table 5-3. The table shows that cancer risk to West Oakland community members from maritime DPM emissions is expected to be reduced dramatically from 2005 levelsas a result of the projected reductions in seaport emissions due to current and proposed state and federal air quality regulations. Overall cancer risk is estimated to be 75% lower in 2020, while cancer risk from on-shore sources is reduced by 80%, in part due to the greater availability of cleaner engine technology for trucks, locomotives and terminal yard equipment.

Table 5-3. Port of Oakland Maritime PM Emissions and Associated Cancer Risk in 2005 and 2020 (estimated).

Source Category	Incremental Risk Factor[b] (excess cancer cases in 1 million/ton of PM)	PM Emissions (tons)		Cancer Risk (excess cancer cases in 1 million)	
		2005	2020[a]	2005	2020
Total Off-Shore		**172**	**48**	**78**	**25**
OGV-transit & maneuvering	0.4	156	40	62	16
OGV- anchor	0.4	2	1	1	0.3
Harbor Craft	1.1	13	8	15	8
Total On-Shore		**103**	**20**	**109**	**22**
OGV-berthing	0.9	61	11	55	10
Cargo Handling	0.7	22	4	15	3
Truck	2.1	17	2	35	4
Rail	2	2	3	4	6
Construction[c]	NA	1	NA	NA	NA
TOTAL		**274**	**68**	**187**	**47**

[a] Emissions for 2020 are based on the medium growth scenario for the projection with all current and likely future regulations implemented. PM is substituted for DPM, since the emissions are essentially equivalent (see footnote on Table 4-1). These risk projections are based on the current spatial distribution of emissions, which may change over time.

[b] Population weighted average excess cancer risk due to DPM exposure per ton of DPM emitted as calculated by CARB (see Section 4.2).

[c] Construction activity varies from year to year and no estimates are available of construction emissions for 2020; CARB's study did not estimate health risks from on-Port construction activities.

[2] Incremental risk factors from different source categories are most appropriately interpreted in terms of their *relative* size rather than as a measure of the absolute amount of community cancer risk associated with a given level of emissions.

6 AIR QUALITY IMPROVEMENT GOALS

Two types of goals are included in this air quality master plan: broadly stated goals to reduce the Port's impact on public health and ambient air quality, and explicit numerical targets for reductions of specific pollutants for future years.

6.1 Health Risk and Air Quality Goals

The centerpiece goals of the MAQIP that will guide the selection of specific air quality improvement projects and that will ultimately measure its success as an air quality master plan are:

Goal 1 Reduce the adverse public health impacts of the Port's seaport-related air emissions on workers in the maritime area and on residents in the neighboring communities that are most affected by goods movement at the seaport (in particular West Oakland), as expeditiously as feasible.

Goal 2 Reduce the adverse impacts of the Port's seaport-related air emissions on ambient air quality in West Oakland and more generally in the San Francisco Bay Area Air Basin, as expeditiously as feasible.

To support these goals, the Board of Port Commissioners on March 18, 2008, adopted the *Air Quality Policy Statement and "Early Actions" to Reduce Air Pollutant Emissions and Related Human Health Risk* (see Appendix H). This action committed the Port to the goal of reducing the community's excess cancer risk attributable to DPM emissions from Port sources by 85% between 2005 and 2020 by taking all feasible measures to reach the goal[1].

During development of this plan, CARB's West Oakland Health Risk Assessment was still under development, so the precise relationship between emissions and risk was not known. Therefore, the Port and Task Force assumed a one-to-one correspondence between emissions and risk, consistent with CARB's own planning assumptions. Under this assumption, an 85% reduction in emissions yielded an 85% risk reduction. Therefore, the Port's goal is consistent with CARB's statewide goal of an 85% reduction in diesel PM and health risk.

6.2 Emission Reduction Goals

In support of the health risk and ambient air quality goals, the Port and the MAQIP Stakeholder Task Force established interim (2012) and longer term (2020) emission reduction targets for specific air pollutants (PM, SOx, and NOx) by emissions sources, as summarized in Table 6-1. These goals are based on a "medium" growth scenario for Port cargo (Figure 5-1). In setting these emission reduction goals, a distinction was made between off-shore emission sources (ships underway and harbor craft activity) and on- or near-shore sources (all other maritime-related sources, including ships at berth). By setting separate goals for off-shore sources, it was possible to take into account uncertainties regarding the ability of State and Federal regulators or the Port to reduce emissions from these sources, given the legal, political, and technological difficulties involved. In addition, while off-shore sources represent a large fraction of Port

[1] The baseline data that will be used to measure the Port's progress toward this goal are the "Port of Oakland 2005 Seaport Air Emissions Inventory" (2007, revised 2008) and the California Air Resources Board's "Diesel Particulate Matter Exposure Assessment Study for the West Oakland Community: Preliminary Summary of Results" (March 2008 and subsequent revisions).

emissions, these sources are potentially of less concern from a community health risk perspective than on/near-shore sources since they are located further away from populated areas. Emissions from equipment sources within the on- and off-shore categories may not be reduced uniformly, and some may even increase. Therefore, the goals are based on average emissions reductions within each category.

The 2012 interim goals are consistent with the forecasted emissions from the Port's medium growth scenario, recognizing that in the short term (2008 to 2012), reductions beyond those due to regulations will be difficult to achieve due to time, financial, and technological constraints. Therefore, for the short term, the Port's primary focus is on early compliance with regulations so that emissions and risk can be addressed more quickly than mandated.

The 2020 goals assume that CARB's port emissions reduction regulations (Table 5-1) are successfully implemented, with full and timely compliance by industry. These goals go beyond the benefits of these regulatory measures, however, and set higher reduction targets. The additional reductions needed to meet these goals would come from feasible emissions reductions initiatives introduced by the Port, its tenants and business partners. The 2020 goals are clearly ambitious, and seek to achieve reductions beyond those forecasted under medium growth.

These quantitative emissions reduction goals can be used to guide the design and selection of future initiatives, and can later serve as a measure of progress in implementing the air quality plan.

Table 6-1. Emission Reduction Goals.

Pollutant by Port Source	Percent Change by Year, compared to 2005[a]	
	2012	2020
PM Emissions		
Off-Shore	+2%	-85%
On/Near-Shore	-65%	-85%
SOx Emissions		
Off-Shore	-3%	-94%
On/Near-Shore	-85%	-85%
NOx Emissions		
Off-Shore	+12%	TBD
On/Near-Shore	+1%	-34%

[a] 2012 goals are based on full regulatory compliance. 2020 goals are based on full regulatory compliance and adoption of feasible initiatives.

6.2.1 Diesel PM Reduction Goals

Given the emphasis by regulators and the community on reducing risk due to diesel PM (DPM) exposure, the emission reduction goals are oriented towards achieving the greatest possible reductions in DPM emissions. The following goals are ambitious, but potentially achievable, subject to technological, financial and other constraints:

DPM Goal 1: By 2012, reduce on- and near-shore DPM from Port activities by 65% from the baseline 2005 emissions level.

DPM Goal 2: By 2020, reduce on- and near-shore DPM from Port activities by 85% from the baseline 2005 emissions level.

DPM Goal 3: By 2012, minimize the increase in off-shore DPM from Port activities to 2% over the baseline 2005 emissions level.

DPM Goal 4: By 2020, reduce off-shore DPM from Port activities by 85% from the baseline 2005 emissions level.

6.2.2 SOx Reduction Goals

Methods used to reduce DPM have the added benefit of also reducing oxides of sulfur (SOx) emissions, thus reducing exposure to both SO_2 and sulfate aerosols. The following goals are ambitious, but potentially achievable, subject to technological, financial and other constraints:

SOx Goal 1: By 2012, reduce on- and near-shore SOx from Port activities by 85% from the baseline 2005 emissions level.

SOx Goal 2: By 2020, reduce on- and near-shore SOx from Port activities by 85% from the baseline 2005 emissions level.

SOx Goal 3: By 2012, reduce off-shore SOx from Port activities by 3% from the baseline 2005 emissions level.

SOx Goal 4: By 2020, reduce off-shore SOx from Port activities by 94% from the baseline 2005 emissions level.

6.2.3 NOx Reduction Goals

DPM reduction technologies provide a relatively small concurrent benefit with respect to NOx reductions. As a result, the NOx emission goals allow for a small increase in NOx by 2012 in order to accommodate the growth forecast under the medium Port growth scenario as shown in Figure 5-1. By 2020, the goal is to reach a nearly 35% reduction from on- and near-shore sources. This reduction will be largely achieved by the introduction of shore power for OGVs when at berth and by the introduction of new, cleaner engines for cargo handling equipment, trucks, and locomotives. A specific goal for reduction of NOx emissions from off-shore sources by 2020 has not yet been defined due to uncertainties about the ability of regulators or the Port to reduce NOx emissions from OGVs given the legal, political, and technological difficulties involved. Note that simply making improvements to the composition of fuel used in OGV engines, while producing significant PM and SOx reductions, has little impact on NOx emissions.

The following goals are ambitious, but potentially achievable, subject to technological, financial and other constraints:

NOx Goal 1: By 2012, minimize the increase in on- and near-shore NOx from Port activities to 1% over the baseline 2005 emissions level.

NOx Goal 2: By 2020, reduce on- and near-shore NOx from Port activities by 34% from the baseline 2005 emissions level.

NOx Goal 3: By 2012, minimize the increase in off-shore NOx from Port activities to 12% over the baseline 2005 emissions level.

NOx Goal 4: By 2020, reduce off-shore NOx from Port activities by an amount still to be determined, compared to the baseline 2005 emissions level.

6.3 Challenges

The Port's air quality improvement goals outlined in this plan are ambitious, and face a number of challenges, including:

- New emissions reduction regulations adopted and proposed by CARB, in particular, are extremely aggressive in their implementation schedules and technological requirements. Some types of equipment may not become available when expected, may not be affordable or may not be as cost-effective as anticipated. Technological, economic or legal factors may result in suspension or postponement of certain requirements or deadlines.
- The new regulations do not leave much room for voluntary actions that produce additional emissions reductions. Furthermore, achieving full compliance with each regulation will likely be difficult; experience tells us that 100% compliance is rarely achieved.
- Some of the CARB regulations have already been successfully challenged through the legal system, and other regulations may be contested as well. There is a possibility that the Port may also be challenged in trying to achieve reductions beyond those required by law. The Port would not wish to pursue action that is certain to result in litigation.
- Since the development of the MAQIP and the Board's action, the preliminary results of the West Oakland HRA have been published and provide a more specific relationship between emissions and risk. The HRA indicates that even more ambitious emissions reductions may be needed to reach the MAQIP risk reduction goals.
- Emission reductions from ocean going vessels are particularly challenging from a implementation standpoint as well as a legal perspective, since ocean going vessels calling at the Port are nearly all international flagged and are not readily subject to local, state or even federal regulations.

7 EMISSIONS REDUCTION STRATEGIES

To achieve the ambitious MAQIP goals, emissions reductions will need to occur through both regulatory compliance and additional action on the part of Port tenants and customers. Air emissions can be reduced by technological means ("source controls") or by operational changes that increase efficiency or otherwise reduce emissions. Enforcement of regulatory requirements will be conducted by the regulatory agencies such as CARB and BAAQMD.

7.1 Source Controls

There are a limited number of control technologies that can reduce emissions from Port-related source categories. The basic choices are:

1. switching to cleaner fuels or other means of powering sources,
2. retrofitting existing equipment with control devices, or
3. replacing existing equipment with newer, cleaner equipment.

Table 7-1 provides examples of emission control technologies that can potentially be applied to Port-related sources of diesel emissions. In many cases, control technologies of the types listed are already required or will be required in the near future based on existing State and Federal regulations.

Table 7-1. Summary of diesel emissions control technologies.

Source Category	Owner or Operator	Fuels	Retrofit	Replacement
OGV (Ships) – Main Engines	Carriers	Low sulfur fuels, Emulsified fuels (fuel-water mix)	Install pollution control systems (e.g. selective catalytic reduction),Engine modifications	New engine standards, Accelerated old engine retirement
OGV (Ships) – Auxiliary Engines	Carriers	Low sulfur fuels, Emulsified fuels, Use grid power or portable clean generators while berthed	Pollution control systems (e.g. selective catalytic reduction), Engine modifications, Exhaust after-treatment (hood)	New engine standards, Accelerate old engine retirement
Harbor Craft (Tugs)	Tug companies	Low sulfur fuels, Emulsified fuels, Biodiesel, Use grid power or portable clean generators while berthed	Pollution control systems (e.g. selective catalytic reduction), Engine modifications	New engine standards, Accelerate old engine retirement
Cargo Handling Equipment	Terminal operators and railroads	Low sulfur fuels, Emulsified fuels, Biodiesel	Pollution control systems (Oxidation catalysts, diesel particulate traps)	Diesel-electric hybrids, Fuel cell technologies, LPG/LNG powered equipment
Trucks	Trucking companies and independent operators	Low sulfur fuels, Emulsified fuels, Biodiesel	Pollution control systems (Oxidation catalysts, diesel particulate traps)	New engine standards, Accelerate old engine retirement, LPG/LNG powered equipment

Source Category	Owner or Operator	Fuels	Retrofit	Replacement
Railyards (primarily switching locomotives)	Railroads	Low sulfur fuels, Emulsified fuels, Biodiesel	Engine modifications, idle limiting devices	New engine standards, Accelerate old engine retirement, Green goats (diesel-electric hybrids), Generator set (genset) switching engines
Construction Equipment	Construction contractors	Low sulfur fuels, Emulsified fuels, Biodiesel	Pollution control systems (Oxidation catalysts, diesel particulate traps, Engine modifications	New engine standards, Accelerate old engine retirement

The regulatory efforts discussed in Section 3 are focused on source control, and require the owners and operators of Port-related sources to apply one or more control technologies to reduce emissions of DPM, NO_X and other pollutants. These regulations are rigorous and do not leave much room for additional emissions reductions. Achieving the intended emissions reductions benefits will require enforcement by regulatory agencies including CARB and BAAQMD, with cooperation from the Port.

7.2 Operational and Design Efficiencies

In addition to equipment control technologies, operational changes can potentially improve the efficiency of Port operations and simultaneously reduce emissions. Emissions reductions are achieved by reducing the amount of polluting activity required to move containers through the Port and within or near local neighborhoods. Some reductions in polluting activity can be achieved with regulations, such as restrictions on truck and locomotive idling time, but most activity reduction stems from investing in more efficient equipment or operations. For example, the Port's Joint Intermodal Terminal, which provides near-dock rail access, was estimated to take 20,000 truck moves off I-80 when it began operating in 2002. Other examples of operational and design efficiencies that could be considered by the Port terminal operators and other tenants and maritime businesses include:

- The "virtual container yard" describes various information technologies that track the whereabouts and status of containers inside and outside the Port. This system allows more efficient use of container trucks by reducing the number of one-way trips made while empty.
- "Crane double cycling" describes a more efficient use of large electric cranes and other yard container equipment. Cranes typically unload and load vessels in separate operations. As containers are unloaded, a queue of empty yard trucks or "hostlers" forms to receive containers and take them for in-yard processing. Later, as the crane switches to loading, another queue of loaded hostlers forms to bring containers to the crane. To the extent a crane can unload and load simultaneously, it can save time and vehicle emissions.
- Improvements in container yard layout and technology within a terminal can lead to faster cargo processing, thereby reducing the number of in-yard container movements. That means less waiting time for trucks, less truck idling and reduced emissions.

- "Chassis pooling," a form of equipment sharing, is another means of increasing efficiency. Participating shipping lines provide their own chassis for use by the pool, which can be managed and maintained by a subsidiary of the participating terminals, or a third party. This allows drayage trucks to use pooled chassis to serve multiple carriers and greatly reduces gate turn-times. Common chassis pools can, among other things, provide a more efficient management of terminal assets, increase the volume of goods through the port, free up space used to store chassis on port lands, and reduce fuel consumption and the number of truck trips. Pooled chassis can also facilitate the implementation of virtual container yards.

8. AIR QUALITY IMPROVEMENT INITIATIVES

State and federal regulations are expected to result in substantial reductions in air emissions from equipment used in Port operations over the next decade. Many of those regulations, however, depend on equipment turnover to realize their full emissions reduction benefits. Therefore, the MAQIP Task Force developed a process to select, screen and categorize air quality initiatives with a goal of achieving emission reductions above and beyond those required by law to meet the MAQIP goals. Current Port emissions reduction strategies are aligned with many of the initiatives selected by that process, and future strategies may be selected from these or from additional initiatives recommended by the successor group to the MAQIP Task Force.

8.1 Initiative development

To select air quality initiatives with a potential to achieve emissions and risk reductions beyond regulatory requirements, the MAQIP Task Force developed an initiative screening process depicted in the flow chart in Figure 8-1. Only initiatives with a direct relationship to emission and risk reductions were eventually selected.

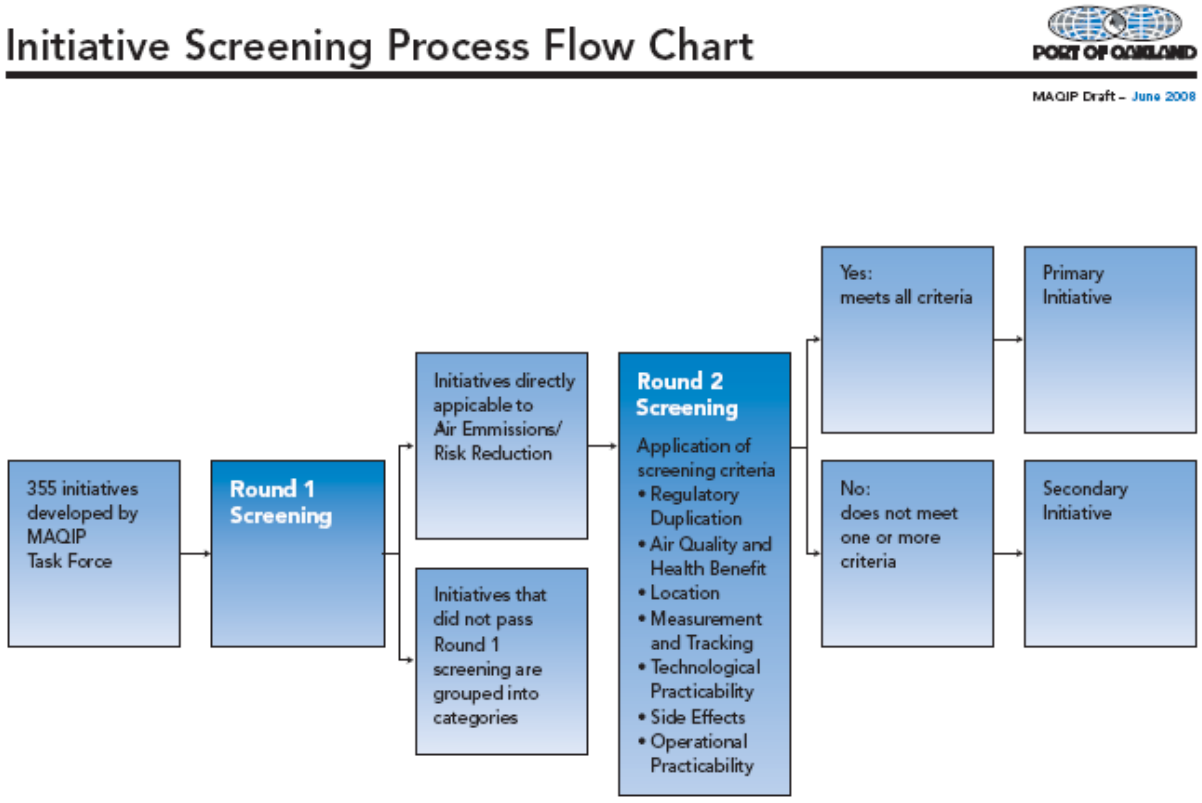

Figure 8-1. Initiative screening process flow chart.

8.1.1 Original List of Potential Initiatives

The Source Document Work Team of the MAQIP Task Force reviewed a wide range of existing documents (Table 8-1), including the State's California Goods Movement Action Plan, to compile an initial list of air quality initiatives for the full Task Force to consider. The list was

supplemented with initiatives provided by Task Force members and members of the public at the September 27, 2007 MAQIP meeting, resulting in a final list of 355 potential initiatives.

Table 8-1. Source documents used for developing initial list of initiatives.

1	ARB/Railroad Statewide Agreement (MOU), 2005
2	ARB Resolution 6-14 (April 20, 2006)
3	BAAQMD CARE Phase 1 Findings and Recommendations, Sept. 2006
4	Boalt Hall School of Law Economic Justice Class Presentation to City of Oakland Port Task Force (April 18, 2007)
5	City of Oakland Community Task Force on Ports Recommendations
6	Ditching Dirty Diesel Collaborative and Pacific Institute, "Paying with our Health" (November, 2006)
7	EPA presentation on Hydraulic hybrids
8	Northwest Ports Clean Air Strategy (Draft May 16, 2007)
9	Pacific Institute "Clearing the Air", November 2003.
10	San Pedro Bay Ports Clean Air Action Plan – Overview
11	San Pedro Bay Ports Clean Air Action Plan – Proposed Clean Trucks Program Fact Sheet
12	San Pedro Bay Ports Clean Air Action Plan – Proposed Clean Trucks Program Q&A
13	State of California, California Goods Movement Action Plan, January 2007
14	Summary of studies, West Oakland Diesel Truck Emissions Reduction Initiative (May 1, 2003)
15	West Oakland Toxics Reduction Collaborative Recommendations (March 26, 2007)

8.1.2 Screening Process and Criteria

An eleven-member Work Team of the Task Force, with support from Port staff and technical consultants, stakeholder technical consultants, and BAAQMD staff, reviewed the 355 initiatives from the original list to identify those that directly reduce air emissions and health risk.

The 225 initiatives that did not meet that first round of screening were grouped into categories (e.g., Policy, Funding, Health Risk, etc.) and included in Appendix I.

To evaluate the remaining 128 initiatives for further consideration, "screening criteria" were adopted by the Task Force on September 27, 2007 (Table 8-2; the full report is provided in Appendix C.) The screening criteria were developed to assist in selecting initiatives with potential benefits, and were not intended to establish a framework for funding, implementing, monitoring, or tracking the initiatives. The air quality initiatives selected and prioritized through this process were intended to achieve emission reductions above and beyond those required by law.

Table 8-2. Screening Criteria Adopted by the MAQIP Task Force.

Criterion	Description
1. Regulatory Duplication	Does the proposed initiative achieve "surplus" emission reductions, defined as emission reductions in advance of or beyond an existing regulation or other commitment (for example, an existing MOU)?
2. Air Quality and Health Benefit	Does the proposed initiative contribute to non-negligible local emission and health risk reduction and/or regional ambient air quality improvement?
3. Location	Does the benefit of the proposed initiative occur primarily in the designated "primary impact geographic area" of the MAQIP (i.e., West Oakland)?
4. Measurement and Tracking	Can the emission reductions from implementation of the proposed initiative be estimated quantitatively and therefore tracked over time?
5. Technological Practicability	Can the proposed initiative be implemented with existing or foreseeable technology?
6. Side Effects	Does the proposed initiative avoid or at least minimize foreseeable negative environmental, economic, or social side effects?
7. Operational Practicability	Can the proposed initiative be implemented without significant disruption to the movement of freight or compromising safety?

8.1.3. Primary and Secondary Initiatives

An eleven-member MAQIP work team applied the seven screening criteria presented in Table **8-2** to the remaining initiatives. This "Round 2" screening effort categorized initiatives into two groups for achieving reductions above and beyond regulatory requirements:

- **Primary Interest Initiatives**: The initiative received a "*yes*" response to each of the criterion from at least 8 of the 11 Work Team members. This list represents those initiatives that, according to the Work Team's review, are of primary interest for reducing emissions and health risks associated with Port seaport activities. This list is not exhaustive and presents an overview of the types of actions that may be taken by the Port and its maritime partners. The Work Team anticipated that, over time, other initiatives meeting all seven criteria could be suggested or pursued by the Port, its business partners, its agency partners, or other stakeholders.
- **Secondary Interest Initiatives**: The initiative received a *"no"* response to one or more of the criteria from at least 8 of the 11 Work Team members. These initiatives were identified as worthy of further evaluation although they did not meet all seven criteria. As with the Primary List, the Secondary List is intended to provide suggestions or guidance for actions that may be taken by the Port, its business partners, its agency partners, or other stakeholders.

Forty-nine primary and 35 secondary interest initiatives, as determined by the Work Team, were presented to the Task Force for confirmation (see Table 8-3). An additional 35 initiatives that duplicate existing regulatory or MOU requirements were also identified. These initiatives, organized by emission source category, represent potential opportunities for early implementation or exceedance of regulatory requirements. All initiatives will need to be evaluated for financial, legal, and technological feasibility prior to implementation.

8.2. MAQIP Task Force Initiatives

The rigorous screening that was applied to the proposed initiatives resulted in a document that described in detail the selection process and presented the final MAQIP Task Force initiatives as of January 30, 2008 (see Appendix D for the full document). Many hours of work and discussion went into choosing the initiatives, which are listed in Table 8-3. The work team's introduction indicates some of the limitations of their effort:[1]

> *The MAQIP Supplemental Work Team performed its review and categorization of the 355 initiatives to the best of its ability, given its combined knowledge and expertise. Additional development of the initiatives, some of which are currently drafted as general concepts, will be needed prior to any feasibility analysis and the implementation of any initiative on either the Primary or Secondary Lists of Initiatives is subject to economic, legal and technological feasibility. All the measures on this list are intended to represent actions that offer a potential to go beyond existing state and federal regulations and/or MOUs. Initiatives in the regulatory duplication section represent potential opportunities for early implementation (e.g. accelerate) or opportunities to build upon (e.g. 'exceed') regulatory requirements. Acceleration and/or exceedance are similarly subject to economic, legal and technological feasibility. The numbering of the initiatives within each category (e.g. Trucks) and sub-category (e.g. Primary List) does not indicate ranking or priority of any sort.*

[1] "Proposed Lists of Primary Interest and Secondary Interest Air Quality Initiatives for Potential Implementation", revised by the MAQIP Task Force on January 30, 2008. See Appemdix D for full document.

Table 8-3. Primary and Secondary Air Quality Initiatives for Potential Implementation and Initiatives Duplicating Existing Requirements.[1]

No.	Initiative	Description
I. Emission Source Category: Truck		
A. Primary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Safety and Neighborhood Education	Institute a collaborative effort among the West Oakland community, the Oakland Police Department, trucking companies/truckers and the Port for increasing public, trucker, and terminal operator education on safety and neighborhood issues.
2.	Replace or Retrofit Trucks	State a goal of replacing or retrofitting 1,500-2,500 trucks over 5 years to meet a "clean truck" standard. Ban older trucks from Port terminals in a phased 5-year schedule. The owner of the old truck will be paid for the truck.
3.	Truck Buy-Back Program	Create a buy-back program for old trucks based on established criteria (buy worst trucks first) similar to or consistent with the Truck Incentives Working Group of the West Oakland Toxics Reduction Collaborative (WOTRC).
4.	Web-Based Reservations	Implement standardized mandatory web-based reservation systems.
5.	Gate and Roadway Efficiency	Continue to design and build terminal gate and roadway efficiencies for congestion relief, with input from all users.
6.	Fuel Saving Devices	Identify and retrofit in collaboration with various users fuel saving devices that would also reduce greenhouse gas emissions.
7.	Electrified Parking Spaces	Provide electrified parking spaces for trucks and/or for reefer units to reduce unnecessary idling.
8.	Enforce Truck Routes	Institute a collaborative effort among the West Oakland community, the Oakland Police Department, trucking companies/truckers and the Port to increase enforcement & penalties on prohibited truck routes in West Oakland and evaluate/establish alternate truck route to reduce emissions and exposure.
9.	Meet PM Standards and Be Cleanest for NOx	By 2011, require all trucks calling at the port frequently or semi-frequently to meet or exceed the EPA 2007 on-road particulate matter (PM) emissions standards (0.01 G/BHP-HR for PM), and be the cleanest available oxides of nitrogen (NOx) at the time of replacement or retrofit.
10.	Incentives for Early Implementation	Provide incentives for early implementation for cleaner trucks. An example incentive could be a decreased or increased concession fee.
11.	Modernize Private Trucks	Adopt and implement ARB rule to modernize (replace and/or retrofit) private truck fleet.
12.	Idle Reduction	Implement idle reduction education, technology, and policy program with provisions to assure terminal adherence to anti-idling policies and procedures (ref: AB 2650).
13.	Traffic Barriers	Install traffic Barriers on streets where trucks are prohibited (City of Oakland)
14.	Prohibit Overnight Truck Parking	Pass an ordinance prohibiting overnight truck parking in residential areas (City of Oakland).
15.	LNG & CNG Trucks	Support acquisition and use of more LNG & CNG trucks.
16.	Provide Services at Port	Provide truck services (fueling, truck repair, food and beverages) at the Port of Oakland.
B. Secondary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Virtual Container Yard	Develop a virtual container yard (off Port property) with compliance by all terminal operators to create more efficient movement of goods. This requires a 3rd coordinating party & central database to design & implement or a better relationship between data developers and the Port.
2.	Paperless Gate	Require terminal operators to implement "paperless gate;" such as RFID in combination with web-based booking systems to prevent gate congestion and idling and use OCR for gate efficiency.
3.	Pier Pass	Implement Pier Pass drayage truck fleet emission reduction program as implemented in LA/LB with extended gates & daytime congestion fee.
4.	Labor Work Rule Flexibility	Improve labor work rule flexibility to enable increased daily truck turns.
5.	Inland Container Pools	Establish inland container pools where trucks can drop-off and pick-up empty containers, to minimize deadhead truck runs (chassis pool).
6.	Efficient Queues	Create more efficient queues; Call trucks to the Port when needed to reduce idle time.
7.	Electrified Truck Stop	Create an electrified truck stop (cold ironing the trucks) so that trucks do not idle in the queue.

No.	Initiative	Description
8.	Software Upgrade	Accelerate software upgrade for trucks (i.e. adjust the software in certain trucks that are "gamed" to allow for greater emissions at higher speeds)
9.	Maintenance and Training Programs	If applicable, concessionaires will be required to establish maintenance and training programs to reduce emissions.
10.	Design and Operational Measures	Use design/operational measures such as parking, synchronized traffic signals, and driver training.
11.	Alternative Fuels	Encourage the use of biodiesel and other alternative fuels.
12.	Move More Containers by Rail	Decrease truck traffic by increasing the percentage of containers moved by rail.
13.	Trucker Mobility Program	Create a trucker mobility program so that they do not need to drive trucks out of the Port unnecessarily (i.e. - use a shuttle, BART, or other public transportation).
C. Duplication with Existing Regulatory or MOU Requirement:		
1.	Anti-Idling Rules	Pass anti-idling rules and enforce anti-idling at terminal gates.
2.	Limit Impact of Oakland Army Base Redevelopment	Take steps to limit the impact of Port construction operations related to the Oakland Army Base redevelopment.
3.	Vehicle Inspection and Maintenance Program	Develop a Port-run vehicle inspection and maintenance program for port drayage trucks. This would be periodic and random inspection program, and could also be imposed on terminal operators. (State has heavy duty truck inspection rule program).
4.	Retrofit Eligible Equipment	Identify and retrofit eligible equipment such as diesel particulate filters (DPF) or diesel oxidation catalysts (DOC).
5.	CA Low Sulfur Diesel	Utilize CA low sulfur diesel for trucks.
6.	Smoke Inspections	Conduct smoke inspections for trucks in communities.
7.	5-Minute Idling Limits	Enforce 5-minute idling limit for trucks.
8.	ARB Compliance for International Trucks	Adopt and implement ARB rule to require international trucks to meet US emission standards.
9.	Enforce CA TRU Rule	Enforce CA rule for transport refrigeration units on trucks, trains, and ships.
10.	Restrict Entry Unless PM Control Equipped	Restrict entry of trucks new to port service unless equipped with diesel PM controls.
II. Emission Source Category: Ocean Going Vessels		
A. Primary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Port Collaboration to Provide Incentives	Collaborate with other ports (LA/LB and/or Seattle) to coordinate the movement of clean ships through incentives rather than mandates.
2.	Best Technology in New Purchases	Ensure the best technologies are incorporated into new equipment purchases.
3.	Additional At-Dock and During Voyage Emission Control	Implement additional at-dock (e.g. stack after-treatment) and during voyage (e.g. electrification or scrubbing) emissions reduction options deemed viable.
4.	Control Devices on New Vessels and Frequent Callers	Use of diesel particulate matter (DPM) and/or NOx control devices on auxiliary and main engines on new vessel builds and existing frequent callers.
5.	Incentivize Cold Ironing	Create incentives for cold-ironing beyond regulations.
6.	Incentivize Low Sulfur Fuel	Create incentives for all ships to use low sulfur fuel (0.1%) in both vessel main and auxiliary engines.
7.	Support MARPOL Annex 6	Support ratification of MARPOL Annex 6 for international shipping.
8.	SECA Designation	Obtain SOx Emission Control Area (SECA) designation or alternative for North America.
9.	Retrofit Main Engines	Retrofit existing main engines on ships during major maintenance.
B. Secondary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Improve Operational Efficiency	Implement operational efficiency improvements during Port development to reduce time at anchor and at dock.

No.	Initiative	Description
2.	Increase Destination Loading	Increase "destination loading" on ships from the Far East.
3.	Cleanest Vessels for CA	Dedicate cleanest vessels to California service.
C. Duplication with Existing Regulatory or MOU Requirement:		
1.	Implement ARB Low Sulfur Auxiliary Engine Rule	Implement ARB ship auxiliary engine rule to use lower sulfur fuel (0.1% by 2010) (OAL review) (note: rule currently under litigation)
2.	Cleaner Fuels for Auxiliary Engines at Anchor and Berth	100% use of cleaner fuels, such as 0.1% sulfur content, in the auxiliary engines at anchor and at dock for vessels with adequate tank capacity. Assess the feasibility for vessels other than frequent callers, including vessels at anchor and vessels with smaller tank capacity. This is a partial duplication of CARB's auxiliary engine fuel regulation currently under legal challenge but being temporarily enforced.
3.	Cleaner Fuels for Auxiliary Engines During Transit	Use < 0.2% Sulfur Marine Gas Oil (MGO) Fuel in vessel auxiliary engines at berth and during transit out to a specified distance from the Port. This is a partial duplication of CARB's auxiliary engine fuel regulation currently under legal challenge but being temporarily enforced.
4.	Use MGO During Transit and Maneuvering	Standardize the use of marine gas oil (MGO) (less than 1.5% Sulfur (S)) fuels in the main engines during transit and maneuvering out to a specified distance from the Port, moving towards a 0.1% S standard as appropriate fuels become available.
5.	Cold Ironing	Use "Cold-Ironing" technology to shut down auxiliary engines on ocean-going ships while in port by connecting to electrical power supplied at the dock, or equivalent alternative.
III. Emission Source Category: Harbor Vessels		
A. Primary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	ULSD and Bio-Fuel	Use ultra low sulfur diesel and/or bio-fuel blends for cleaner emissions (this is a partial duplication with CARB's ultra low sulfur fuel rule).
2.	Tighter EPA or ARB Standards	Adopt tighter USEPA or ARB emission standards for harbor craft.
3.	Implement Incentives	Implement incentives to accelerate introduction of new harbor craft engines.
B. Secondary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Subsidize Tugs Using Soy Diesel	Offer a subsidy for tugs that use cleaner-burning, but more expensive, soy diesel. Provide the subsidy if the equipment uses the fuel and stays in Oakland. This model could also be expanded to other businesses.
2.	ULSD and Bio-Fuel	Use ultra low sulfur diesel and/or bio-fuel blends for cleaner emissions (this is a partial duplication with CARB's ultra low sulfur fuel rule).
C. Duplication with Existing Regulatory or MOU Requirement:		
1.	Meet EPA Tier II Standards	Require all home-based harbor craft to meet most EPA Tier II standards for harbor craft of equivalent reductions.
2.	Retrofit and Repower Engines	By a specified time, require all previously re-powered home based harbor craft to be retrofitted with the most effective CARB verified NOx and/or PM emissions reduction technologies. When Tier III engines become available, all home based harbor craft will be re-powered with new engines.
3.	CA Low Sulfur Diesel	Utilize CA low sulfur diesel for harbor craft.
4.	Replace, Retrofit, Use Alternative Fuels	Clean up harbor craft through replacement, retrofit, or alternative fuels.
IV. Emission Source Category: Cargo Handling Equipment		
A. Primary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Accelerate Compliance with CARB's CHE Rule	Seek ways to accelerate compliance with CARB's Container Handling Equipment rule.
2.	Encourage Use of Clean Fuels	Encourage the use of ultra low-sulfur diesel and/or biofuel and promote the use of other cleaner fuels and lubricants where appropriate.
3.	Hybridization and Electrification	Increase fuel efficiency by using CHE with hybridization or full-electrification technologies, as feasible.
4.	Replace with Cleaner	Replace equipment with lighter, more efficient straddle carriers, rubber tired gantries (RTG), or fully-electric rail mounted

No.	Initiative	Description
	Equipment	gantry (RMG) cranes, and use Tier 4 engines for yard tractor fleet.
5.	Regenerative Energy Technologies	Identify opportunities for and maximize the use of regenerative energy technologies for CHE.
6.	Improve Efficiency and Design as Modifications Occur	Maximize operational efficiency and terminal design as port development occurs and negotiate cleaner alternatives at the time of major modifications and lease negotiations.
7.	Lease Measures and Project Reviews	Use lease measures and project reviews to drive continuous improvements and emissions reductions.
8.	Increase Electrification	Use electrification in much more Port/terminal operations equipment.
B. Secondary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Exhaust Treatment	Complete retrofits of suitable CHE with exhaust treatment equipment.
2.	Crankcase Emissions Reductions Systems	Use crankcase emission reduction systems equipment.
3.	Increase Zero Emission Equipment	Increase penetration of zero emission or near zero emission cargo handling equipment.
C. Duplication with Existing Regulatory or MOU Requirement:		
1.	ARB Inter-modal Cargo Equipment Rule	Finalize ARB inter-modal cargo equipment rule (OAL)
2.	Best Available Technology Fleet Upgrade	Complete full-scale fleet upgrade to the best available technology.
3.	Yard Tractors Meet Tier IV Standard	Require all yard tractors to meet a minimum EPA 2007 On-road or Tier IV engine standard by the end of 2010.
4.	CHE Meet Tier IV Standard, Equip CHE with VDECS	Require all CHE with engines with > 750 hp to meet, at a minimum, the EPA Tier IV of road standards by the end of 2014. Starting 2007, require all CHE with engines < 750 hp be equipped with cleanest available VDEC verified by CARB.
5.	Replace, Retrofit, Use Alternative Fuels	Implement ARB rule for cleaner cargo handling equipment through replacement, retrofit, or alternative fuels.
6.	ARB Forklift Rule	Adopt and implement ARB forklift rule for gas-fired equipment.
7.	Green Construction and Maintenance	Require green equipment for goods movement related construction and maintenance.
8.	Tier IV Standards	Implement US Tier 4 equipment emission standards.
9.	85%+ DPM Control on CHE	Upgrade cargo-handling equipment to 85% diesel PM control or better.
V. Emission Source Category: Rail		
A. Primary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Replace or Retrofit Switching Locomotives	Identify all existing switching locomotives in service at the Port of Oakland that may be potential candidates for replacement or retrofit.
2.	Implement Tier III Standards	Specify a date by which any new switch engine acquired must meet EPA Tier III standards.
3.	Implement Efficiency Improvements	Implement efficiency improvements to switchyards such as electrification of lift equipment and RFID system implementation when consistent with existing rail yard configuration and operations.
4.	Cleanest Available Technology for New or Redesigned Yards	Require any new rail yards developed or significantly redesigned to operate the cleanest available rail yard technology.
5.	Lower Emitting Switch Engines	Use lower emitting switch engines within rail yards, where traditionally the oldest locomotives are used.
6.	Update Switcher Engines by 2010	Upgrade engines in switcher locomotives by 2010.
7.	Retrofit Engines with DPM	Retrofit existing locomotive engines with diesel PM controls when certified by EPA and CARB.

No.	Initiative	Description
	Controls	
B. Secondary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Freight Car Productivity Improvements	Implement freight car productivity improvements, incorporating technologies that reduce train resistance (drag).
2.	Increase Yard Efficiency and Identify Feasibility of On-Dock Rail	Increase port-wide rail and switching yard efficiencies and identify the feasibility of on-dock rail as alternative to near dock rail.
3.	Infrastructure for Rail Traveling North and East	Create infrastructure for another level of rail traveling North & East.
4.	More Rails for Long Haul	Utilize more rails for long haul.
5.	Tier III Locomotives in CA	Concentrate Tier 3 locomotives in California.
6.	Class I Long Haul Locomotives Transition to Tier III Fleet Average	Over a voluntary transition period, require the fleet average for Class I Long Haul Locomotives calling at port properties to be Tier III equivalent PM and NOx and to use 15 minute idle restrictors.
7.	Tier III/IV Line Haul Locomotives for New Engines and Rebuilds	Implement Tier 3/Tier 4 US standards for line haul locomotives at time of purchase (new engine and rebuild standards).
8.	Biofuel or Other Clean Fuels	Encourage the use of biofuel or other cleaner fuels in switchyard and line haul locomotive engines.
C. Duplication with Existing Regulatory or MOU Requirement:		
1.	CA Low Sulfur Diesel	Utilize CA low sulfur diesel for captive instate locomotives.
2.	Automatic Idling-Reduction Devices	Eliminate non-essential locomotive idling both inside and outside of rail yards by installing automatic idling-reduction devices on 99% of unequipped intrastate locomotives by June 30, 2008.
3.	Low Sulfur Diesel in 80% of CA Locomotives	Dispense lower-sulfur diesel in 80% of locomotives operating in California by January 1, 2007.
4.	Visible Emission Reduction and Repair Program	Ensure that the incidence of locomotives with excessive visible emissions is very low through the Visible Emission Reduction and Repair Program.
5.	Early Review of Emissions Impacts	Conduct early review of air emissions impacts from designated yards – with ensuing feasible mitigations.
6.	ULSD in Locomotive Engines	Use ultra low sulfur diesel in switchyard and line haul locomotive engines.
7.	2005 Statewide MOU	Implement 2005 Statewide MOU for Rail Yard Risk Reduction.
8.	Idling Restriction Training	Conduct training on locomotive idling restrictions.
VI. Emission Source Category: Other		
A. Primary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Biodiesel Consortium	Develop a biodiesel consortium (City of Oakland, Port of Oakland, City of Berkeley, West Oakland community).
2.	Sustainable Commuting Employee Programs	Establish employee programs to facilitate sustainable commuting.
B. Secondary List of Potential Initiatives Subject to Economic, Legal and Technological Feasibility:		
1.	Position for Public Health Officer at the Port	Create a position for a public health officer at the Port to take the lead on health impact assessment, and inform staff on community & worker health.
2.	Sponsor a Healthy Homes Project	Sponsor a Healthy Homes Project utilizing technology and design practices to reduce the amount of dangerous pollution residents breathe inside their homes. (Alameda County Public Health Department and the California Department of Health Services.)
3.	Pollution Mitigation and Prevention	Conduct mitigation and pollution prevention.
4.	Enforce Traffic and Vehicle Safety Laws	Increase enforcement of traffic and vehicle safety laws and regulations.

No.	Initiative	Description
5.	Establish Construction Staging Areas	Establish construction staging areas in locations to minimize impact on local circulation with appointment system.
6.	Retrofit Freight Vehicles with Probes and Smart Sensors	Retrofit freight vehicles with probes and smart sensors to measure speed, weather, pollution, lane departure, cargo location, customs data, container RFID information, and vehicle/frame condition inspection dates.
C. Duplication with Existing Regulatory or MOU Requirement		
1.	Regulate Emissions from Stationary and Indirect Sources	Regulate criteria pollutant and toxic emissions from stationary sources and indirect sources based on Phase I findings.
2.	Enforce Adopted Commercial Vehicle Laws	Expand enforcement of commercial vehicle laws already adopted.
3.	Use Green Construction Equipment	Use green equipment for construction of infrastructure projects (as available).

8.3. Selected Initiatives

Since 1999, the Port has funded and supported innovative ways to reduce emissions from maritime operations. The Port is continuing its commitment to clean air through a variety of new and continuing programs and projects. This section outlines those strategies and their relationship to individual initiatives identified by the MAQIP Task Force (Table 8-3). To avoid confusion, the term "initiative" refers to the entries in the January 30, 2008 version of the "Compendium of Primary and Secondary Initiatives" as listed in Table 8-3.

As discussed in Section 1, "Introduction", the Port normally uses a planning continuum (Figure 1-1) that starts with a conceptual strategic or master plan (e.g., the MAQIP) that provides a framework for how to achieve the goals delineated in the plan. The next step is to develop the comprehensive programs that manage how the goals will be reached. Finally, the specific projects that reach the goal are implemented. Both programs and projects are presented in Table 8-4 to show their relationship to the MAQIP initiatives. Table 8-5 breaks out programs and projects by source category.

Most of the strategies in Table 8-4 have been selected for further study and probable implementation by the Port, its tenants, customers, the City of Oakland, BAAQMD, CARB and community groups, depending on financial, legal and technological feasibility. For the Port, selection of a strategy means that Port resources (staff and funding) have been dedicated to investigating or implementing the activity. Each program or project identifies the partners working on the strategy, with the lead partner or partners listed first.

Some programs and projects are described, but are not scoped out in detail, especially if responsibilities, funding and target timelines are not yet established. The Port is committed to working with a maritime stakeholder group to design emissions reduction projects and programs based on MAQIP initiatives, subject to feasibility.

Table 8-4. Selected Programs and Projects and Their Relationship to MAQIP Initiatives.

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Trucks	
Port of Oakland Comprehensive Truck Management Plan The Comprehensive Truck Management Plan (CTMP) is a broad plan initiated by the Port of Oakland Maritime Division, with substantial multi-stakeholder collaboration. The objectives of the CTMP range from enhancing Port security and safety, to improving trucker productivity, and reducing emissions from Port drayage trucks. Many of the MAQIP intiatives are featured in the CTMP, including: a. retrofit and replacement of drayage trucks, b. provision of parking areas and support City of Oakland's efforts for additional enforcement of truck parking or operations on neighborhood streets to reduce community exposure to truck emissions, and c. truck registration and tracking.	

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Trucks	
Retrofit and replacement of drayage trucks In partnership with the BAAQMD and CARB (GMERP), the Port plans to jointly fund retrofits (diesel particulate filters that are verified by CARB to reduce DPM by at least 85%) and/or replacements (2007 engine or better) for trucks that serve the Port's maritime activities. The project shall comply with California's GMERP Final Guidelines. Schedule: June 30, 2009 - Install DPFs on up to 1,000 trucks if technically feasible (Year 1) Cost: $15,000,000 (estimated, at $15,000 per truck) Funding: Port, CARB (Prop 1B, Year 1) and BAAQMD (TFCA) will jointly fund the cost of DPFs and/or truck replacements according to the current plan. Partners: Port (Environmental), BAAQMD and CARB, with DPF providers, truck owners	**Trucks (Primary)** 1 – collaborate/educate 2 (part) – retrofit/replace 8 – truck route 12 – idling education 15? – LNG/CNG trucks
Provision of parking areas Fifteen acres of truck parking in the Port's maritime area are planned adjacent to the 15 acres of parking that will be provided by the City of Oakland. The Port is providing interim parking on former Oakland Army Base sites until the lot is completed. Opportunities for truck driver education on idling and truck routes and for additional truck services at the site may exist and could be investigated by the private truck parking operator. This is in addition to truck parking that is already provided in the Port maritime area) Schedule: Interim parking is currently being provided Cost: TBD Funding: TBD Partners: Port (Maritime), with, City of Oakland and private operator (OMSS)	**Trucks (Primary)** 1 – collaborate/educate 8 – truck route 12 – idling education 16 – truck services
Additional enforcement of truck parking or operations on neighborhood streets While the Port already funds two city police officers to enforce truck parking and operations restrictions in West Oakland, that agreement is under review to determine how the services could be more effectively targeted at violators. Schedule: underway Cost: $150,000 annually Funding: Port funds Partners: Port (Government Affairs), with City of Oakland Police Department	**Trucks (Primary)** 1 – collaborate/educate 8 – truck route
Truck registration and tracking A key feature of the CTMP, this measure is in the design phase in collaboration with the CTMP Steering Committee. Schedule: TBD Cost: TBD Funding: TBD Partners: Port (Maritime), with CTMP Steering Committee, truck owners	**Trucks (Primary)** 1 – collaborate/educate 4 – terminal reservations 8 – truck route **Trucks (Secondary)** 1 – virtual container yard 2 – RFID gate 6 – efficient queues **Rail (Primary)** 3 – yard efficiencies

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Trucks	
LNG infrastructure and equipment Replace diesel equipment with 9 LNG-fueled heavy-duty trucks and 2 mobile fueling stations. This equipment will operate in the Port area. Schedule: Operational in 2009 Cost: $3 million Funding: $1.75 million – Caltrans CMAQ grant, through MTC; $0.4 million – Port funds; $0.9 million – private operator (Clean Air Logix) Partners: Port (Environmental) and Clean Air Logix, with Caltrans, MTC	**Trucks (Primary)** 15 – LNG/CNG trucks
Truck idling outreach and education The BAAQMD enforces port truck idling regulations at the Port of Oakland. A more coordinated program to educate truck drivers on the regulations and on local truck routes and parking restrictions should be undertaken. Schedule: TBD Cost: TBD Funding: TBD Partners: BAAQMD, truckers, dispatchers, Oakland Police and Traffic, CHP, Port, tenants, WOEIP, community groups	**Trucks (Primary)** 1 – collaborate/educate 8 – truck route **Other (Secondary)** 4 – enforce traffic and safety
Truck work groups Continue participation in established forums that share information on truck air quality and related issues, technologies, policies, programs and funding, such as: • MAQIP Interagency Group • West Coast Collaborative • West Oakland Toxic Reduction Collaborative (WOTRC), Truck Incentives Working Group • Port Accessibility Task Force (Bay Area World Trade Center) • Other Schedule: ongoing Cost: Port staff time Funding: Port Partners: Port (Environmental, Social Responsibility, Government Affairs), with EPA, BAAQMD, WOEIP, Alameda County Public Health Department, truckers, City of Oakland, BAWTC, other agencies	**Trucks (Primary)** 1 – collaborate/educate 8 – truck route
Cargo Handling Equipment	
Electric-powered rail mounted gantry cranes Potential tenants are studying the feasibility of incorporating electrified rail mounted gantry cranes in a proposed intermodal rail terminal expansion at the former Oakland Army Base. Schedule: TBD Cost: TBD Funding: Tenant Partners: Potential rail tenants, with Port (Maritime and Engineering), consultants	**Cargo handling (Primary)** 1 – early compliance 3, 8 – electrification 4 – electric RMG (part) **Rail (primary)** 3 – yard efficiencies

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Ships	
APL/Eagle Marine Services shore power APL/Eagle Marine Services intends to implement grid-based shore-side power at their Oakland terminal (Berths 60-63). The project will provide the terminal infrastructure to enable ocean-going container vessels to turn off their auxiliary engines and connect to shore-side power while at berth, thereby reducing diesel and greenhouse gas emissions. The project scope will include procurement and installation of a substation, underground cabling, connection to the electrical grid, and shore-side plugs for two berths. APL plans to plug in 25% of ship visits by 2011, 60% by 2014, and 90% by 2020. Each of these represents acceleration from regulatory requirements by 3 years and additional emission reductions of 10% in each key milestone year. Schedule: operational by December 2009 Cost: $4 million Funding: $2.9 million CARB I-bond funding $1.1 million private funds Partners: APL/Eagle Marine Services, with BAAQMD, CARB, Port (Maritime and Engineering)	**Ships (Primary)** 6 (part) – Early action shore power
Alternative shore power In 2007, the Port, BAAQMD, APL/Eagle Marine Services, PG&E and CleanAir Logix tested an LNG fueled mobile shore-side power technology designed to reduce emissions from ships while at berth. Future use of this technology (Wittmar DFMV™ Cold Ironing) will depend on availability of feasible alternative fueling. Schedule: test completed; future applications TBD Cost: $275,000 from Port for test of technology Funding: Port funds Partners: Port (Environmental) and CleanAir Logix, with BAAQMD, APL/Eagle Marine Services, PG&E	**Ships (Primary)** 6 (part) – Early action shore power
Port infrastructure for shore power Port staff are currently meeting with tenants to hear about their plans for shore power, and to determine if there are any opportunities for early compliance with CARB's regulation. In anticipation of that regulation, Port staff are examining the electric infrastructure requirements for shore power, and likely capital investment costs. Schedule: TBD Cost: TBD Funding: TBD Partners: Port (Maritime), with tenants	**Ships (Primary)** 6 (part) – Early action shore power
Voluntary compliance with fuel regulations On January 1, 2007, CARB began enforcement of its ship auxiliary engine rule requiring shipping lines to use low sulfur fuel in their auxiliary engines within 24 nautical miles of California in order to dramatically reduce particulate matter emissions near ports and while at berth. CARB discontinued enforcement on May 7, 2008 pursuant to an injunction ordered by a federal district court. In spite of this and prior rulings, many shipping lines calling at the Port of Oakland have offered to voluntarily use low sulfur fuel in their auxiliary engines. The Pacific Merchant Shipping Association (PMSA) has recommended that member companies continue using low-sulfur fuel in their auxiliary engines. Schedule: TBD Cost: TBD Funding: Shipping lines Partners: Shipping lines	**Supports MAQIP's emissions and health risk reduction goals**

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Rail	
Clean Switcher Locomotive Engines The Port is leveraging funding to assist BNSF (the Port's rail tenant) with the replacement of older yard locomotives with two new clean burning genset switcher locomotives at the Oakland International Gateway (OIG). These engines are committed to Oakland service. Schedule: Operational in 2009 Cost: $3.0 million for 2 units Funding: $1.3 million – Port $1.7 million – BNSF Partners: Port (Environmental) and BNSF	**Rail (primary)** 1? – switcher ID 6 – switcher replacement
Other equipment and fuels	
Construction Equipment In 2007, the Port launched an incentive pilot program to encourage contractors to use lower emissions construction equipment. The program was incorporated into the specifications for one project to date and is intended to promote the use of clean construction equipment ahead of the implementation schedule required by CARB off-road fleet rule. Schedule: pilot project is underway Cost: TBD Funding: TBD Partners: Port (Engineering), with construction contractors	**Supports MAQIP's diesel PM reduction goals**
Port-Owned Vehicle Fleet The Port is gradually replacing its own fleet of 200 cars and trucks with hybrid, CNG-fueled, or electric vehicles. To date, the Port has replaced 25% of its fleet and is on track to replace the rest within the next five years. The Port is also testing an ethanol biofuel (O2 diesel) in some Port vehicles. Schedule: underway; 25% completed by 2007; 100% completed by 2013 Cost: TBD Funding: Port funds Partners: Port (Maritime)	**Trucks (Primary)** 15 – LNG/CNG trucks (support) **Trucks (Secondary)** 11 – alternative fuel
CNG station In 2007, the Port, the City of Oakland and other partners assisted Clean Energy Corporation in construction of a CNG station at 205 Brush Street, adjacent to the Port's maritime area. The station can be used for fueling both trucks and passenger vehicles, and is open to the public 7 days a week/ 24 hours a day. The Port donated land, and the City secured grants from BAAQMD and the California Energy Commission to assist in construction. Schedule: complete and operational Cost: Unknown Funding: $166,100 – value of Port property (2005) $375,000 – grant from California Energy Commission and Alameda County Congestion Management Agency, through the City of Oakland Remaining costs – Clean Energy Corporation Partners: Clean Energy Corporation and Port (Maritime and Environmental), with City of Oakland, BAAQMD, and the California Energy Commission, Alameda County Congestion Management Agency	**Trucks (Primary)** 15 – LNG/CNG trucks (support) **Trucks (Secondary)** 11 – alternative fuel

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Operational Efficiencies	
The Port routinely works with its tenants to improve terminal design, security systems and other goods movement infrastructure so greater efficiencies can be achieved. Additional cargo growth through these terminals would primarily be hauled by rail, instead of trucks, to inland destinations. Rail is a more efficient means of moving cargo over long distances, with fewer air emissions per ton of cargo moved per mile. Improvements in technology, yard layout, traffic patterns and gate configuration can result in faster cargo processing, with shorter waits for trucks in line or inside the terminal. Less waiting means less truck idling and reduced emissions. The Port will continue to negotiate with current and prospective tenants on incorporating improvements into terminal projects. Operational and design efficiencies are discussed in more detail in Section 7, "Emissions Reduction Strategies". The emission reduction benefits of such projects can be substantial. For example, TraPac reported that a recent container yard project led to a 25% decrease in truck turn times, despite a 25-30% increase in cargo throughput. Continued improvements should lead to even better truck turn times in the future.	**Trucks (Primary)** 5 – terminal efficiencies 7 – reefer plugs (part) **Trucks (Secondary)** 6 – efficient queues 12 – more rail cargo **Ships (Secondary)** 1 – terminal efficiencies **Cargo handling (Primary)** 6 – terminal efficiencies
Rail yard development and reconstruction The Port is negotiating options for rail yard development on the former Oakland Army Base property. Opportunities for operational efficiencies may include electrified yard cranes and improved track and yard layouts. Schedule: TBD Cost: $220 million Funding: $110 million – grant from Caltrans TCIF (Prop 1B funds) $110 million – Port funds Partners: Port (Maritime, Engineering and Environmental), UP with Caltrans	**Rail (Primary)** 3 – yard efficiencies **Rail (Secondary)** 2 – yard efficiencies 4 – more rail cargo **Trucks (Primary)** 5 – terminal efficiencies
Seventh Street Grade Separation The Port is planning to improve portions of Seventh Street in the Port area to reduce congestion and eliminate conflicts with UP and BNSF rail crossings. Schedule: TBD Cost: $300 million (estimated) Funding: 50% of cost, up to $175 million – grant from Caltrans TCIF (Prop 1B funds) Remainder of cost – Port funds Partners: Port (Maritime, Engineering and Environmental), with Caltrans, UP and BNSF	**Trucks (Primary)** 5 – roadway efficiencies

Programs and Projects by Source Category	Cross Reference to Primary and Secondary Initiatives (Table 8-4)
Air quality policy and education	
Participate in air quality policy and funding forums Continue participation in established forums that share information on maritime air quality issues, technologies, policies, programs and funding, such as: • MAQIP Interagency Group • West Coast Collaborative • West Oakland Toxic Reduction Collaborative (WOTRC) • CARB Goods Movement Local Entity Work Group • Port tenants' meetings • Other Schedule: ongoing Cost: Port staff time Funding: Port Partners: Port (Environmental, Government Affairs, Maritime, Social Responsibility), EPA, BAAQMD, WOEIP, Alameda County Public Health Department, CARB, City of Oakland, tenants, other ports and agencies	**Ships (Primary)** 1 – W. Coast clean ships 8 – MARPOL 6 support 9 – SECA designation
Health risk assessment responsibility at the Port In response to community concerns, a Port Environmental Supervisor has been designated the health risk assessment coordinator for the Port. The current assigned staff person holds graduate degrees in public health and, as a Certified Industrial Hygienist, is experienced in analyzing and communicating health risks. Schedule: ongoing Cost: Port staff time Funding: Port Partners: Port (Environmental), with Alameda County Public Health Department	**Other** 1 – staff for health risk assessment (part)
Research opportunities	
Investigate technologies and grants opportunities Investigate technologies and funding opportunities for additional potential emissions reductions strategies. Schedule: ongoing Cost: TBD Funding: TBD Partners: TBD	
Track MAQIP progress through air monitoring Develop an ambient air monitoring program to track the Port's progress towards meeting its emissions reduction goals. Schedule: TBD Cost: TBD Funding: BAAQMD, other Partners: BAAQMD, with Port, other MAQIP stakeholders	
Track MAQIP progress through emissions inventories Update the Port's "2005 Seaport Air Emissions Inventory" to track the Port's progress towards meeting its emissions reduction goals. Schedule: Commence in spring 2009 with 2008 data. Repeat biannually thereafter. Cost: TBD Funding: Port Partners: Port (Environmental), with CARB, BAAQMD, tenants	

Table 8-5. Summary of Programs and Projects by Source Category.

Programs
Trucks
Comprehensive Truck Management Plan
Additional enforcement of truck parking or operations on neighborhood streets
Provision of parking areas
Truck idling outreach and education
Truck registration and tracking
Truck work groups
Ships
Port infrastructure improvements for shore power
Voluntary compliance with fuel regulations
Operational Efficiencies
Marine terminal improvements
Rail yard development and reconstruction
Seventh Street Grade Separation
Policy and education
Health risk assessment responsibility at the Port
Participate in air quality policy and funding forums
Research
Investigate technologies and grants opportunities
Track MAQIP progress through air monitoring
Track MAQIP progress through emissions inventories
Projects
Trucks
Retrofit and replacement of drayage trucks
LNG infrastructure and equipment
Rail
Clean Switcher Locomotive Engines
Ships
Alternative shore power
APL/Eagle Marine Services shore power
Cargo handling equipment
Electric-powered rail mounted gantry cranes
Other equipment and fuels
Construction Equipment
CNG station
Port-Owned Vehicle Fleet

9. IMPLEMENTATION

The Port intends to implement emissions reduction programs and projects generally following the approaches described in this section. The Port will notify its tenants, business partners and other stakeholders of the MAQIP air quality goals and will recommend that they also follow the approaches outlined in this plan for selection of their emissions reduction programs and projects.

Similar approaches apply to both programs and projects, but the term "project" is used throughout this section, because most programs lead to implementation of specific projects.

9.1. Port Implementation Authority

Most of the emissions reduction projects needed to reach the MAQIP goals will be initiated by the Port's tenants and related businesses in response to regulations enacted by CARB, the BAAQMD, and the U.S. EPA. Government agencies develop their regulations through a feasibility analysis and detailed design for implementation, along with a legal justification. Furthermore, agencies have the legal authority to enforce compliance with adopted regulations according to the regulatory deadlines.

The Port requires compliance with all federal, state and local laws, regulations and permits in its lease and other agreements, and routinely works with its tenants and business partners to monitor compliance and to address any concerns that may arise.

Initiatives that are not required by regulations, but that assist in meeting the MAQIP goals, may be implemented by other means, including voluntary actions, incentive programs, lease provisions, tariffs and other mechanisms. The Port can further implementation of such initiatives through a variety of approaches, subject to feasibility analysis, including:

- Ask tenants and business partners to take voluntary actions to improve air quality. This could be undertaken at any time.
- Develop an incentive program for tenants and business partners. This could be an effective way to encourage participation by tenants with long term leases. Incentives may or may not be financial, and could be enacted through an MOU, tariff, lease supplement or other mechanism. All incentives would be subject to a feasibility analysis and to the availability of funding for program administration and implementation.
- Negotiate with tenants when leases are open for renewal to provide an opportunity for commitments by tenants to specific measures. A proposal could be submitted by a tenant or requested by the Port when a lease expires. However, leases are not always applicable, as in the case of ocean carriers. There are only a limited number of opportunities to enact emissions reduction initiatives using this approach, and success depends largely on market and competitive conditions. Once a tenant and the Port agree on lease terms, both parties must abide by the agreement, and the Port can use its existing authority to enforce lease provisions.

- Include initiatives as part of a project description or as mitigation measures in a CEQA document covering maritime area development. Mitigation measures must be feasible and minimize the significant adverse impacts of a project. The measures may incorporate phasing and performance standards that may be accomplished in more than one specified way. The development project proponent is normally responsible for implementing and managing mitigation measures. Tenants, business partners or others responsible for air quality mitigations will be urged to select projects based on the MAQIP initiatives.
- Undertake initiatives as Port-sponsored projects through grants and Port funding, if available.
- Impose emissions reduction requirements or projects by the Port, if and when necessary and feasible. For a variety of reasons, this tactic is not desirable. The "one-size-fits-all" nature of such requirements does not provide business and competitive flexibility to preserve the Port's economic feasibility. The “one-size-fits-all” nature of such requirement does not provide business and competitive flexibility to preserve the Port’s economic feasibility. Furthermore, this approach may be subject to legal challenges based on federal preemption, commerce clause, equal protection or other claims, challenges which could result in lengthy delays and ultimately may prevent realization of timely emissions reductions.

9.2. Port Organizational Capacity and Constraints

The Port has demonstrated its ability to initiate, manage and complete emissions reductions projects, but may face challenges as it works towards reaching the MAQIP goals. Clear coordination with all stakeholders is vital to ensure successful implementation and monitoring of projects and reporting on progress towards the emissions and health risk reduction goals. The organization chart in Figure 9-1 identifies a preliminary schematic structure. As a first step organization roles and responsibilities need to be identified. Port divisions with their primary roles and responsibilities as they pertain to implementation of the MAQIP goals, programs and projects. Each project requires participation to varying degrees from almost every division.

Participation from beyond Port internal resources is needed, as illustrated in Figure 9-2. That figure shows the roles and responsibilities of both Port and its tenant, business, environmental, agency and community partners by the functional areas to which they can best contribute to realizing the MAQIP goals.

Some of the internal and organizational challenges that could affect timely implementation of projects and meeting goals are:

- Budget – The challenge of identifying sufficient funding sources is possibly the most serious barrier to early and extensive implementation of emissions reduction projects.
- Staffing – The coordination needed among divisions to implement projects can be impeded if staff are not available to assist when needed. For example, when grant opportunities are announced, there is usually a short timeframe in which to investigate the guidelines, determine suitability, line up partners and prepare a grant application.
- Technical expertise – When staff do not possess the technical knowledge to conduct a project or program (e.g., health risk assessment), it is necessary to hire consultants with that experience. Besides the cost implications, it takes several months to find and hire appropriate firms through the mandatory contracting procedures.

The Board of Port Commissioners and the Port's Executive Director understand these potential challenges, and will work towards overcoming them in order to meet the Board's MAQIP-driven goal of reducing community health risk from seaport operations.

9.3. Port Project Selection

Initiation of an emissions reduction project (or program) at the Port requires:

- Identification of a project
- Screening and feasibility analysis of the project
- Recommendation and decision to undertake the project

The flow chart in Figure 9-3 maps out the expected steps needed to move MAQIP initiatives from proposals to successful implementation. It conceptually illustrates the stages from project identification through monitoring and adaptive management and indicates the primary responsibilities for each stage.

9.3.1. Identification

The initiatives that were identified through the MAQIP development process (Table 8-4 in Section 8) are expected to comprise the source of most selected air quality improvement projects initially. Later, projects may be proposed as MAQIP initiatives by an advisory committee (see Section 10, Next Steps), by Port staff, by tenants or by other stakeholders. Ideas for projects could come from agency or private industry-sponsored research or pilot programs, from other ports or maritime-related businesses, and from environmental firms, among other sources. To the greatest extent possible, initiatives would be discussed with the maritime stakeholders group prior to advancing further in the project selection process. However, it is possible that some project opportunities could arise that require an immediate decision by the Port. Examples of such opportunities might be proposals from tenants to partner in a specific project that will support the emissions reduction goals or projects supported by federal, state or local grant funding programs with short-term deadlines. Such projects would be presented to MAQIP stakeholders for review at the earliest opportunity.

9.3.2. Screening and Feasibility

Once a proposed project is identified by the Port, it will go through a screening process and feasibility analysis. The screening criteria developed by the MAQIP Task Force (Table 8-3 in Section 8) will be used to assess the general potential for emissions and health risk reductions. Tenants and maritime-related businesses will also be urged to use the screening criteria.

Projects passing the screening criteria will then be evaluated for feasibility, including factors such as:

- Overall cost of a project including administration, availability of funding, return on investments, and similar financial considerations;
- Cost-effectiveness of the expected emissions reductions, based on the cost of the measure compared to the emissions reductions;
- Practicability of introducing new equipment, fuel or other measures;
- Availability of new technologies and compatibility with existing operations; and

- Legal feasibility.

The information and planning needed to conduct a feasibility analysis will also contribute to the preparation of a more detailed project description that can be used as the basis for making a decision about whether to proceed with a project.

9.3.3. Recommendation and Decision

A maritime stakeholder group will assist by reviewing proposed projects that have undergone a feasibility study, and advising on adoption. While it is up to Port management and the Board of Port Commissioners to decide whether to proceed with a project, the recommendations of an advisory group would be considered as part of their evaluations.

9.4. Port Project Management

All projects that the Port undertakes, including emissions reduction projects, are subject to a series of approvals and reviews to ensure that Port funds are used in compliance with the Port Charter and Board policies and that actions comply with the law.

Some of the elements typically needed to initiate a project at the Port include:

- A recommendation and decision to undertake a project.
- Assigned staff to manage and conduct the work associated with the project (e.g., coordinate with internal and external stakeholders, manage consultants or contractors, conduct the project feasibility analysis, prepare application materials, apply for grants, prepare Board agenda reports, write and execute contracts, pay bills, review work products, prepare CEQA/NEPA documentation and permit applications, etc.)
- Funding from internal or external sources (e.g., annual operating budget, capital improvement budget, grants)
- Board of Port Commissioners review and authorization (e.g. for setting policy, for expenditure of Port funds, for execution of agreements (contracts, MOUs, leases, etc.), and for CEQA findings and acceptance of permit conditions, among other requirements).

Other agencies, private companies and non-profits have their own formal or informal processes for selecting and launching projects, but each is likely to require the same broad elements of decisions, staffing, funding and approvals.

Once projects are approved, project managers within the Port generally establish and track the budget, schedule, and progress towards completion, and work with the Port Attorney's Office on legal agreements, if required. Emissions reductions projects, such as the Port's Container Terminal Equipment Retrofit and Replacement Project and the Truck Replacement Program, usually require contracts with equipment providers, equipment recipients, and salvage yards depending on the purpose of the program. Grant funding normally requires agreements with granting agencies, as well as preparation of a program designed to comply with the terms of the grant.

For emissions reduction projects, guidelines are often prepared to clarify the purpose, eligibility requirements, cost-effectiveness criteria and participant obligations after funding. Examples of guidelines are the Port of Oakland Truck Replacement Program guidelines[1] and the BAAQMD

[1] http://portofoakland.com/pdf/envi_prog_06_2.pdf

Truck Retrofit Program guidelines[2]. Communications and outreach plans are needed for projects targeted to external clients (e.g., truckers or terminal operators).

Tracking compliance with the established schedule is particularly important once an emissions reduction project is underway since delays could result in the loss of early action benefits. Furthermore, delays could indicate that a project is not yet technologically feasible, that clients perceive costs as outweighing benefits, or that unexpected complications must be managed. All of those reasons could trigger the need to redesign the project through adaptive management (see Section 10.1).

[2] http://www.baaqmd.gov/pln/grants_and_incentives/gm/retrofit_requirements.doc

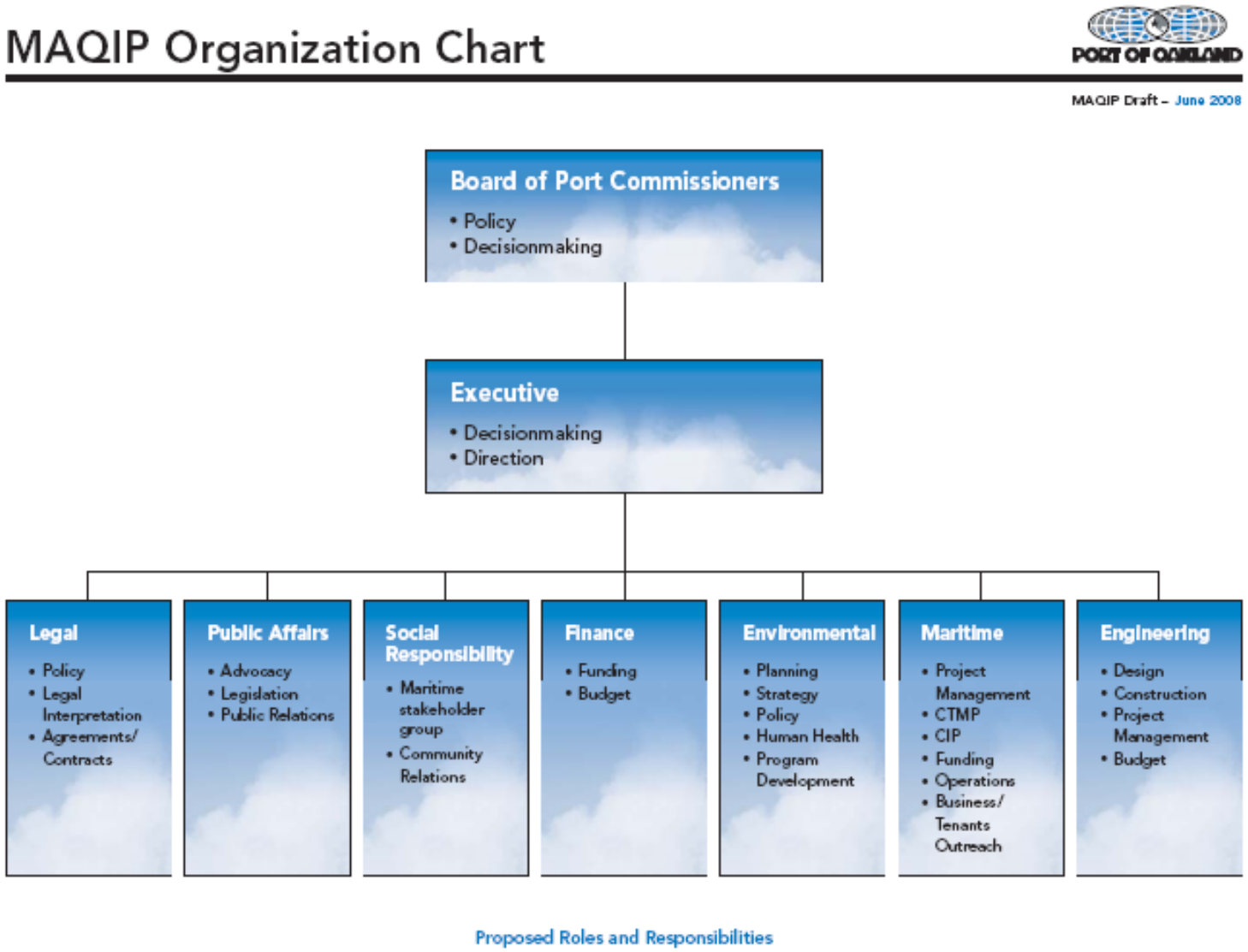

Figure 9-1. Port of Oakland organizational chart.

Figure 9-2. Port programmatic components functions.

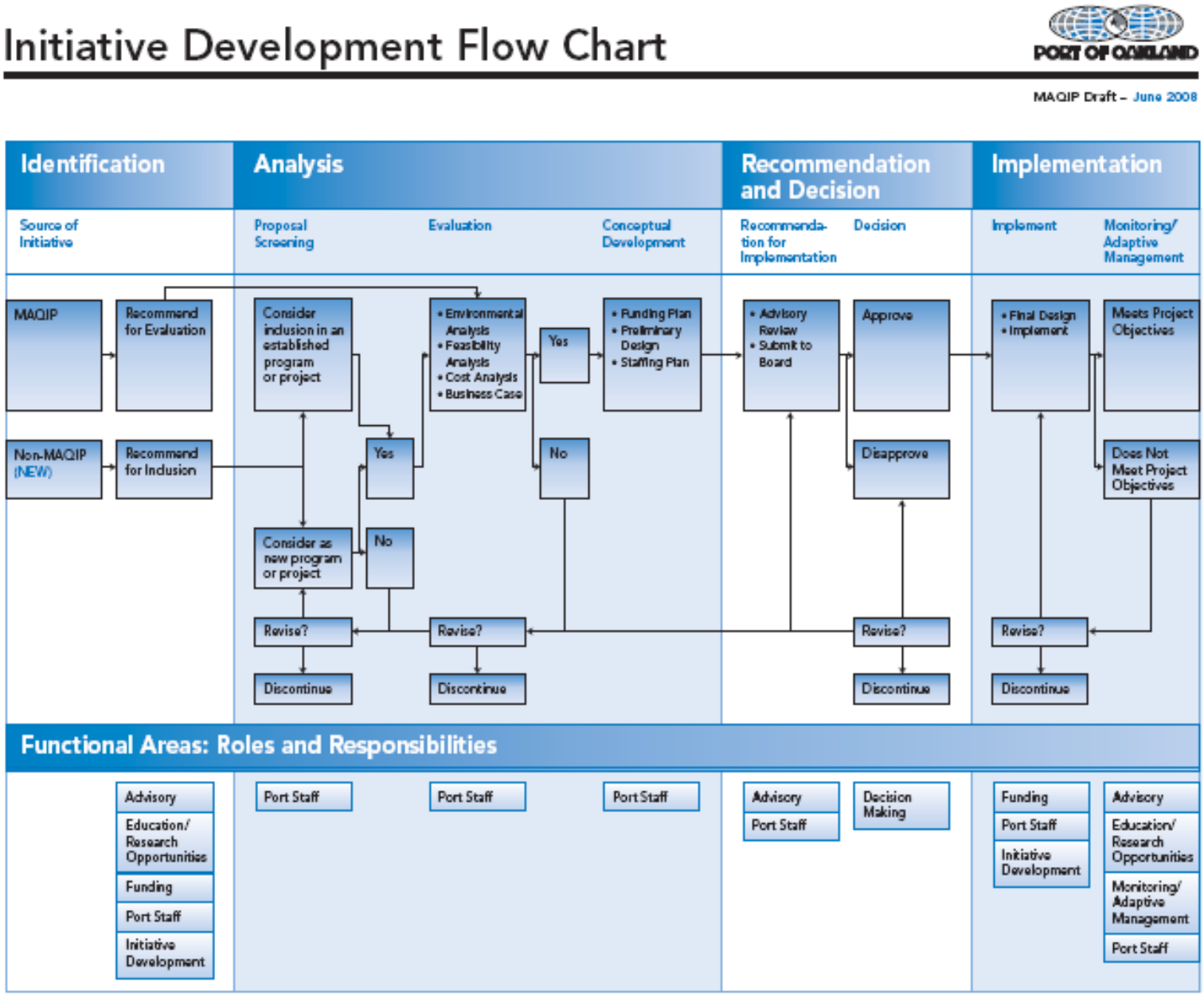

Figure 9-3. Flowchart of MAQIP initiative development procedures.

9.5. Funding

Achievement of the MAQIP goals by 2020 will be costly, with most of the costs borne by the Port's tenants and related businesses and customers as they upgrade equipment and take other steps to comply with state and federal air quality regulations. To implement feasible initiatives that exceed regulatory requirements, however, the Port and its partners need to find additional sources of funding. The scale of costs can be estimated by looking at the Ports of Los Angeles and Long Beach's Clean Air Action Plan: those ports, the South Coast Air Quality Management District, bonds and impact fees are committed to provide $2 billion over the next five years for emissions reduction measures. Given that benchmark, it is clear that new funding mechanisms and close partnerships with federal and state funding agencies are needed to pay for the Port's MAQIP goals.

9.5.1. Port Funding Sources

Historically the Port's principal funding sources for maritime environmental improvement activities have been operational revenues and bond-funded capital project budgets. Because these revenue sources are insufficient to meet the needs of the MAQIP and of maritime development for the foreseeable future, the Port is turning to new funding and financing mechanisms. Among other options, the Port is considering the feasibility of imposing a user fee (often referred to as a container fee). Fee revenues would potentially be used to generate matching funds for Proposition 1B grants and for other purposes that address key infrastructure and environmental projects for the sustainable growth of cargo into the future.

9.5.2. Grant Funding Sources

Grant funds are generally made available on an annual basis, through a competitive application process managed by the granting agency. Funding is normally subject to specific eligibility, usage and matching funds criteria that can be difficult to meet, particularly in the context of Port operations where the Port does not own or operate the equipment eligible for grant funding. The Port, public agencies, community groups and others can partner with private entities to obtain funds, but ultimately, it is the private owner or operator who must agree to meet the requirements of the grant (e.g., implementation deadlines, owner contributions, operational restrictions.)

The Port and its business partners may seek grants in the future for projects such as shore power infrastructure and truck replacements, depending on the availability of Port or other resources to provide any requisite financial matches.

Proposition 1B, the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 authorized $19.925 billion of state general obligation bonds for specified purposes, including high-priority transportation corridor improvements, trade infrastructure and port security projects. It also authorized the Legislature to appropriate $1 billion to CARB to reduce air pollution emissions and health risk from freight movement along California's priority trade corridors. The 2007-08 fiscal year budget included the first installment of $250 million for air pollution control projects. CARB adopted Program Guidelines in early 2008 to ensure that the funding program achieves its statutory objectives of "early and extra" emissions reductions. Emissions reduction projects from diesel engines in trucks, locomotives, ships, harbor craft, and cargo-handling equipment are potentially eligible for funding over the Proposition 1B funding

period. The program can only fund emission reductions "not otherwise required by law or regulation."[3]

The Bay Area was awarded $3.4 million by CARB in early grant allocations to retrofit trucks that operate at the Port of Oakland and to install shore side power at two berths at the Port. Another $5 million was awarded to the BAAQMD for the truck diesel particulate filter retrofit project, to which the Port and BAAQMD are also planning to contribute $5 million each to retrofit 1,000 drayage trucks that serve the Port. It is expected that Proposition 1B funding will be critical over the next few years to early implementation of projects at the Port, and to introduction of measures that reduce emissions beyond what is required by regulations.

The **Carl Moyer Memorial Air Quality Standards Attainment Program** provides incentive funds for the incremental cost of replacing older engines with newer and cleaner engines, adding control equipment like particle traps, and to purchase new vehicles that are cleaner than the law requires. Equipment owners must pay part of the cost. Eligible projects include cleaner on-road, off-road, marine, locomotive, and certain stationary and portable engines. CARB administers the program at the state level and allocates funds to local air pollution control districts. The BAAQMD sets priorities, reviews applications and awards funds in the Bay Area. A related funding program (AB923) allows air districts to increase motor vehicle registration fees by $2 to implement Carl Moyer Program projects. Highest priority will be given to highly impacted communities, including West Oakland. There are a number of eligibility criteria and restrictions that affect the ability of projects at the Port of Oakland to obtain funds.

The Transportation Fund for Clean Air (TFCA) is a grant program funded by a $4 surcharge on motor vehicles registered in the Bay Area. The surcharge generates approximately $22 million per year in revenues. The purpose of the TFCA program is to provide grants to implement the most cost-effective projects in the Bay Area that will decrease motor vehicle emissions, and thereby improve air quality. Because the TFCA program is aimed at reducing emissions from on-road vehicles, it is not likely to be a major source of funding for MAQIP projects, other than for clean truck programs.

The **West Coast Collaborative** is a program within the U.S. EPA's National Clean Diesel Campaign to coordinate diesel emissions reduction funding. The federal Diesel Emissions Reduction Act (DERA) authorized $200 million per year nationwide for 5 years for implementation of diesel emissions reduction projects. Perhaps more importantly, the West Coast Collaborative is also a forum for ports, businesses and agencies to discuss West Coast diesel technologies, challenges and successes.

9.6. Timeline

While individual projects benefit from detailed schedules as they approach implementation, a more conceptual timeline is appropriate for this air quality master plan. Figure 9-4 outlines a general timeline for the strategies in Section 8. The strategies range from projects that are currently underway to ambitious programs (CTMP), and the timeline is a best guess of the current schedule and funding. Many factors can affect the timely completion of projects, with the most common being funding and staffing limitations and technological feasibility (e.g., CARB verification of equipment, market availability of equipment and installers, unsuitability of

[3] Goods Movement Emission Reduction Program, California Health and Safety Code, 39625.5 (a)(1)

equipment for a particular situation, and delays in research and development of promising technologies.)

Timeline of Programs and Projects[1]

2008	2009	2010 and later
Policy and education Health risk assessment responsibility at Port (initiate) Participate in air quality policy and funding forums (ongoing) **Other equipment and fuels** Construction equipment incentive (2nd year) CNG station (ongoing) Port-owned vehicle fleet (ongoing) **Rail** Clean switcher locomotive engines – award funds **Research** Investigate technologies and grants opportunities (ongoing) Track MAQIP progress through BAAQMD air monitoring (initiate) **Ships** Alternative shore power (under consideration) APL/Eagle Marine Services shore power – award funds Port infrastructure improvements for shore power (ongoing) Voluntary compliance with fuel regulations (ongoing) **Trucks** Additional enforcement of truck parking or operations on neighborhood streets (ongoing) Comprehensive Truck Management Program (initiate) LNG infrastructure and equipment – award funds Provision of parking areas Retrofit and replacement of drayage trucks – begin Year 1 program Truck idling outreach and education (ongoing) Truck registration and tracking Truck work groups (ongoing)	**Policy and education** Health risk assessment responsibility at Port (ongoing) Participate in air quality policy and funding forums (ongoing) **Other equipment and fuels** Construction equipment incentive (3rd year) CNG station (ongoing) Port-Owned Vehicle Fleet (ongoing) **Rail** Clean switcher locomotive engines – begin operations **Research** Investigate technologies and grants opportunities (ongoing) Track MAQIP progress through BAAQMD air monitoring (ongoing) Track MAQIP progress through emissions inventories (prepare 2008 inventory) **Ships** APL/Eagle Marine Services shore power Infrastructure for shore power (ongoing) Voluntary compliance with fuel regulations (ongoing) **Trucks** Additional enforcement of truck parking or operations on neighborhood streets (ongoing) Comprehensive Truck Management Program (ongoing) LNG infrastructure and equipment – begin operations Provision of parking areas (ongoing) Retrofit and replacement of drayage trucks – conclude Year 1 program Truck idling outreach and education (ongoing) Truck registration and tracking (ongoing) Truck work groups (ongoing)	**Cargo handling equipment** Electric-powered rail mounted gantry cranes **Operational Efficiencies** Marine terminal improvements Rail yard development and reconstruction Seventh Street Grade Separation **Policy and education** Health risk assessment responsibility at the Port (ongoing) Participate in air quality policy and funding forums (ongoing) **Other equipment and fuels** Construction equipment incentive CNG station (ongoing) Port-owned vehicle fleet (ongoing) **Research** Investigate technologies and grants opportunities (ongoing) Track MAQIP progress through BAAQMD air monitoring (ongoing) Track MAQIP progress through emissions inventories (prepare bi-annually) **Ships** Infrastructure for shore power (ongoing) Voluntary compliance with fuel regulations (ongoing) **Trucks** Additional enforcement of truck parking or operations on neighborhood streets (ongoing) Comprehensive Truck Management Program (ongoing) Provision of parking areas (ongoing) Truck idling outreach and education (ongoing) Truck registration and tracking (ongoing) Truck work groups (ongoing)

[1] All dates are estimated.

Figure 9-4. Timeline of Port programs and projects.

10 MONITORING AND REPORTING

Monitoring takes on multiple meanings in this plan. It can mean:

- monitoring the execution of an emissions reduction project
- monitoring the results of an emissions reduction project
- monitoring the results of the MAQIP commitments

To monitor effectively, business partners, funding agencies, community members and other stakeholders need to be kept informed through reporting. Given the effort invested in developing the MAQIP by the Task Force members, it is important that those stakeholders, in particular, be kept informed on the Port's and tenants' progress towards meeting the MAQIP goals.

10.1 Project Execution Monitoring and Reporting

During the planning and execution of a Port-sponsored emissions reduction project, the staff project manager is responsible for providing periodic updates on the project status. For example, projects funded through the Vision 2000 Air Quality Mitigation Program are reported on formally through annual or more frequent written reports to West Oakland Neighbors and other community members. Informal status reports are provided verbally in meetings with air quality, community and maritime stakeholders (e.g. West Oakland Toxic Reduction Collaborative, Maritime tenants' and customers' meetings) or through e-mail communications. Those informal communications often provide an opportunity to discuss project issues and approaches with stakeholders. The planned maritime stakeholder group will be a dedicated forum for sharing the status of a project during development and execution and discussing issues associated with the project.

Because of the acute interest by the residential and environmental communities in emissions reduction projects, the Port intends to provide a written status report on those projects at least annually. Reports will be presented to the Board of Port Commissioners or one of its committees, and will be made available to the community on the Port's web site. The Port will also request updates from tenants on their programs and projects to include in status reports. Informal reporting and discussions will continue through both existing and potentially new forums.

10.1.1 Adaptive Management

A benefit of discussing projects with knowledgeable stakeholders during the planning and early implementation stages is that problems can be detected and analyzed more readily than without their participation. Continually evaluating the progress and early results of a project, then adjusting actions accordingly can create a more successful effort than originally envisioned, or salvage a complicated project. An adaptive management approach could dictate changes that range from revising project guidelines (e.g., change the cost-effectiveness criteria or allowable engine years in a truck replacement project), to canceling a project entirely.

10.2 Project Results Monitoring and Reporting

Emissions reductions occurring as a result of a specific project can normally be estimated with some accuracy, especially if periodic reporting is required as part of the participation in the project (e.g., truck or container equipment replacement or retrofits). Collecting data periodically from project equipment recipients and estimating emissions reductions can provide milestones towards the goal of emissions reduction above and beyond those required by regulations. For consistency, the emissions calculator used to qualify a project could be used to estimate later emissions, although methodologies and emission factors are occasionally revised.

Results of follow-up monitoring will be reported through annual, or more frequent, written status reports to the Board and the community.

10.3 MAQIP Goal Monitoring and Reporting

Measuring the Port's overall progress towards meeting its goals requires periodically updating the Portwide emissions inventory for each source category (i.e., ships, harborcraft, terminal yard equipment, trucks and trains), then linking the Port's maritime emissions to its community health risk.

Reports from the CARB, BAAQMD, and EPA on the results of their emissions reduction regulations will supplement the Port's emissions inventory.

10.3.1 Emissions Inventory

A key element in tracking implementation of the MAQIP involves development of regular updates to the Port emission inventory. The Port prepared a comprehensive inventory of pollutant emissions from Port related ships and associated harbor craft activity as well as cargo handling equipment, trucks, and locomotives operating on Port property that was representative of activity occurring in 2005. As new emission control technologies are introduced in response to regulations and other initiatives undertaken by the Port, its tenants or other groups, it will be necessary to track the resulting reductions in emissions with respect to the MAQIP goals. To accomplish this, the Port intends to update the emission inventory on a regular basis. Current plans call for inventory updates to be prepared at two year intervals, beginning with the calendar year 2008 emissions. Given the time it takes to compile the inventory, there will be a time lag of at least 12 months after the close of the inventory year before the inventory results can be reported. The frequency of the inventories is subject to change depending on prioritization of Port resources.

Development of a full inventory for sources at the Port is a complex process involving collection of data on all emission generating activities (ship calls, berthing times, truck trips, etc.), equipment (engine types and sizes, exhaust after treatment devices), operating parameters (engine loads, travel speeds, idling times, etc.), and associated emission factors. In order to provide regular emission updates with reasonable efficiency, the Port is evaluating the feasibility of developing a streamlined process by which the updated emissions can be more easily generated based on data to be supplied by the Port's tenants.

10.3.2 Risk Assessment

With regularly updated emission inventories for Port sources, the process of tracking the degree of risk reduction in the West Oakland community relative to the Port's goal on an approximate

basis is relatively straightforward. Results from CARB's West Oakland risk assessment study, as summarized in Table 5-3, provide the quantitative link between changes in emissions for each major source group and the excess cancer risk from exposure to DPM emissions experienced by West Oakland residents. The data in this table can be used to revise the estimated cancer risk based on the revised emission inventory. In this way, progress towards the diesel PM cancer risk reduction goal can be periodically tracked without repeating the resource-intensive health risk assessment effort.[1]

10.3.3 Ambient Air Monitoring

The Port is talking to the BAAQMD regarding a local air monitoring program. The BAAQMD program is aimed at collecting ambient air data to better understand relationships between emissions, pollutant concentrations in the air, exposure, and ultimately health risk. The extent and timing of the Port's potential contribution to this program has yet to be determined.

10.4 Report Summary

The Port commits to regular reporting as outlined in Table 10-1 to facilitate continued involvement of stakeholder and interagency groups, in addition to updating the community and public on emissions and risk monitoring. Major reporting tasks will include tracking growth of Port activity and emission reductions and documenting progress towards implementation of the MAQIP. The targeted frequency for some resource-intensive reports, such as the emissions inventory and health risk updates, may be delayed if budget and staff are not available.

The Port will continue to meet regularly with tenants and partners. Tenants will be asked to report periodically on the status of air quality improvements, regardless of whether they are participating in a Port or grant-funded incentive program. The Port will continue to participate in agency-only discussions via an Interagency Group.

[1] It should be noted that this approach will only yield a rough estimate of risk reduction because it does not account for changes in the spatial distribution of sources which may occur over time. For example, development of the former Oakland Army Base will create new sources where non existed previously, thus somewhat altering the relationship between changes in emissions and changes in health risk established in CARB's study.

Table 10-1. MAQIP reports list.

Report	Purpose	Frequency	Estimated Release Date
Reports to Stakeholder Advisory Group	Update Stakeholder Advisory Group on progress towards implementing the MAQIP and achieving the MAQIP goals	At least once per year	September 2008
Emission reduction projects and programs status reports	Update the Board and community on the status of emissions reduction projects and programs	Anticipated at least annually	December 2008
Emission Inventory Update	Provide regular updates on current levels of DPM, NOx and other pollutant emissions	Anticipated once every two years (first update may be for 2008 emissions)	2009 and every two years thereafter
Community health risk updates (using factors from 2005 West Oakland Health Risk Assessment)	Provide updates on community health risk reductions resulting from emission reductions at the Port	After emissions inventory releases.	2009 and every two years thereafter
Tenants' progress reports on emission reduction initiatives	Provide information on progress made by the Port's tenants in implementing emission reduction measures	Periodically, depending on extent of tenant projects.	Various
Port staff report to the MAQIP Interagency Group	Provides regulatory and other government agencies with regular updates on progress in MAQIP implementation	Quarterly 7/1/08 – 6/30/09 and at least annually thereafter	July 2008

10.5 Ongoing Stakeholder Input

Port staff is currently conducting an inventory and assessment of all of its stakeholder groups in an effort to create a comprehensive Maritime stakeholder group. This group would consider recommendations from the MAQIP, CTMP, Oakland Mayor's Task Force (2007) and the Oakland Partnership (sponsored by the Chamber of Commerce), and similar groups as they pertain to the Port and the neighboring community.

This Maritime stakeholder group will be comprised of key air quality agency staff, community members, Port maritime tenants, other maritime businesses, and other organizations. The stakeholder group will be advisory to the Port.

This group will provide the opportunity for the community, industry and Port to meet on a regular basis. It is proposed that the group will meet 3 times annually in 2008-2009 during the months of September, February and May. Thereafter, the meeting schedule will transition to quarterly or semi-annually.

The comprehensive Maritime stakeholder group may require smaller working groups to address topics such as monitoring of MAQIP implementation. Such working groups will be established

as needed, and will be advisory to the Maritime stakeholder group. Below are some examples of what the stakeholder group is envisioned to address:

- **Monitoring:** Monitor implementation of specific MAQIP initiatives.
- **Community Outreach:** Assist with communicating the status of MAQIP projects with the local community.
- **Research/Study**: Investigate technologies and funding opportunities for potential emissions reductions strategies identified in the MAQIP.
- **Funding and Policy**: Through the Interagency Group, continue efforts to identify, coordinate and pursue funding sources, proposed policy/legislative initiatives and compliance with regulatory initiatives.