California Environmental Protection Agency

Air Resources Board

Public Meeting Agenda

LOCATION:
California Department of Transportation
111 Grand Avenue
1st Floor, Auditorium
Oakland, California 94612

This facility is accessible by public transit. For transit information, go to website http://www.bart.gov/index.asp (This facility is accessible to persons with disabilities.)

TO SUBMIT WRITTEN COMMENTS ON AN AGENDA ITEM IN ADVANCE OF THE MEETING GO TO:
http://www.arb.ca.gov/lispub/comm/bclist.php

April 24, 2008
9:00 a.m.

Item #

08-4-1: Health Update: Effects on the Heart from Particulate Matter Exposure and a Possible Role of Genetics

Staff will update the Board on the findings of a study that investigated the linkage between fine particle-associated heart function abnormalities and a gene involved in iron metabolism. The results suggest that people who have a variant form of this gene are at least partially protected against fine particle-induced heart function changes compared to people who have the non-variant form of the gene, indicating a possible role of genetics in sensitivity to particulate matter.

08-4-2: Public Meeting to Consider a Research Proposal

Lifecycle Analysis of High- Global Warming Potential Greenhouse Gas Destruction," $300,000, RFP No. 07-330.

08-4-3: Public Meeting to Consider the Appointments to the Research Screening Committee

The Board's legislatively mandated Research Screening Committee consists of scientists, engineers, and others knowledgeable, technically qualified, and experienced in air pollution problems. The Committee meets approximately four times a year to review proposed and completed research projects. ARB staff will propose two new members be appointed to the Committee.

08-4-4: Presentation on the Bay Area Air Quality Management District's Climate Protection Program

On June 1, 2005, the Bay Area Air Quality Management District initiated a climate protection program. Jean Roggenkamp, Deputy Air Pollution Control Officer, will be presenting on the Bay Area climate protection activities, including efforts such as the $3 million grant program, 4th and 5th grade curriculum, greenhouse gas regional emission inventory, ICLEI-BAAQMD workshop series, and the greenhouse gas reduction technology study.

08-4-5: Report to the Board on AB 32 Implementation Update on Electricity and Natural Gas Sector

ARB staff will provide an update on climate change activities in the electricity and energy sector.

08-4-6: Report to the Board on Health Risk Assessment for the Port of Oakland and West Oakland Community

The staff will present the results of the comprehensive West Oakland health risk assessment, including the Port of Oakland and surrounding community in West Oakland.

08-4-7: Update the Board on the Air Resources Boards' 2006 of the Emission Reduction Plan for Ports and Goods Movement in California

Staff will provide an update on progress made in implementing the Emission Reduction Plan for Ports and Goods Movement in California (Plan) including: rulemakings, enforcement, technological development, public outreach, additional risk assessments and challenges faced.

08-4-8: Public Hearing to Consider Approval of Modified Transportation Conformity Budget Contained in the 2007 Air Quality Management Plan for Attaining the Federal 8-Hour Ozone and PM 2.5 Standard in the South Coast Air Basin

The Board will consider revisions to the conformity budgets for the South Coast Air Basin. The proposed revisions are intended to address concerns raised by the U.S. Environmental Protection Agency, and are being considered by the Board at the request of the Southern California Association of Governments and the South Coast Air Quality Management District.

08-4-9: Update the Board on the Status of the 8-Hour Ozone Plan

Staff will update the Board on the status of the federal 8-hour ozone attainment demonstration plans being prepared for the Western Mojave Desert, Ventura County, and the Sacramento Metropolitan Ozone Nonattainment Areas.

08-4-10: Report to the Board on an Update on the 2005 ARB/Railroad Statewide Agreement

Staff will provide an update to the Board on the implementation efforts for the Statewide Rail Yard Agreement. The last update was provided at the July 27, 2007, ARB meeting.

CLOSED SESSION – LITIGATION

The Board will hold a closed session as authorized by Government Code section 11126(e) to confer with, and receive advice from, its legal counsel regarding the following pending litigation:

East Yard Communities for Environmental Justice (East Yard Communities) v. ARB, Case No. CASE NO. 2:08-CV-00473-R.

Central Valley Chrysler-Jeep, Inc. et al. v. Goldstene, U.S. District Court (E.D. Cal. - Fresno), No. 1:04-CV-06663-AWI-GWA.

Fresno Dodge, Inc. et al. v. California Air Resources Board and Witherspoon, Superior Court of California (Fresno County), Case No. 04CE CG03498.

General Motors Corp. et al. v. California Air Resources Board and Witherspoon, Superior Court of California (Fresno County), Case No. 05CE CG02787.

State of California by and through Arnold Schwarzenegger, Governor of the State of California, and the California Air Resources Board v. U.S. Environmental Protection Agency and Stephen L. Johnson, Administrator, U.S. Court of Appeals (D.C. Cir.), Case No. 07-1457, filed November 8, 2007.

State of California by and through Arnold Schwarzenegger, Governor of the State of California, and the California Air Resources Board v. U.S. Environmental Protection Agency and Stephen L. Johnson, Administrator, U.S. District Court (D.C.) Case No. 07-CV-o2024-RCL, filed November 8, 2007.

State of California by and through Arnold Schwarzenegger, Governor, and the California Air Resources Board v. U.S. Environmental Protection Agency, and Stephen L. Johnson, Administrator, U.S. Court of Appeals (9th Cir.) Case No. 08-70011, filed January 2, 2008.

Green Mountain Chrysler-Plymouth-Dodge-Jeep, et al. v. Crombie , 508 F.Supp.2d 295, U.S. District Court Vermont (2007), appeal to 2nd Circuit Court of Appeals pending, Docket Nos. 07-4342-cv(L) and 07-4360-cv(CON).

OPPORTUNITY FOR MEMBERS OF THE BOARD TO COMMENT ON MATTERS OF INTEREST.

Board members may identify matters they would like to have noticed for consideration at future meetings and comment on topics of interest; no formal action on these topics will be taken without further notice.

OPEN SESSION TO PROVIDE AN OPPORTUNITY FOR MEMBERS OF THE PUBLIC TO ADDRESS THE BOARD ON SUBJECT MATTERS WITHIN THE JURISDICTION OF THE BOARD.

Although no formal Board action may be taken, the Board is allowing an opportunity to interested members of the public to address the Board on items of interest that are within the Board's jurisdiction, but that do not specifically appear on the agenda. Each person will be allowed a maximum of three minutes to ensure that everyone has a chance to speak.

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http://www.arb.ca.gov/lispub/comm/bclist.php

IF YOU HAVE ANY QUESTIONS,
PLEASE CONTACT THE CLERK OF THE BOARD
1001 I Street, 23rd Floor, Sacramento, CA 95814

(916) 322-5594
FAX: (916) 322-3928
ARB Homepage: www.arb.ca.gov

To request special accommodation or language needs, please contact the following:

- **For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. Please contact ARB's Disability Coordinator at 916-323-4916 by voice or through the California Relay Services at 711, to place your request for disability services.**
- **If you are a person with limited English and would like to request interpreter services to be available at the Board meeting, please contact ARB's Bilingual Manager at 916-323-7053.**

THE AGENDA ITEMS LISTED ABOVE MAY BE CONSIDERED IN A DIFFERENT ORDER AT THE BOARD MEETING.

SMOKING IS NOT PERMITTED AT MEETINGS OF THE CALIFORNIA AIR RESOURCES BOARD

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

LOCATION:
California Department of Transportation
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Oakland, California 94612

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April 24, 2008
9:00 a.m.

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CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER A HEALTH RISK ASSESSMENT FOR THE PORT OF OAKLAND AND WEST OAKLAND COMMUNITY

The Air Resources Board (the Board or ARB) will conduct a public meeting at the time and place noted below to consider a staff presentation on the Diesel Particulate Matter Health Risk Assessment for the Port of Oakland and West Oakland Community.

DATE: April 24, 2008

TIME: 9:00 a.m.

PLACE: California Department of Transportation
111 Grand Avenue
1st Floor, Auditorium
Oakland, California 94612

This item will be considered at a one-day meeting of the Board, which will commence at 9:00 a.m., April 24, 2008. Please consult the agenda for the meeting, which will be available at least 10 days before April 24, 2008, to determine the order of agenda items.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. Please contact ARB's Disability Coordinator at 916-323-4916 by voice or through the California Relay Services at 711, to place your request for disability services. If you are a person with limited English and would like to request interpreter services, please contact ARB's Bilingual Manager at 916-323-7053.

This presentation will provide the preliminary summary of results of the diesel particulate (diesel PM) health risk assessment that was conducted in cooperation with the Bay Area Air Quality Management District, the Maritime Port of Oakland, and the Union Pacific Railroad. The purpose of the study was to better understand the emissions impacts and the potential public health risk from exposures to diesel PM due to activities at the Maritime Port of Oakland and other significant sources of diesel exhaust in and near the West Oakland community and to provide information to help evaluate the effectiveness of possible mitigation measures.

ARB staff will present an oral report at the meeting. This presentation will describe the study design, explain results of the study, provide key findings, and discuss projected future emissions and risk levels with implementation of adopted and planned regulations. Documents related to this presentation are available at http://www.arb.ca.gov/ch/communities/ra/westoakland/westoakland.htm.

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by email before the meeting. To be considered by the Board, written comments and email submissions not physically submitted at the meeting must be received **no later than 12:00 noon, April 23, 2008**, and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Facsimile submittal: (916) 322-3928

Please note that under the California Public Records Act (Government Code section 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and other search engines.

The Board requests, but does not require 30 copies of any written submission. Also, the ARB requests that written and email statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have time to fully consider each comment. Further inquiries regarding this matter should be directed to Dan Donohoue, Chief, Emissions Assessment Branch, (916) 322-6023 or ddonohou@arb.ca.gov.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

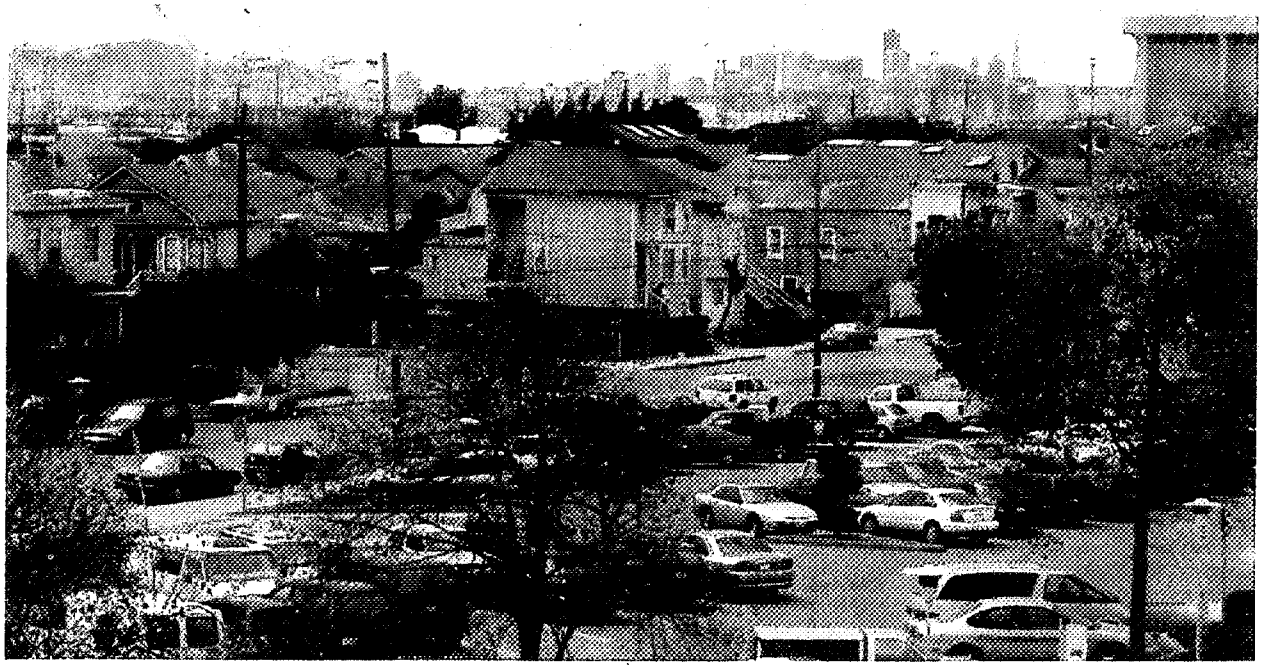
Date: April 8, 2008

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov

DRAFT

DIESEL PARTICULATE MATTER HEALTH RISK ASSESSMENT FOR THE WEST OAKLAND COMMUNITY

Preliminary Summary of Results



March 19, 2008
State of California
AIR RESOURCES BOARD

California Environmental Protection Agency
Air Resources Board

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DIESEL PARTICULATE MATTER HEALTH RISK ASSESSMENT FOR THE WEST OAKLAND COMMUNITY
Preliminary Summary of Results

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Acknowledgements

Air Resources Board staff extends its appreciation to representatives of the Port of Oakland, Environ Corporation, and the Bay Area Air Quality Management District for providing assistance with preparation of the emissions inventory data and spatial allocation of emissions.

The staff of the Air Resources Board has prepared this report. Publication does not signify that the contents reflect the views and policies of the Air Resources Board.

DIESEL PARTICULATE MATTER HEALTH RISK ASSESSMENT FOR THE WEST OAKLAND COMMUNITY
Preliminary Summary of Results

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I. INTRODUCTION, KEY FINDINGS, and RECOMMENDATIONS

A. Introduction

The California Air Resources Board (ARB or Board) conducted a health risk assessment (HRA or study) to help understand the emissions impacts and the potential public health risk from exposures to diesel particulate matter (diesel PM) due to activities at the Maritime Port of Oakland and other significant sources of diesel exhaust in and near the West Oakland community. The West Oakland community is located in Oakland, California and is bounded by the Maritime Port of Oakland (the Port), the Union Pacific Railyard, and the I-580, I-880, and I-980 freeways. Approximately 22,000 people reside in West Oakland and, as trade through the Port has increased, many residents have voiced concerns about the health impacts from exposures to diesel exhaust. An aerial photograph of the West Oakland community is provided in Figure 1.

Figure 1: Aerial Map of the West Oakland Community

This study was a cooperative effort between the ARB and the Bay Area Air Quality Management District (BAAQMD). Both the Port and the Union Pacific (UP) Railroad assisted by providing information on their local marine and rail operations located near the West Oakland community. The study was designed to enhance our understanding of diesel PM emission impacts by evaluating the current and future contributions of diesel PM emissions from sources at the Port, the Union Pacific Railyard, local freeways

and other sources of diesel PM near the West Oakland community on the potential health impacts for people living in the West Oakland community. This information will assist in the efforts underway to reduce diesel PM emissions by helping to identify the sources that have the greatest impact on potential cancer risks to nearby residents and by providing a tool that will allow evaluation of the impacts of measures adopted, planned, and under development that are designed to reduce diesel PM emissions. In addition, the information from this study is being used to satisfy Union Pacific Railroad and ARB's commitment under the Statewide Railroad Agreement (CARB, 2005) wherein health risk assessments are required for each major railyard. This HRA fulfills that commitment for the Union Pacific Railroad's Oakland Railyard.

This report provides a preliminary summary of the results from the study in a less technical and more easily understood format. A more comprehensive and technical report that provides a description of the supporting technical basis for the study and a more comprehensive summary of the results is also under development and will be available in June 2008 at http://www.arb.ca.gov/ch/communities/ra/westoakland/westoakland.htm. We do not expect the final comprehensive report to impact the findings in this preliminary summary report.

B. Key Findings

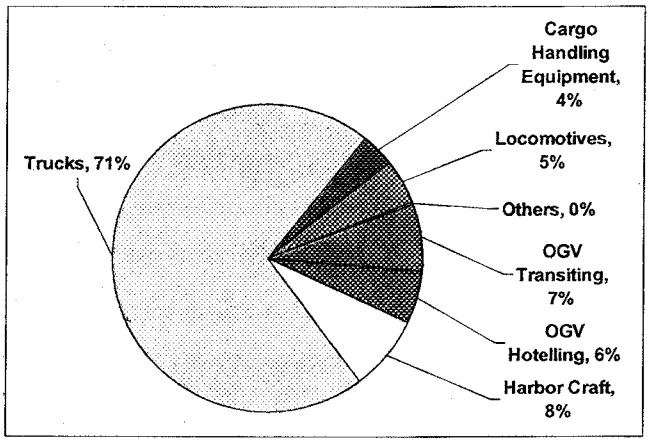
The ARB conducted a HRA to help understand the emissions impacts and the potential public health risk from exposures to diesel PM associated with activities at the Port, the UP Railyard, and other significant sources of diesel exhaust in and near the West Oakland community. The impacts from diesel PM emissions on the West Oakland community as well as on the broader regional San Francisco Bay Area were evaluated. As will be described later in this report, the diesel PM emission sources were allocated to three Parts. Part I included the diesel PM emissions from Port operations; Part II encompassed activities at the UP Railyard; and Part III included other diesel PM emissions from activities not included either in Part I or Part II such as ocean-going vessels (OGV) destined for San Francisco Bay ports other than the Port of Oakland, on-road heavy-duty trucks not transporting goods to and from the Port, harbor craft such as the commercial ferries used to transport passengers across the bay, and local distribution centers in and near the West Oakland community.

The key findings that can be drawn from the study are:

- The West Oakland community is exposed to diesel PM ambient concentrations that are almost three times the average background diesel PM ambient concentrations in the BAAQMD.
- The estimated lifetime potential cancer risk for residents of West Oakland from exposure to diesel PM emissions is about 1,200 excess cancers per million. This estimate assumes residents are exposed to the year 2005 levels of diesel PM emissions (Port and UP operations, and non-Port/non-UP marine and land-based diesel sources) continuously for 70 years.

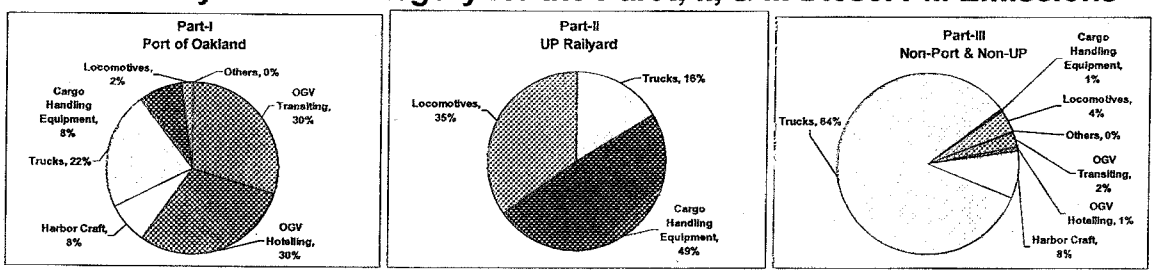
- The potential health risks in the West Oakland community from exposures to diesel PM emissions are of significant concern. Diesel PM emissions from Port operations result in an estimated lifetime potential cancer risk of 200 excess cancers per million in the West Oakland. Diesel PM emissions from the UP Railyard result in potential cancer risks of about 40 excess cancers per million and emissions from non-Port and non-UP sources about 950 excess cancers per million.
- As shown in Figure 2, the emissions from on-road heavy-duty trucks result in the largest contribution to the overall potential cancer risks levels in the West Oakland community, followed by OGV (combined transiting, maneuvering, anchoring, and hotelling emissions), harbor craft, locomotives, and cargo handling equipment.

Figure 2: Percent Contribution to the West Oakland Community Potential Cancer Risk by Source Category for the Combined Part I, II, & III Diesel PM Emissions



- The contribution to the potential cancer risk in the West Oakland community from the different Parts varies. As shown in Figure 3, for the Port diesel PM emission sources, the OGV transiting (includes maneuvering and anchoring) and hotelling emissions are responsible for the largest contribution to the potential cancer risks in the West Oakland community followed by on-road trucks and cargo handling equipment. Cargo handling equipment at the UP Railyard is responsible for the largest contribution from the UP activities followed by locomotives. For the Part III sources, those sources in or near the West Oakland community that are not associated with either the Port or the UP Railyard, the on-road trucks are responsible for over 80 percent of the contribution to the potential cancer risks in the West Oakland community.

Figure 3: Percent Contribution to the West Oakland Community Potential Cancer Risk by Source Category for the Part I, II, & III Diesel PM Emissions



- The impact of emissions on potential cancer risk also varies by source category. With respect to activities at the Port of Oakland, reducing truck emissions will have the greatest impact on reducing potential cancer risk in the West Oakland community, followed by locomotive, then OGV emissions.
- On a regional basis, diesel PM emissions from Port operations impact a very large area, about 550,000 acres. More than 3 million people live in this area and as a result of the diesel PM emissions from the Port, have potential elevated cancer risks of more than 10 chances in a million. Overall, the Port emissions result in a regional population-weighted potential cancer risk of about 27 in a million. OGV emissions are the largest contributor to the regional risk due to Port-related activities, responsible for about 85 percent of overall average potential cancer risks.
- On a regional basis, diesel PM emissions also result in non-cancer health impacts. Due to diesel PM from Port operations, there are an estimated 18 premature deaths per year, 8 hospital admissions for respiratory and cardiovascular problems, about 290 cases of asthma-related and other lower respiratory symptoms, and 15,000 minor restricted activity days.
- Diesel PM emissions and the associated cancer and non-cancer health risk will be reduced in the West Oakland community by about 80 percent by 2015 due to ARB's regulatory actions. However, even with these actions, the remaining cancer risk will be greater than 200 in a million in the West Oakland community.
- Additional actions are needed in the near-term to accelerate emission reductions and to reduce the health impacts from diesel PM emissions in the West Oakland community and the region as a whole. Actions are also necessary to help offset growth and further reduce risk levels in future years.

C. Recommendations

The findings described above demonstrate that people living in the West Oakland community are exposed to unhealthful levels of diesel PM emissions and that these emissions will decline as adopted and planned regulatory programs are implemented. However, even with the benefits from these regulatory programs, the residual risks are unacceptable and much more needs to be done to ensure that the potential cancer risks are reduced quickly and that programs are developed to offset the expected growth in emissions as global trade expands. Achieving emission reductions from the myriad of diesel PM emission sources is a challenging task and success depends on collective and innovative efforts at the community, local, State, federal and International levels. It

is not possible to meet this challenge alone. There also isn't one approach that can be used to reduce emissions from the ships, locomotives, trucks, and other diesel-fueled vehicles and equipment. A variety of strategies are needed including regulatory efforts, voluntary and incentive programs, careful land-use decisions and cooperative agreements.

With that in mind, as well as the accomplishments to date in the efforts to reduce diesel PM, we have several recommendations to take under consideration including:

- Maximize emissions and risk reduction as quickly and early as possible
  As this risk assessment shows, current health risks in the West Oakland community and the Bay Area region as a whole are too high. While ARB has a regulatory program in place, further efforts are needed to achieve additional emissions reductions.

  - The ARB, BAAQMD, the Port and its tenants, UP, and the community should work cooperatively to identify, prioritize, and implement actions beyond those identified in the Statewide Goods Movement Emission Reduction Plan to reduce diesel PM and other air emissions as quickly as possible.
  - The ARB, BAAQMD, the Port and its tenants, UP, and the community should work cooperatively to encourage and support national and international efforts to reduce emissions from ocean-going vessels as well as national efforts to reduce emissions from locomotives.

- Build and leverage funding sources to ease transition to clean technologies
  Regulatory programs designed to reduce emissions from trucks, ocean-going vessels, commercial harbor craft, and cargo handling equipment are expensive. The State has established funding opportunities which need to be utilized to their fullest extent to help ease the transition. The Port of Oakland should work in concert with ARB, the BAAQMD, and other stakeholders to identify additional funding opportunities.

  - The Port should work with the ARB, the BAAQMD, and the terminal operators to secure any incentive funding that may be available through the Carl Moyer Memorial Air Quality Standards Attainment Program.
  - The Port should work with the ARB, the BAAQMD, the terminal operators, and trucking companies to take advantage of the Proposition 1B Goods Movement Emission Reduction Program funds. These funds directly support early and accelerated diesel PM emission reduction programs and can help ease the transition into compliance with adopted and proposed ARB regulations.
  - The Ports of Los Angeles and Long Beach are implementing an Infrastructure Cargo Fee designed to provide a large supplemental funding source for infrastructure and air quality improvements. The Port of Oakland should consider such a program or similar mechanism to ensure sufficient funding is available to meet air quality goals.

- Ensure successful implementation of ARB regulations
Achieving successful implementation of ARB regulations in the Bay Area will achieve major emissions reductions in the West Oakland community. Achieving these goals requires ARB, the Port of Oakland, UP, BNSF, and private industry to work together and cooperate to ensure emissions reductions are achieved. Specific initiatives include the following:

  - The BAAQMD, the Port and its tenants, UP, and the community should actively work to support the adoption of the proposed regulations "*Fuel Sulfur and Other In-Use Operational Requirements for Main Propulsion Diesel Engines and Auxiliary Boilers Operated on Ocean-Going Vessels Within California Waters And 24 Nautical Miles of the California Baseline*" and "*Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants, and Greenhouse Gases from In-Use Heavy-Duty Diesel-fueled Vehicles.*" These proposed regulations are scheduled for ARB consideration in 2008 and are critical to reducing diesel PM emissions not only throughout the State but also in the West Oakland community.
  - The Port should work with the terminal operators, the local electrical utilities, and vessel operators to comply with ARB's regulation to reduce hotelling emissions. This may include the installation of shore power infrastructure to support cold-ironing for ships that visit the Port, negotiating with the local electrical utilities for reduced tariffs, and encourage vessel modifications to reduce emissions.
  - The Port of Oakland should continue to work closely with ARB staff on the registration requirements, funding issues, and development of a plan to meet the regulatory requirements for the Drayage Truck regulation.
  - UP Railroad should continue to aggressively work to fulfill commitments made in the 2005 ARB/Railroad State Wide Agreement *"Particulate Emissions Reduction Program at California Rail Yards."* Key elements for the agreement between the ARB and the Railroads (UP and BNSF) include the identification and implementation of future feasible mitigation measures based on the results of the railyard HRA.

- Continue to study trucking operations at the Port and in West Oakland
As discussed in this assessment, emissions estimates representing trucks are uncertain. We propose additional actions be taken to better understand the impact of drayage trucks on a regional basis, and both drayage and other trucks on the West Oakland community.

  - The BAAQMD should continue working with the community and the Port to implement its studies of trucking operations in the West Oakland community
  - The Port of Oakland should conduct a port truck survey and origin/destination study that investigates where Port truck trips begin, how

Port trucks travel through the local community, and where Port trucks ultimately deliver their cargo.

- The BAAQMD and ARB should consider revisiting findings from this risk assessment if new information about trucking operations in West Oakland deviates significantly from findings developed in this assessment.

II. BACKGROUND AND STUDY OVERVIEW

Diesel engines emit a complex mixture of air pollutants, composed of gaseous and solid material. The visible emissions in diesel exhaust are known as particulate matter or PM, which includes carbon particles or "soot." In 1998, following a 10-year scientific assessment process, ARB identified diesel PM as a toxic air contaminant based on its potential to cause cancer and other health problems, including respiratory illnesses, and increased risk of heart disease. Subsequent to this action, research has shown that diesel PM also contributes to premature deaths (ARB, 2002). Health risks from diesel PM are highest in areas of concentrated emissions, such as near ports, railyards, freeways, or warehouse distribution centers. Exposure to diesel PM is a health hazard, particularly to children whose lungs are still developing and the elderly who may have other serious health problems.

Diesel PM is a significant component of particulate matter in many cities. Diesel PM is composed of carbonaceous particles (soot) and particles that can form from nitrogen oxides (NO_X) and oxides of sulfur (SOx) emitted by diesel engines. The health impacts of particulate matter (PM10 and PM 2.5) have been studied in epidemiological studies conducted in many different cities. These studies have found an increase of one to two percent in daily mortality associated with each 10 $\mu g/m^3$ increase in PM10 exposure. The most vulnerable subpopulations are those with preexisting respiratory or cardiovascular disease, especially the elderly. In addition, increased hospital admissions and illnesses from respiratory disease have been associated with particulate matter exposure in adults and children. Numerous epidemiological studies have also found an association between exposures to diesel PM and an increased risk of lung cancer.

*A **risk assessment** is a tool used to evaluate the potential for a chemical or pollutant to cause cancer and other illnesses.*

Health risk assessments are a useful tool for comparing the potential health impacts of various sources of air pollution. In a risk assessment, the amount of diesel PM emitted from each source (e.g., truck or ship) is estimated. An air modeling computer program uses local meteorological data (e. g. wind speed and direction) to estimate the annual average ground level concentrations of diesel PM in the communities around the facility. The increased risk of developing lung cancer from exposure to a particular level of diesel PM can be estimated using the Office of Environmental Health Hazard Assessment's (OEHHA) cancer potency factor for diesel PM. The non-cancer health impacts of diesel PM exposure can also be quantified if the expected concentrations of a pollutant are high enough and there is enough population exposed to predict a result.

*For **cancer** health effects, the risk is expressed as the number of chances in a population of a million people who might be expected to get cancer over a 70-year lifetime. The number may be stated as "10 in a million" or "10 chances per million". Often, scientific notation is used and you may see it expressed as 1×10^{-5} or 10^{-5}. Therefore, if you have a potential cancer risk of 10 in a million, that means if one million people were exposed to a certain level of a pollutant or chemical there is a chance that 10 of them may develop cancer over their 70-year lifetime. This would be 10 new cases of cancer above the expected rate of cancer in the population. The expected rate of cancer for all causes, including smoking, is about 200,000 to 250,000 chances in a million (one in four to five people).*

These non-cancer impacts include premature death, hospital admissions, respiratory illnesses/asthma, and lost school/work days. However, the cancer health impacts have more commonly been used as the yardstick with which to compare the impacts of various diesel sources. Risk assessments have various uncertainties in the methodology and risk assessments are therefore deliberately designed so that risks are not under predicted. Risk assessments are best understood as a tool for comparing risks from various sources, usually for purposes of prioritizing risk reduction, rather than as a literal prediction of the incidence of disease in the exposed population.

A. West Oakland Community Health Risk Assessment Study Overview

West Oakland is bounded to the west and southwest by the Maritime Port of Oakland, the Union Pacific Railyard, and the I-880 freeway. The I-580 freeway traverses along the northern edge of the neighborhood, the I-980 freeway to the east and the I-880 freeway to the south. West Oakland covers about a three square mile area and is a diverse neighborhood. It is not uncommon to find light industrial, commercial, and residential areas intermixed within the same block. As mentioned earlier, to investigate the potential health impacts from exposures to diesel PM emissions, a health risk assessment was conducted. Below we provide brief summaries of the key elements for the HRA.

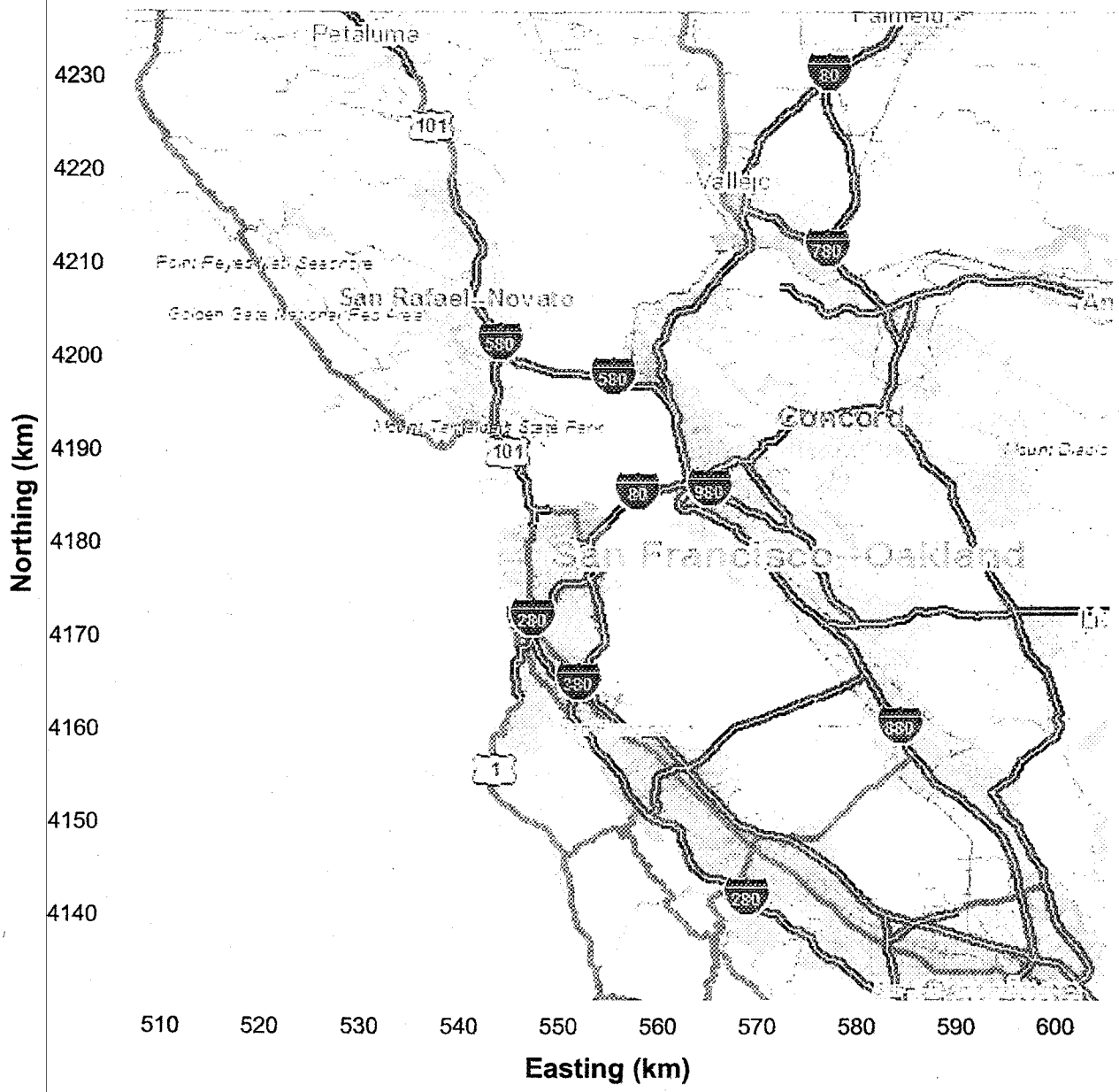
Study (Modeling) Domain

The study or modeling domain is the area in which the concentrations of diesel PM emissions in the atmosphere are to be determined. In this study, the modeling domain includes the Port, the ocean to the west of the Golden Gate Bridge out to the outer buoys, the inner bay waterway between Golden Gate Bridge and the Port, and the nearby communities. The size of the modeling domain was selected to ensure that the modeling effort would take into consideration all the diesel PM emissions. These emissions include all of the ship travel routes in the nearby ocean and the inner waterways to and from the Port, the Port property, and other land-based areas that could result in diesel PM emissions that would be expected to have risks level of 10 per million or greater. The modeling domain for the study is shown in Figure 4. It covers a 100 kilometer (km) by 100 km area (about 3,800 square miles).

For computer modeling purposes, the domain needs to be broken up into smaller areas referred to as grid cells. Selection of grid cell size reflected a compromise between the desire to define meteorological and geophysical variations on a very small scale, and the computer time and resources necessary to run the model. Given the complex terrain (sea-land, rolling mountains, etc.), non-uniform land-use characteristics, and the water bodies large enough to cause strong local-scale flows, we decided to use a grid cell size of 500 meters (m) x 500 m (about a third of a mile by a third of a mile) for the modeling effort. To provide a more detailed estimate of localized impacts of the emissions on the nearby community of the Port (West Oakland community), we used a grid cell size of 250 m x 250 m for the areas bordering the Port.

The meteorological grid was defined by 10 vertical layers. Cell heights were set at 20, 60, 80, 100, 300, 600, 1000, 1500, 2200, and 3000 meters above-ground level (AGL).

Figure 4: Modeling Domain for the West Oakland Community Health Risk Assessment



Air Pollutants Evaluated

The study focused on the impacts from diesel PM. As mentioned earlier, diesel PM is a toxic air contaminant and exposure to diesel PM emissions can result in serious health impacts. Previous studies have shown that diesel PM is responsible for over 70 percent of the potential cancer risk from all toxic air contaminants in California. (DDRP, 2000) Because the health impacts from diesel PM are so large and exceed the health impacts from other air toxics on a community and regional basis, we limited the study to diesel PM emissions and did not evaluate the impact of other toxic air contaminants on West Oakland of the region.

Sources and Locations of Diesel PM Investigated

There are many sources of diesel PM emissions within the study domain. Diesel PM emission inventories were prepared for all local sources of diesel PM that were expected to impact the West Oakland community. To help manage the development of the emissions inventory and to interpret the results, the study domain was segregated into three parts. Part I included the diesel PM activities associated with the Maritime Port of Oakland. Part II addressed diesel PM sources at the Union Pacific (UP) Railyard. Part III examined the other sources of diesel PM in the Bay (over-water) and those located in and near the West Oakland community. Both Parts I and III included emission sources that were located overwater such as ships, ferries and tug boats. Figures 5 and 6 provide aerial overviews of the land-based portions and the water-based regions for Parts I, II, and III. These are the areas in which we estimated the diesel PM emissions.

Figure 5: Land-based Emissions Domain for Parts I, II, and III

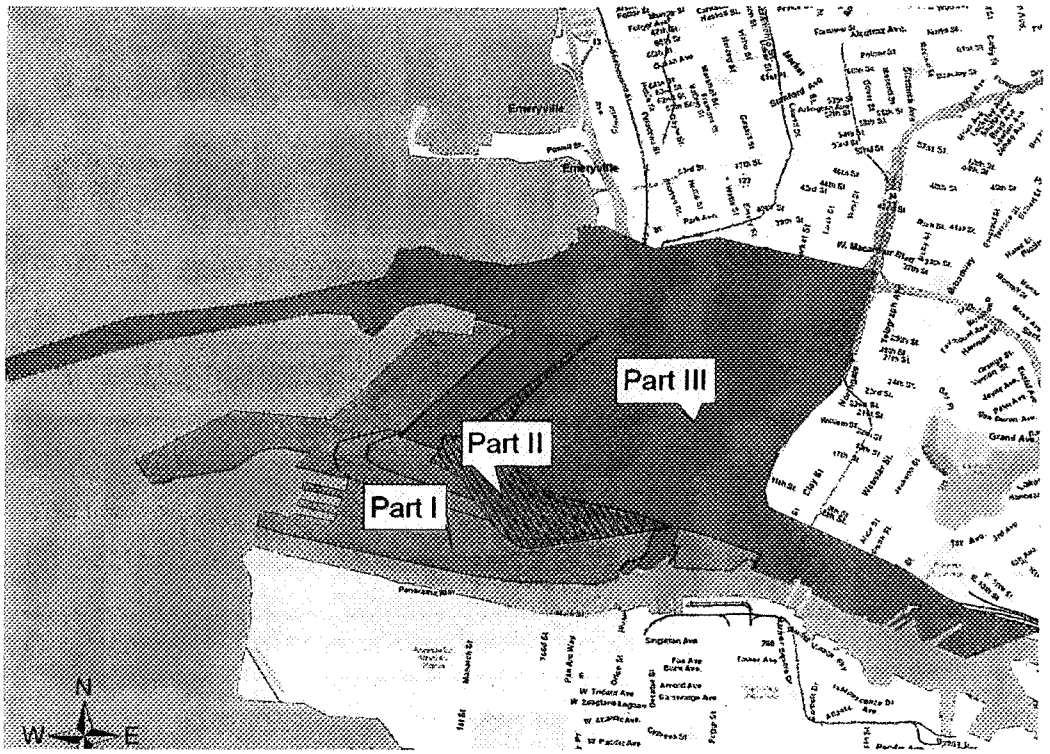
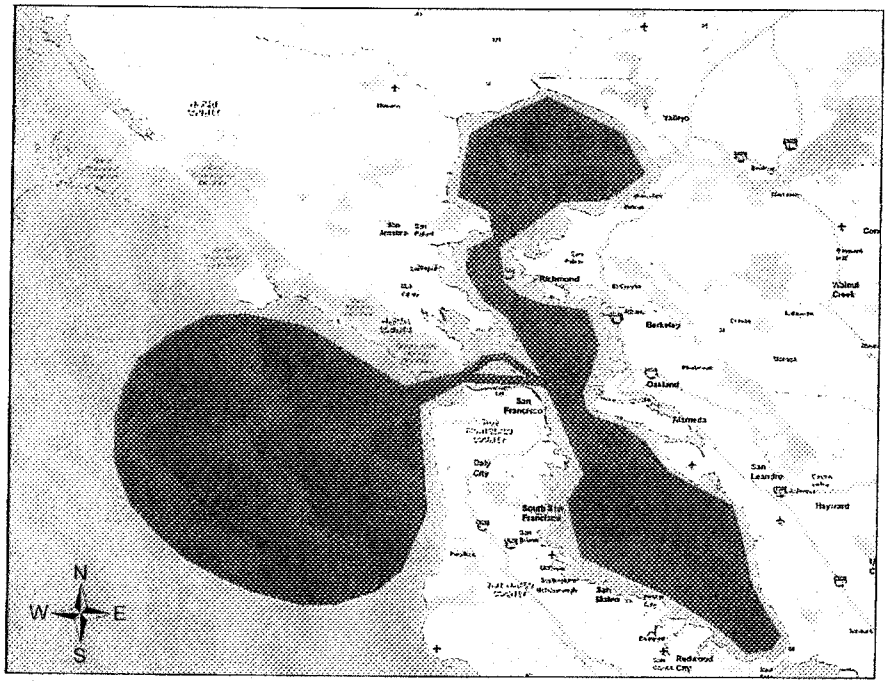


Figure 6: Overwater-based Emissions Domain for Parts I and III



In each area, there were a wide variety of operations and activities that resulted in emissions of diesel PM. In Table 1 below, we provide a summary of the various diesel PM emission sources inventoried in each Part.

Table 1: Sources of Diesel PM Evaluated in the HRA

Area	Description	Emission Sources Inventoried
Part I	Maritime Port of Oakland	ocean-going vessels, commercial harbor craft, cargo handling equipment, port drayage trucks operating on Port property, in West Oakland and on local freeways, on-port locomotives
Part II	Union Pacific Railyard	locomotives, cargo handling equipment, truck refrigeration units and reefer cars, drayage trucks
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, cargo handling equipment, locomotives, Amtrak Maintenance facility, major construction projects, stationary point sources, truck-based businesses and distribution centers

* Included in Part III were only ocean-going vessels destined for ports in the Bay Area other than the Port of Oakland

2005 Baseline Emissions Inventory

We compiled a 2005 baseline emissions inventory representing emission sources in Part I, Part II, and Part III. Part I emissions inventories were developed by the Port of Oakland and reviewed by ARB and BAAQMD staff. Part II emissions inventories were developed by Union Pacific and reviewed by ARB staff. Part III emissions inventories were developed by ARB, Port, and BAAQMD staff. Because inventories were categorized into different Parts, we took care to ensure each Part was distinct so as to avoid double-counting of emissions. Table 2 provides summary emissions estimates by source category and Part. As shown in Table 2, the emissions of diesel PM from Port-related activities were estimated to be approximately 265 per year for the Port (Part I), 11 tons per year for the Union Pacific Railyard activities (Part II), and about 570 tons per year for the other sources (Part III). All combined, it was estimated that there were approximately 845 tons of diesel PM emissions in 2005 from the combined activities. A more detailed summary for the Parts I, II, and III emissions inventory is provided in Appendix A. In addition, the Part I inventory prepared for the Port by Environ International Corporation (Environ) can be found at http://www.portofoakland.com/environm/airEmissions.asp. Additional information on the Part II inventory is provided in Appendix C and the details on the Part III inventory can be found in Appendix D.

It should be noted that the emissions totals for the various categories presented in Table 2 may be slightly different than the emissions presented in Appendix A. The emission inventory in Table 2 is the inventory used in the dispersion modeling. It differs slightly from the Appendix A inventory because, in some cases such as for Part III ocean-going vessels, the emissions inventory presented in Appendix A included emissions that were outside of the model domain. In addition, the Part I (port) heavy-duty diesel truck inventory used in the modeling exercise is different than that published in the Part I inventory prepared by the Environ for Port. The approximately 20 tons per year (T/Y) reported in Table 2 for Part I trucks includes approximately 2.8 T/Y emissions from port-truck activities on nearby freeways that was not included in the inventory prepared for the Port. It also includes on-site truck emissions from the Oakland Maritime Support Services (OMSS) facility (1.4 T/Y).

Table 2: Summary of Modeled 2005 Diesel PM Emissions for the West Oakland HRA

Source Category	Port of Oakland (Part I)	Union Pacific Railyard (Part II)	Non-Port & Non-UP (Part III)	Combined
	2005 Diesel PM Emissions Tons/Year			
Ocean-going Vessels	209	-	218	428
Cargo Handling Equipment	21	2.2	4.3	27
Heavy-duty diesel trucks	20	1.9	90	112
Commercial Harbor Craft	13	-	238	251
Locomotives	2.0	3.9	1.3	7.2
TRUs & Reefer Cars	-	3.2	-	3.2
Amtrak Maintenance Facility	-	-	3.4	3.4
Major Construction Projects	-	-	13	13
Stationary Point Sources	-	-	0.2	0.2
Total	265	11	568	845

Notes: Modeled emissions are different than emissions reported in Appendix A and D due to the size of the modeling domain being slightly smaller than the overall region in which emissions were estimated. For Part III, the "Major Construction Projects" includes community construction projects. Approximately 10% or 1.2T/Y of the 13 T/Y is due to emissions from construction projects on Port property. Part III trucks include on-road truck emissions from activities at distribution centers.

The emission inventory presented in Table 2 represents the most comprehensive inventory of diesel PM emissions in the West Oakland area that has been done. The inventory was compiled from ARB developed category-specific emissions inventory models, and additional data where necessary to allocate emissions spatially within the modeling domain. The inventory was reviewed by several organizations within ARB, and by the BAAQMD and the Port. Overall, there is general agreement that the inventory represents the best information available on each category of emissions source, and the magnitude of emissions in the modeling domain.

However, early on in the inventory development process, ARB staff realized that information on trucking activity, both associated with the Port of Oakland and trucking operations in the West Oakland community as a whole, was quite limited. For example, we have very limited information on the origin and destination of port truck trips both within and outside of the West Oakland community, and we have limited information on the intensity of non-port related trucking operations within the West Oakland community. We believe these data limitations have led to a potential overestimate of overall trucking emissions within the modeling domain and a potential underestimate of the overall fraction of trucking emissions that are attributable to the Port of Oakland. The implications of this are discussed later in this document.

Because of these data limitations, ARB staff has worked with BAAQMD staff in their development and implementation of new studies focused on improving the quantification of Port and non-Port trucking operations in the West Oakland community. These studies are necessary, and will provide information that can be used in the future to update and refine truck inventory estimates provided in this report. ARB staff has

also suggested that the Port of Oakland needs to conduct origin-destination truck surveys to better understand the location of trucking operations on both a regional basis, and within the West Oakland community. Without these studies, we cannot know with certainty the magnitude of trucking emissions that are attributable to the Port of Oakland that occur within the West Oakland community or on a regional basis.

Future Emissions Inventory

One of the goals of this health risk assessment was to estimate both baseline and future health risks associated with emissions from the Port of Oakland, the Union Pacific Railyard, and other emissions sources. Evaluating the potential health impacts in future years requires the use of emission inventories for future years. Forecasting emissions requires estimating the future growth, and the impact of current and pending State and federal regulations on each emissions source. To accomplish this task, we used a scaling approach that was derived from ARB reports and published emissions estimates and designed to simulate the combined impact of both growth and regulatory control trends on each source category individually.

In general, the growth assumptions are consistent with the assumptions used in the Goods Movement Emission Reduction Plan approved by the ARB in 2006 and are about 4-5% per year for each category. Even with substantial growth, emissions are expected to decrease in the future. These decreases are caused by regulations that the ARB and federal government have already adopted, such as ARB's rule requiring the clean-up of all trucks that service California's Ports. For the purposes of this forecast, we assumed that two major ARB rules, which are currently under development, will apply in 2015 and 2020. The ARB is currently developing a regulation which will require ocean-going ships to use cleaner fuels in their main engines and auxiliary boilers, and a regulation which will require the clean-up of private on-road heavy duty trucks. Both of these rules will be considered by the Air Resources Board for adoption in 2008. Overall, every emissions source covered in this assessment has been or will be controlled by local, state, and/or federal regulation. In particular, it is important to understand that with the adoption of ARB's Port Drayage Truck regulation and the proposed Private Fleet Rule every truck operating in West Oakland will be required to meet new, more stringent emissions standards.

Additional information on the control measures and regulations included in the forecasted inventory are provided in Table 8 found later in this report. In addition, information on the growth and control factors used to forecast the inventory is provided in Appendix E. Using this approach, emissions were forecasted to 2010, 2015, and 2020. Table 3 provides the future year emissions estimates for each Part and source category. As can be seen, even with growth, emissions are forecasted to decline due to the regulations that have been adopted or are planned to be adopted in 2008. Overall, the combined emissions are expected to decrease by about 50 percent in 2010 and 70 percent in 2020 relative to emissions levels in 2005.

Table 3: Summary of 2005 and Projected 2010, 2015, and 2020 Diesel PM Emissions for the West Oakland HRA

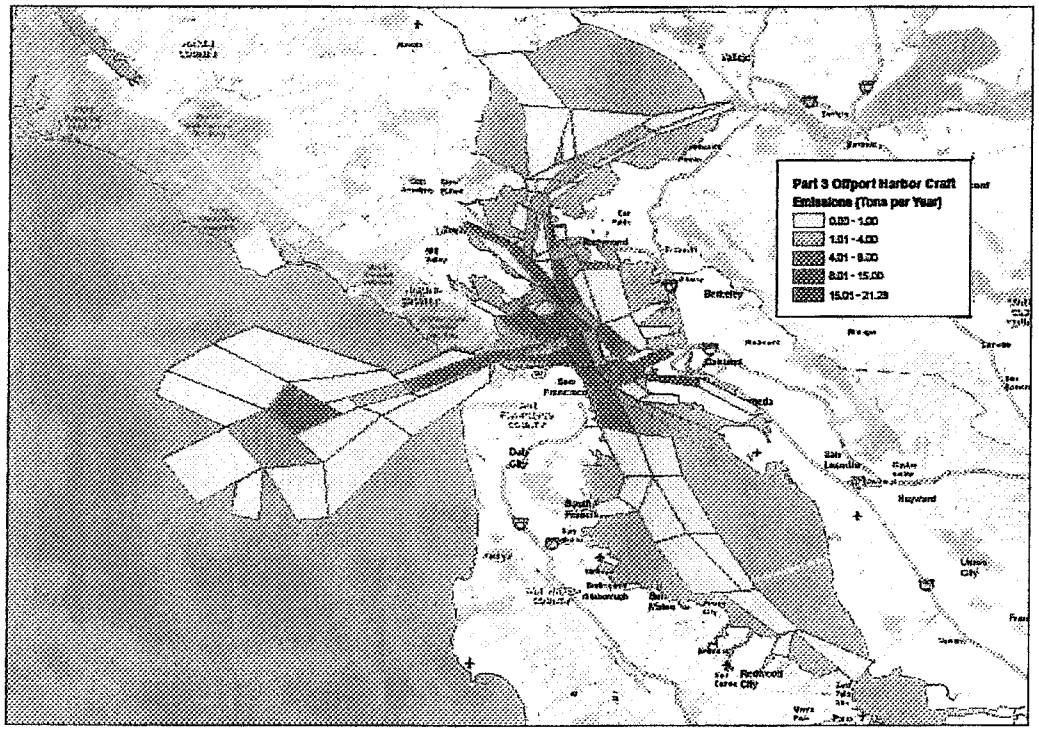
Source Category	(Part I)				Union Pacific Railyard (Part II)				Non-Port & Non-UP (Part III)				Combined			
	Diesel PM Emissions Tons/Year															
	2005	2010	2015	2020	2005	2010	2015	2020	2005	2010	2015	2020	2005	2010	2015	2020
Ocean-going Vessels	209	68	57	66	-	-	-	-	218	61	51	57	427	129	108	123
Cargo Handling Equipment	21	12	4.8	4.3	5.4	3	1.2	1.1	4.3	2.4	1	1	31	18	7	6.3
Heavy-duty diesel trucks	20	3.4	3.4	6.3	1.9	0.3	0.3	0.6	90	55	9	15	112	59	13	21
Commercial Harbor Craft	13	11	5.4	3.6	-	-	-	-	238	218	142	84	251	229	147	87
Locomotives	2	1.6	1.5	1.4	3.9	3.1	3	2.8	1.3	7.3	4.8	5	7.2	9	9	9.4
Total	265	96	72	82	11	6.4	6.5	4.5	556	342	208	162	832	445	285	248

Note: Emissions were forecasted only for locomotives, ships, trucks, harbor craft and cargo handling equipment. For Part II, emissions associated with TRUs and reefer cars were combined with cargo handling equipment emissions. Emissions were not forecasted for stationary point sources or construction projects. Therefore; 2005 emissions from Table 2 will differ than those presented in Table 3 for the year 2005. In addition, the totals may differ slightly due to rounding.

Spatial and Temporal Allocation of Emissions

Running dispersion models requires assigning spatial locations and temporal release profiles to emissions in each Part from each source. This is an important aspect in an HRA because where emissions are released and the time of day they are emitted can have a significant impact on the exposures to the emissions. In addition, many emission sources are not released from a single location but occur over a broad area. To model emissions that occur over a broad area, the emissions are placed within a geometric figure (polygon) that approximates the region in which the emissions are released. Within the polygon, the emissions are evenly distributed. In most cases, spatial locations are derived from source data used for emissions inventory development. This is the case for ocean-going vessels (OGV), cargo handling equipment, and trucks. In some cases, spatial locations are estimated using surrogate data from a sample of data sources. This is the case for commercial harbor craft where we had information from geographic information systems tracking devices on harbor craft that was used to determine where the emissions from harbor craft occurred. An example of how emissions are spatially allocated is provided in Figure 7. Figure 7 presents the locations in which the harbor craft emissions from Part III were assumed to be released in the air dispersion modeling. As is shown, the harbor craft emissions were allocated in an area outside the Golden Gate Bridge and within the inner San Francisco Bay area. Each polygon represents a portion of the Part III harbor craft inventory and the darker the shading in the polygon, the more emissions that were released within that area.

Figure 7: Spatial Allocation of Harbor Craft Diesel PM Emissions in the San Francisco Bay Area



The time during the day (temporal profile) when emissions are released also can impact exposures. This is because the meteorological conditions change over the course of a day – emissions released only during daylight hours will see different meteorological conditions then emissions released over the entire 24-hour day. Because of this, the emission inventory needs to be adjusted to account for the time of day over which the emissions occur. For example, drayage truck emissions predominately occur between 6AM and 8PM while OGV hotelling emissions occur 24 hours a day. Temporal profiles were identified for each source category and for each part based on discussions with the port and business representatives and previous studies of port-related operations. Table 4 provides the assumptions used for the temporal profiles for each emissions source.

Table 4: Temporal Distribution of Diesel PM Emissions for the West Oakland HRA

Category	Time Period	Activity Distribution	Hours Per Day
OGV - Hotelling	12AM – 12AM	100%	24
OGV- Transiting	4AM – 9PM 9PM – 4AM	75% 25%	17 7
Harbor Craft - Tugs	5AM – 8PM 8PM – 5AM	80% 20%	15 9
Harbor Craft - Other	7AM – 6PM 6PM – 7AM	80% 20%	11 13
On-Road Trucks – Part I (on-port)	6AM – 6PM 6PM – 6AM	98% 2%	12 12
On-Road Trucks – Part III	6AM – 6 PM 6PM – 6AM	80% 20%	12 12
Cargo Handling Equipment	9AM – 6PM 6PM – 9AM	80% 20%	9 13
Locomotives	12AM – 12AM	100%	24

Air Dispersion Model

Currently there is not a scientific method to monitor directly for diesel PM in the air. However, air dispersion models can be used to estimate the concentration of diesel PM in the air. Air dispersion models use emission inventory data (magnitude, timing, and location of emissions), local meteorological information (wind speed, direction, temperature, etc.) and mathematical formulations that represent atmospheric processes to predict concentrations of a pollutant in the air.

The selection of an air dispersion model depends on many factors, including: nature of the pollutant (e.g., gaseous, particulate, reactive, inert), characteristics of emission sources (point, area, volume, or line), relationship between emission source and receptor, meteorological and topographic complexities of the area, the complexity of the source distribution, spatial scale and resolution required for the analysis, level of detail and accuracy required for the analysis, and averaging times to be modeled. For this study, ARB staff used the United States Environmental Protection Agency (U.S. EPA) CALPUFF model to estimate the annual average concentration of diesel PM in the West Oakland community. As one of the U.S. EPA's preferred air dispersion models, CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model that can simulate the effects of time- and space-varying meteorological conditions on pollutant transport, transformation, and removal. A key feature of CALPUFF is its ability to account for spatially varying meteorological conditions with a three-dimensional wind field. As such, CALPUFF is capable of producing more accurate results than simpler

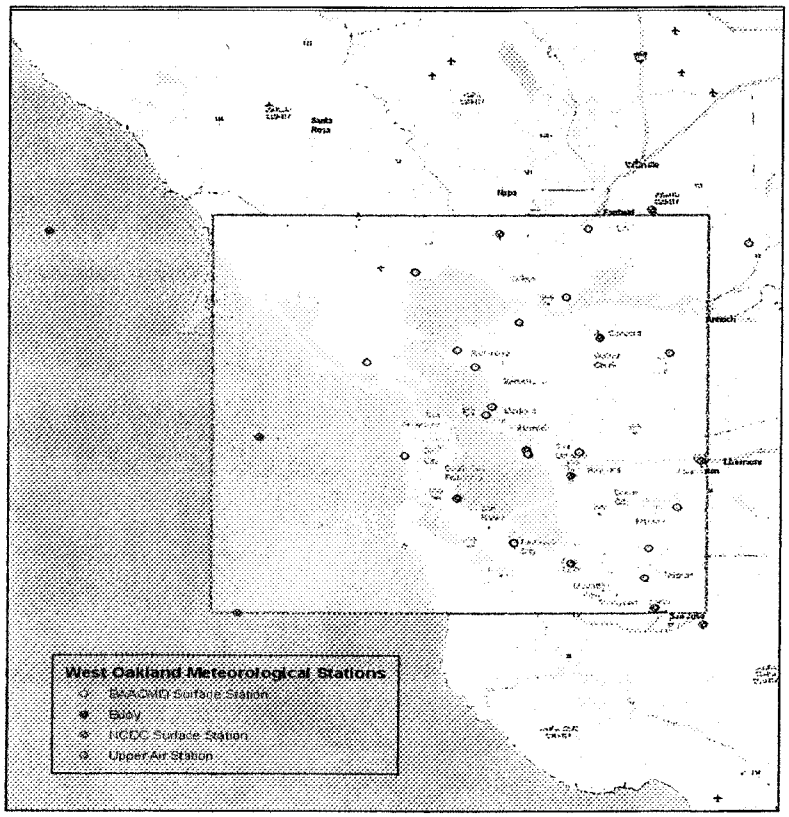
models that do not simulate spatially varying wind fields. This is particularly true when dealing with large study areas and complex terrain such as is the case in this study.[1]

Meteorological Data

The CALMET meteorological processor is a key component of the CALPUFF modeling system. Its primary purpose is to prepare meteorological inputs for running CALPUFF that accurately represent the ground level and upper air meteorology. Meteorological input data required for CALMET include surface, upper-air, and overwater data. Geophysical input data include terrain and land-use data.

Meteorological data used in this study were obtained from the National Climatic Data Center (NCDC), the Bay Area Air Quality Management District (BAAQMD), and the National Weather Service stations. Data on meteorological observations from 30 inland surface stations (13 from NCDC and 17 from BAAQMD), 3 ocean buoys, and 1 upper air station were collected for this study. In Figure 8, we show the various meteorological data collection sites that provided information for the CALMET processor.

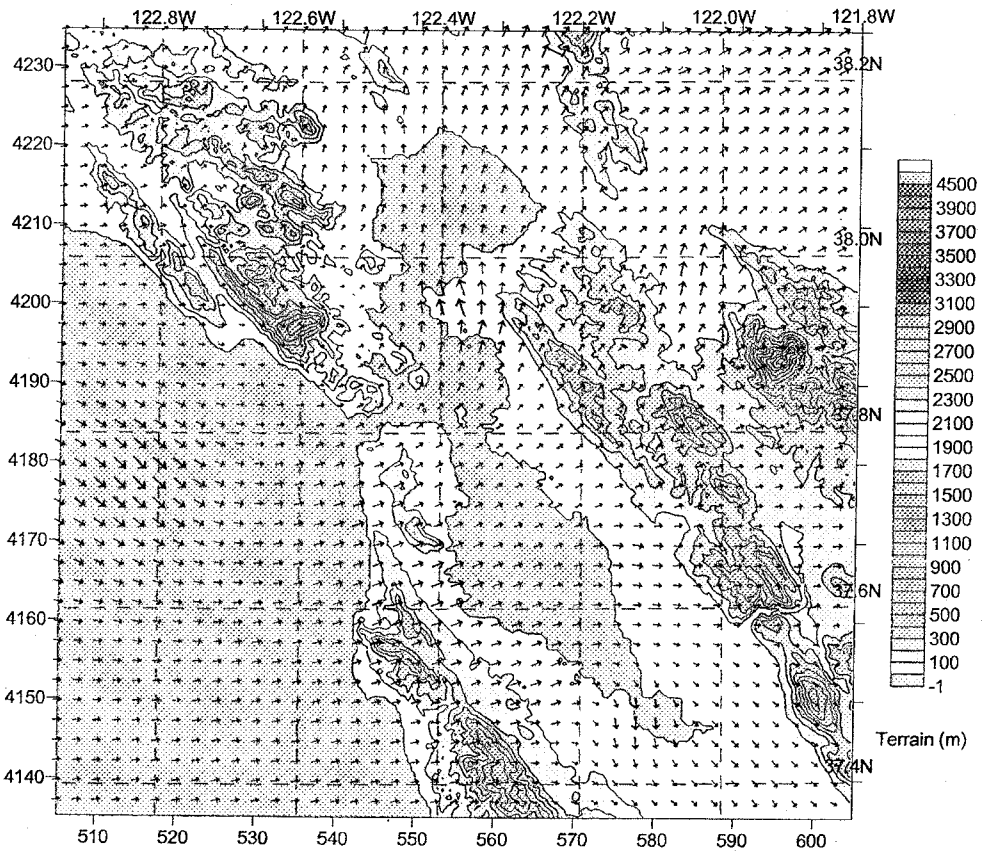
Figure 8: Location of Meteorological Stations Providing Meteorological Data for the West Oakland Community HRA



[1] In order to incorporate the impacts of Part II, the UP Railyard, with the impacts of Parts I and III, we modeled the Part II emissions using CALPUFF. In appendix C, the modeling results using AERMOD are provided. Throughout this Preliminary Summary of Results, any summary tables or comparisons are based solely on the CALFUFF modeling results for Part II.

CALMET is uniquely suited to be able to simulate complex local effects of terrain and wind flow that can impact the concentrations of a pollutant. This is particularly important in this study since the emission sources span a wide area starting from the ocean (west of San Francisco) to the Golden Bridge through the inner San Francisco Bay, to the Port and areas over land. This domain covers an area of very complex wind flows and terrain including over-water areas, over-land areas, and both flat regions and hilly areas. An example of the wind field plot for the model domain over a one-hour period is provided in Figure 9. The arrows on the figure designate both the direction and magnitude (speed) of the wind (i.e., the bigger the arrow, the greater the wind speed). In this example, surface winds were highly variable with terrain features and show almost all phenomena of complex terrain, such as circulation, mountain/hill blocking, channeling, and valley flows. In the northern coastal ranges of the San Francisco Bay Area, the winds were lighter and showed the damping or blocking effects (slowing down of the winds) of the mountains. In the inner San Francisco Bay, winds flow through the Golden Gate Bridge and then turn toward the northeast and/or north. These winds then flow into the inland valley areas of Napa, Fairfield, and Sacramento. In addition, the plot shows how the wind field converges in valley locations and diverges as it meets mountains and hills.

Figure 9: Illustration of Complex Terrain and Wind Flow Patterns in the San Francisco Bay Area



July 1, 2000, 12 to 13 pm, layer 1

Additional details on the modeling methodology are provided in Appendix C.

Exposure Assessment

For this study, we estimated both the cancer and non-cancer health impacts from the exposures to diesel PM emissions. Below we provide brief descriptions of the methodologies used.

Potential Cancer Risks: The potential cancer risks were estimated using standard risk assessment procedures based on the annual average concentration of diesel PM predicted by the model and a health risk factor (referred to as a cancer potency factor) that correlates cancer risk to the amount of diesel PM inhaled.

The methodology used to estimate the potential cancer risks is consistent with the Tier-1 analysis presented in OEHHA's Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA, 2003). A Tier-1 analysis assumes that an individual is exposed to an annual average concentration of a pollutant continuously for 70 years.[2] The cancer potency factor was developed by the OEHHA and approved by the State's Scientific Review Panel on Toxic Air Contaminants (SRP) as part of the process of identifying diesel PM emission as a toxic air contaminant (TAC).

The estimated diesel PM concentrations and cancer risk levels produced by a risk assessment are based on a number of assumptions. Many of the assumptions are designed to be health protective so that potential risks to individuals are not underestimated. Therefore, the actual cancer risk calculated is intentionally designed to avoid under-prediction. There are also many uncertainties in the health values used in the risk assessment. Some of the factors that affect the uncertainty are discussed later in Chapter III.

Non-Cancer Health Impacts: A substantial number of epidemiologic studies have found a strong association between exposure to ambient particulate matter (PM) and adverse health effects (CARB, 2002). As part of this study, ARB staff conducted an analysis of the potential non-cancer health impacts over the broader San Francisco Bay Area region in the study domain associated with exposures to the model-predicted ambient levels of directly emitted diesel PM (primary diesel PM) from the Port. The non-cancer health effects evaluated include premature death, hospital admissions, asthma-related and other lower respiratory symptoms, work loss days, and minor restricted activity days.

ARB staff assessed the potential non-cancer health impacts associated with exposures to the model-predicted ambient levels of directly emitted diesel PM (primary diesel PM) over the entire modeling domain. The population in the domain was determined from U.S. Census Bureau year 2000 census data and then was projected to the year of 2005. Using the methodology peer-reviewed and published in the Staff Report: *Public*

[2]According to the OEHHA Guidelines, the relatively health-protective assumptions incorporated into the Tier-1 risk assessment make it unlikely that the risks are underestimated for the general population.

Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, (PM Staff Report) (CARB, 2002), we calculated the number of annual cases of death and other health effects associated with exposure to the PM concentration modeled over the entire modeling area. Non-cancer health impacts were not separately estimated for the West Oakland community. However, the impact of Port operation on regional PM mortality would include the impacts on the West Oakland community. We did not do a separate PM mortality estimate of West Oakland because the studies used to estimate the PM2.5-mortality concentration-response function are based on regional PM measurements and regional or county-wide health data. The West Oakland community population is 22,000 residents. This is well below the population threshold that ARB staff has used in other health risk assessments (>100,000).

III. PRELIMINARY SUMMARY OF RESULTS

In this chapter, we provide the preliminary summary of results for the potential cancer risks and non-cancer health impacts. It is important to note that no background or ambient diesel PM concentrations are incorporated into the risk quantification. Based on the most recent estimate of basin wide risk in 2000, the estimated background potential cancer risk due to diesel PM in the San Francisco Bay Area is about 480 excess cancers per million (CARB, 2007). However, given the magnitude of the diesel PM emissions for all three parts and the predominate onshore wind flow, it is difficult to accurately estimate how much of the background in West Oakland community is from activities covered in Part I, II, and III versus activities located north or east of West Oakland. In addition, the potential cancer risks only take into consideration the potential cancer risk due to inhalation of diesel PM. This is because studies have shown that the risk contributions by other pathways of exposure, such as ingestion, are negligible relative to the inhalation pathway.

Due to the large number of emissions sources and the way the emissions were allocated to Parts I, II, and III, there are numerous ways of analyzing and presenting the results from this study. For this preliminary summary of results, we focused on the potential cancer risks from all sources and parts on the West Oakland community. We also provide the results from an analysis of the potential cancer and non-cancer impacts of Port-related emissions on the broader regional domain. Additional analyses will be provided in the comprehensive technical report that will be available in May 2008.

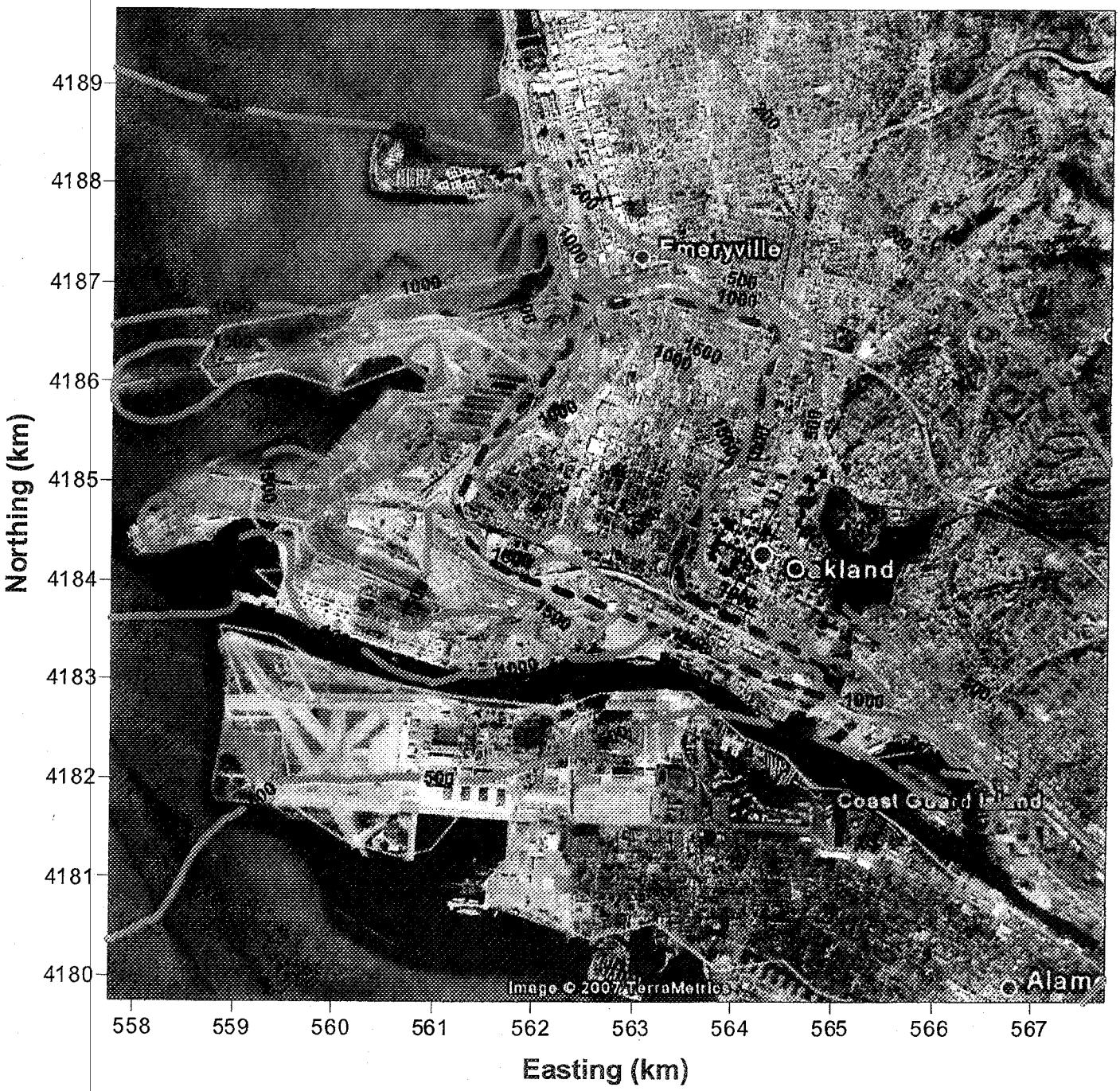
A. Potential Cancer Risk[3]

West Oakland Potential Cancer Risks from All Sources

Figure 10 shows the risk isopleths for all diesel PM emission sources from all three parts superimposed on the map that covers the small (10 km x 10 km) domain used to study the potential cancer risks in the West Oakland community. As can be seen, the entire West Oakland community is exposed to elevated potential cancer risks from diesel PM emissions that occur adjacent to and in the West Oakland community.

[3] As stated earlier, a modeling domain of 100 km x 100 km with a grid resolution of 500 m x 500 m was used in the modeling effort. The effective land area (excluding the Port property and the over water region) is about 6,500 square kilometers (3,800 square miles). The population within the modeling receptor domain is about 5 million based on the U.S. Census Bureau's year 2000 census data. Similarly, the effective land area of the West Oakland community is about 7.7 square kilometers (3 square miles) and the population within the community is about 22,200. The risk numbers, impacted areas, and affected population presented in this chapter are based on the effective land area within the modeling domain; that is, the risk, the area, and the number of population within the port property and over the ocean/lake/water surfaces are excluded from this analysis. Note that if the modeling domain expands, the risks, impacted areas, and affected population presented in this analysis would change.

Figure 10: Estimated West Oakland Community Potential Cancer Risk from All Diesel PM Emissions Sources (Parts I, II, & III)



Notes: The risk levels are based on the 80th Percentile Breathing Rate. Total Modeled Emissions = 845 T/Y in 2005. Modeling Domain = 10 km x 10 km. Resolution = 250 m x 250 m. The dashed line represents the boundary for the West Oakland community.

Using the U.S. Census Bureau's year 2000 census data, we estimated the population within the isopleth boundaries. As shown in Table 5, the entire population of the West Oakland Community, about 22,000 people are exposed to risk levels greater than 500 in a million and over 50 percent of the residents living in the West Oakland Community are exposed to a risk level of greater than 1000 in a million.

Table 5: West Oakland Community Summary of Impacted Area and Affected Population by Potential Cancer Risk Levels from All Emission Sources (2005)

Potential Cancer Risk Level	Impacted Inland Area		Affected Population	
	Acres	Percent	Number	Percent
Risk > 10	1,800	100%	22,200	100%
Risk > 100	1,800	100%	22,200	100%
Risk > 200	1,800	100%	22,200	100%
Risk > 500	1,800	100%	22,200	100%
Risk > 1000	1,000	56%	11,000	50%

Notes: Total area for the community = 1,800 acres; total population = 22,200

As discussed previously, the emission sources were grouped or classified into three parts: the Maritime Port of Oakland (Part I), the Union Pacific Railyard (Part II), and the other non-port and non-UP diesel PM emissions that occur near and in the West Oakland community (Part III). The diesel PM emissions and corresponding population exposed for the three parts are presented in Table 6. All three parts exert significant health impacts to the West Oakland community. Emissions from each part (Part I, II, & III) individually result in risk levels of greater than 10 in a million throughout the entire West Oakland community and affect every resident. The zone of impact for potential risk levels above 100 in a million resulting from either Part I or Part III emissions also encompass the entire West Oakland community.

Table 6: West Oakland Community Summary of Impacted Area and Affected Population by Potential Cancer Risk Levels from Part I, II, & III Emission Sources (2005)

Potential Cancer Risk Level	Impacted Inland Area (acres)				Affected Population			
	Part I (Port)	Part II (UP)	Part III (Non-port/Non-UP)	Combined	Part I (Port)	Part II (UP)	Part III (Non-port/Non-UP)	Combined
Risk > 10	1,800	1,800	1,800	1,800	22,200	22,000	22,200	22,200
Risk > 100	1,800	280	1,800	1,800	22,200	1,800	22,200	22,200
Risk > 200	770	80	1,800	1,800	7,000	100	22,200	22,200
Risk > 500	0	0	1,700	1,800	0	0	20,500	22,200
Risk > 1000	0	0	480	1000	0	0	6,300	11,000

Notes: Total area for the community = 1,800 acres; total population for the community = 22,200

In Table 7, the percentage of the overall population-weighted cancer risk[4] that can be attributed to each part is provided. As can be seen, the West Oakland community has an overall population-weighted risk of nearly 1,200 chances in a million due to the diesel PM emissions from Parts I, II, and III. Of this, the Port operations (Part I) account for about 16 percent of the overall cancer risk or 200 potential cancer cases per million. UP operations (Part II) account for about 4 percent of the overall cancer risk or 43 potential cancer cases per million people. Non-port and non-UP operations (Part III) account for the largest share of the overall potential cancer risk in the West Oakland community, about 80 percent of the total risk or about 950 potential cancer cases per million people.

Compared with Part I or Part II, the emissions from Part III exert the most significant health impacts on the community. Part III emissions are responsible for one out of three residents in the community being exposed to potential cancer risk levels greater than 1000 in a million and everyone in the community is exposed to levels of greater than 500 in a million. As can be seen in Table 7, the elevated potential cancer risk levels are primarily due to on-road trucks.

[4] Population-weighted cancer risk or "average risk" is calculated using the following equation:

$$\bar{R} = \frac{\sum_{i}^{n} (R_i \, x \, POP_i)}{\sum_{i}^{n} POP_i}$$

Where R_i is the estimated risk in grid cell i; POP_i is the allocated number of population in grid cell i; n is the total number of grid cells within the modeling domain. For the West Oakland community, the population-weighted cancer risk is essentially similar to the average risk.

Table 7: Population-weighted Potential Cancer Risks in West Oakland Community by Part and by Source Category

Source Category	Part I (Port)	Part II (UP)	Part III (Non-port/Non-UP)	Combined
OGV Transiting, Maneuvering, & Anchoring	57	0	23	81
OGV Hotelling	57	0	10	67
Harbor Craft	15	0	78	93
Trucks	42	7	795	844
Cargo Handling Equip.	16	21	7	43
Locomotives	4	15	37	56
Others	0	0	2	2
Total	192 (16%)	43 (4%)	951 (80%)	1186 (100%)

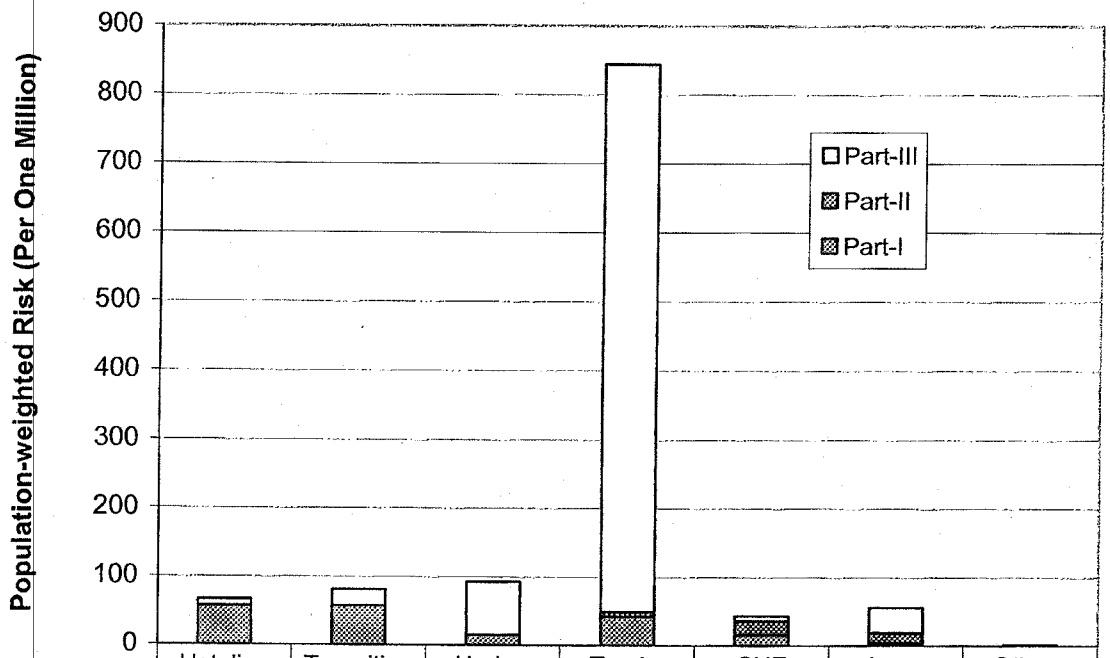
Notes: Total area for the community = 1,800 acres; total population = 22,200. Part III anchorage activities are included with impacts from Part III hotelling.

The magnitude of emissions and the location of the emission from the diesel-fueled equipment and vehicles used in and around the West Oakland community results in different levels of exposures in the community. In Table 7 and Figure 11, the contributions to the overall risk from each source category by part are shown. On-road trucks result in much higher localized risks when compared to other sources. This is in part due to the fact that the West Oakland community is surrounded by major freeways that have a significant amount of heavy-duty truck traffic. In addition, there is very little buffer between the freeways and highly populated areas. Also, many trucks travel through the neighborhoods, increasing exposures to residents that live along the city streets.

As discussed above, truck emissions are relatively more uncertain than other categories due to limitations in the availability of data describing the magnitude and intensity of trucking operations in the West Oakland community. These data limitations may have led to an overestimate in the overall magnitude of trucking emissions in the West Oakland community, and an underestimate of the fraction of total trucking emissions and risks attributable to trucks that service the Port of Oakland. Although these estimates are uncertain, the results from the risk assessment are clear. Trucking operations are the largest single source of health risk to the West Oakland community, even though they are not the largest source of emissions in the modeling domain. Whether those trucking operations are generated by trips visiting the Port or other businesses is of interest, but is not necessary to prioritize and control trucks as an emissions source. The ARB has already adopted a rule that requires the clean-up of trucks servicing California's Ports, and is currently developing a similar rule to cover all other trucking operations. Together, these rules will require in the future (2010 for trucks servicing the Port of Oakland; around 2014 for all others) that all trucks operating in the community must be 85% cleaner than trucks operating in the community today.

Other sources of emissions, such as ocean-going vessels, harbor craft, and locomotives, also generate significant population weighted potential cancer risks to the West Oakland community that individually exceed 50 in a million. These levels are significant and require reduction. Their impacts are not as high as trucks, because the location of these sources are further away from residents of the West Oakland community, and pollutant concentrations decrease with distance as they are dispersed in air. Additional information and discussion on the public health impacts from the various emission sources are provided in Appendix B.

Figure 11: Population-weighted Potential Cancer Risks by All Sources/Parts for West Oakland Community



	Hoteling	Transiting	Harbor	Trucks	CHE	Loco	Others
Part-III	10	23	78	795	7	37	2
Part-II	0	0	0	7	21	15	0
Part-I	57	57	15	42	16	4	0

Notes: Total area for the community = 1,800 acres; total population for the community = 22,200. Part I = Port; Part II = UP; Part III = Non-Port/Non-UP. Hotelling = OGV hotelling. Transiting = OGV Transiting. Harbor = Harbor Craft. CHE = Cargo Handling Equipment. Loco = Locomotives. Part III anchorage activities are included with impacts from Part III hotelling

Understanding the impacts from the various emission sources and locations of emissions can be complicated. As can be seen from the previous charts and tables, there are several different ways of presenting and looking at the data from the HRA. Since one of the primary reasons for this study was to assist in determining the most beneficial diesel PM mitigation strategies, it is important to understand how reductions in emissions from a source category and the geographic location of sources will impact the overall population-weighted risk; that is, which reductions in diesel PM emissions will reduce the potential cancer risk the most.

Table 8 provides a comparison of the relative impact that reductions in diesel PM emissions will have on the potential cancer risk. This comparison shows the relative change in potential cancer risk for each ton of diesel PM emissions reduced per year. In Table 8, we provide this comparison for each of the source categories and geographic locations.[5] Looking at each part (Part I, II, and III), emissions from on-road trucks generate the most potential risk per ton of diesel PM emissions followed by locomotives and cargo handling equipment. For example, for each ton of diesel PM reduced from Part III on-road trucks, we would expect to see a reduction of about 9 in a million in the potential cancer risks in the West Oakland community. For Port sources (Part I), on-road trucks generate the greatest potential cancer risk per ton of diesel PM emissions followed by locomotives, harbor craft, and OGV hotelling. Emission sources at the UP Railyard had similar impacts for each category. With respect to Part III emission sources, on-road trucks had the highest impact on the West Oakland community followed by locomotives and cargo handling equipment.

Table 8: Relative Change in Potential Cancer Risk per Ton of Diesel PM Emissions Reduced (2005)

Source Category	Part I (Port)	Part II (UP)	Part III (Non-Port/Non-UP)
	Risk/ Emissions		
OGV Transiting	0.4	--	0.1
OGV Hotelling	0.9	--	0.3
Harbor Craft	1.1	--	0.3
Trucks	2.1	3.8	8.8
Cargo Handling Equip.	0.7	3.9	1.6
Locomotives	2.0	3.9	7.9
Others	-		0.1

Notes: OGV Transiting includes OGV emissions from transiting, maneuvering and anchorage except that for Part III, anchorage impacts are included with hotelling. Emissions = Diesel PM emissions in tons/year for the year 2005 and the values are from Table 2 and Appendix A. Risk = Average potential cancer risk per million and the values are from Table 7. Total area for the community = 1,800 acres; total population for the community = 22,200

[5] It's important to note that these comparisons are most useful as a guide when comparing one source to another and not as a literal prediction of the community change in risk as emissions are reduced.

West Oakland Community Future Projections of Potential Cancer Risks – 2010, 2015, 2020

Reducing diesel PM emissions is one of ARB's top priorities. In the 1990's, the ARB and the federal government adopted measures, such as new engine standards for on- and off-road vehicles and equipment. These measures are providing benefits today and will continue to provide benefits into the future as older vehicles and equipment are replaced with newer, cleaner engines. However, federal engine standards are not generating emissions reductions quickly enough to meet federal air quality attainment standards or to provide relief to local communities that are impacted by carcinogenic diesel PM.

In 2000, the ARB adopted its Diesel Risk Reduction Plan (DRRP) which established a goal of reducing diesel PM emissions by 85 percent in 2020. (CARB, 2000) In 2006, the ARB adopted its Goods Movement Emissions Reduction Plan, which reiterated the DRRP diesel PM goal, and set additional targets for emissions reductions. (CARB, 2006) Meeting these goals requires the adoption of new regulations designed to generate accelerated reduction in diesel PM emissions. ARB has recently adopted several regulations targeting the clean-up of port related equipment and vehicles.

Measures have been adopted for cargo-handling equipment, truck refrigeration units, port drayage trucks, off-road construction equipment, commercial harbor craft, and ocean-going vessels (auxiliary engine fuel and shore power). This summer, the ARB will consider a regulation requiring the use of cleaner fuels in OGV main engines. And, in the fall of this year, the ARB will consider a rule to require the clean-up of the private on-road heavy-duty truck fleets. These regulations will result in significant reductions in diesel PM and other exhaust emissions.

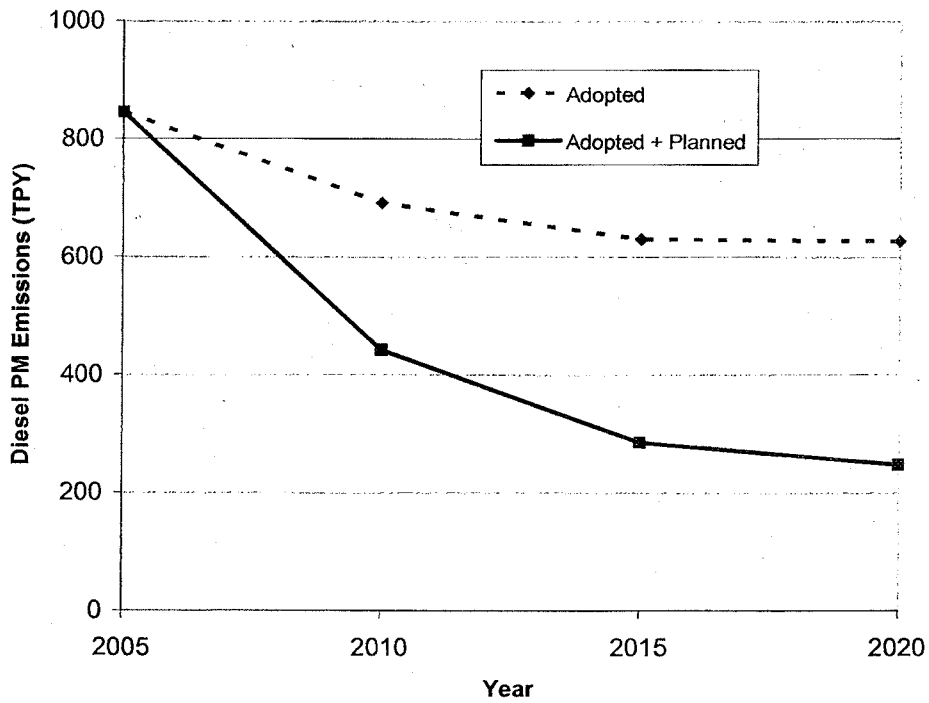
A summary of the various regulations and efforts to date are provided in Table 9. These efforts will result in significant emission reductions in future years, even when considering the expected growth in activities. Diesel PM emissions in the West Oakland community are projected to decline by over 75% by 2020. Future emissions estimates are presented in Figure 12. The upper line reflects those regulations adopted and the lower line reflects measures that have been adopted by the ARB plus two additional regulations scheduled for adoption this year - the ocean-going vessel main engine rule and private fleet truck rule. The chart shows that ARB expects to realize major emissions reductions through these two rules that are currently under development.

The future reductions discussed here represent mainly actions by ARB to reduce emissions from diesel PM sources. There also have been actions undertaken since 2005 by the BAAQMD, Port, UP, shipping companies, terminal operators, and trucking companies that are not reflected in this analysis. Future actions that are currently being contemplated as part of the BAAQMD's Green Ports Initiative and the Ports Maritime Air Quality Improvement Plan are also not reflected in this analysis.

Table 9: ARB Regulations Adopted and Planned (2008) that Reduce Emissions from Diesel PM On- and Off-Road Vehicles and Equipment (adoption date provided in parenthesis)

Adopted Regulations	
New on-road heavy-duty diesel engine standards (October 2001)	Diesel truck operational idling limits (July 2004)
Tier 4 standards for new off-road diesel equipment (December 2004)	Clean up existing diesel cargo handling equipment at ports and intermodal railyards (December 2005)
California diesel fuel for harbor craft and intrastate locomotives (November 2004)	Clean up existing fleet of off-road diesel equipment (July 2007)
Low-sulfur diesel fuel for vehicles and off-road equipment (July 2003)	Clean up existing fleet of harbor craft (November 2007)
Heavy-duty engine manufacturers diagnostics (May 2004)	Cold ironing regulations (December 2007)
Heavy-duty on-board diagnostics (July 2005)	Clean up port truck fleets (December 2007)
Cleaner fuel for ship auxiliary engines (December 2005)	**Planned Regulations**
2005 California Rail MOU	*Cleaner fuel for ship main engines and boilers (June 2008)*
Transport refrigeration units (February 2004)	*Clean up existing private fleets of diesel trucks (late 2008)*

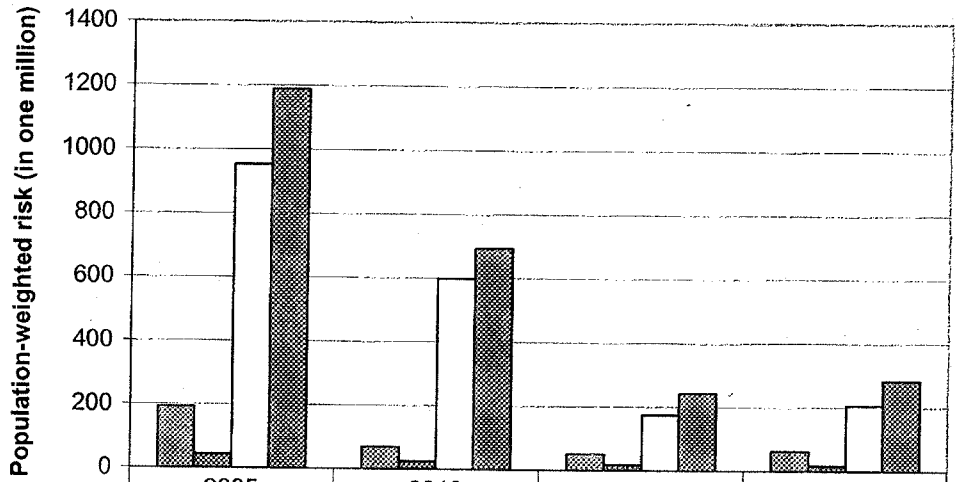
Figure 12: Projected Diesel PM Emissions for All Sources Evaluated in the West Oakland Community HRA (Parts I, II, & III)



This decline in emissions will result in the reduction of the potential cancer (and non-cancer) risks due to exposures to diesel PM. In the West Oakland Community, as

shown in Figure 13, we predict that the overall population-weighted risks will be reduced by about 80 percent in 2015 but then will begin to increase as growth begins to surpass the reductions required by regulatory programs. However, even with reduction in emissions due to the actions outlined in Table 9, the predicted remaining cancer risk in the 2010 timeframe will be over 650 in a million in the West Oakland community and in future years will be greater than 200 in a million. Clearly, additional actions are needed in the near-term to accelerate emission reductions and to reduce the health impacts from diesel PM emissions in the West Oakland community and the region as a whole. Additional actions are also necessary to help offset growth and further reduce risk levels in future years.

Figure 13: Projected Future Population-weighted Potential Cancer Risks in the West Oakland Community Resulting from Exposures to Diesel PM from all Emission Sources (Parts I, II, & III)



	2005	2010	2015	2020
Part I	192	69	51	61
Part II	43	25	18	17
Part III	952	597	174	205
Combined	1187	692	243	283

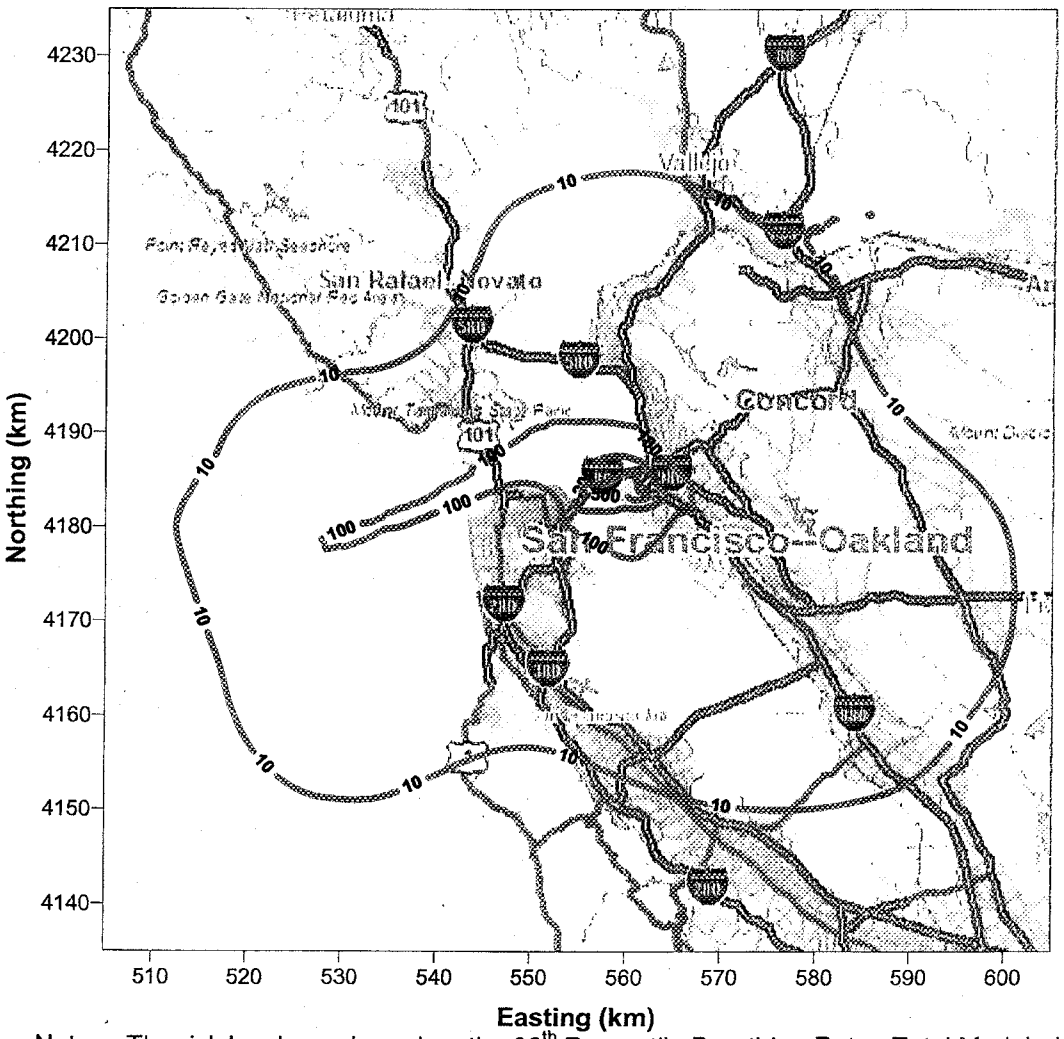
Notes: Total area for the community = 1,800 acres; total population for the community = 22,200.
Part I = Port. Part II = UP. Part III = Non-port/Non-UP.

Regional Potential Cancer Risks from Port Operations

Figure 14 shows the risk isopleths for all diesel PM emission sources from Part I, the Maritime Port of Oakland, superimposed on the map that cover the regional (100 km x 100 km) domain. For the regional domain, the risk contour of 10 in a million extends over a large area, covering about 35 percent of the land-based areas within the domain. Risk levels of greater than 100 in a million also result in the broader Bay Area from the Port diesel PM emissions, however the higher risk levels are primarily located overwater.

The estimated cancer risks presented in Figure 14 are not intended to be a complete estimate of the total cancer risk from exposure to diesel PM throughout the modeling domain. As discussed earlier, the average potential cancer risk from diesel PM in the BAAQMD is about 480 chances per million. Since we are looking at the potential cancer risk contribution over a large region, it is reasonable to view these risks as "above background" risks except in the immediate vicinity of the West Oakland Community. Thus, the estimated risk at the 10 in a million isopleths is estimated to be about 490 in a million when the background risk of 480 is included.

Figure 14: Estimated Potential Cancer Risk in the Regional Domain from Port (Part I) Diesel PM Emissions Sources



Notes: The risk levels are based on the 80th Percentile Breathing Rate. Total Modeled Emissions = 265 T/Y in 2005. Modeling Domain = 100 km x 100 km. Resolution = 500 m x 500 m. Total area for the regional domain = 1,564,000 acres; total population for the regional domain = 5 million.

Using the U.S. Census Bureau's year 2000 census data, we estimated the population within the isopleth boundaries. As shown in Table 10, about 130,000 people out of the 5 million people living within the domain boundaries are exposed to risk levels of over

100 in a million due to the diesel PM emissions from Port operations. Approximately 3.2 million people are exposed to risk levels of greater than 10 in a million. This is about 65 percent of the total population in the modeling domain region. There are about 60 acres located near the West Oakland community that have risk levels greater than 500 in a million which demonstrates that significant impacts from Port emissions also occur outside of the West Oakland community.

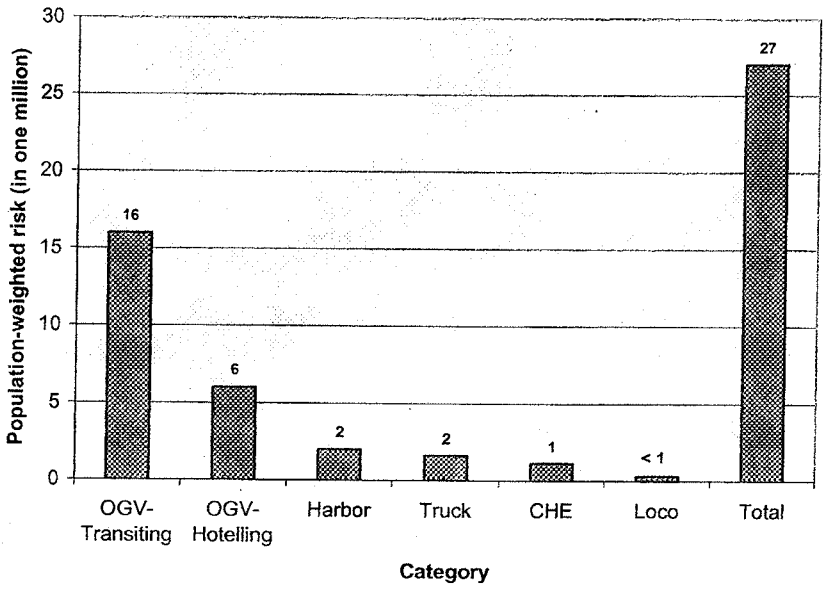
Table 10: Summary of Impacted Regional Area and Affected Population by Potential Cancer Risk Levels from the Maritime Port of Oakland Activities

Potential Cancer Risk Level	Impacted Inland Area		Affected Population	
	Acres	Percent	Number	Percent
Risk > 10	551,500	35%	3,179,000	66%
Risk > 100	11,800	1%	131,000	3%
Risk > 200	2,600	<1%	9,600	<1%
Risk > 500	60	<1%	20	<1%
Risk > 1000	0	0%	0	0%

Note: Total area for the regional domain – 1,564,000 acres; total population = 5 million

The various diesel PM emission sources from Port operations result in different contributions to the regional potential cancer risks. As seen in Figure 15, overall, the Port emissions result in a regional population-weighted risk of 27 potential cancer cases per million people exposed. Of this, OGV emissions contribute the most to the overall risk levels.

Figure 15: Population-weighted Potential Cancer Risk in the Regional Domain Due to Maritime Port of Oakland Diesel PM Emissions



Notes: Total area for the regional domain = 1,564,000 acres; total population for the regional domain = 5 million. Hotelling = OGV Hotelling. Transiting = OGV Transiting. Harbor = Harbor Craft. Loco = Locomotive

Regional Future Projections of Potential Cancer Risks from Port Operations– 2010, 2015, 2020

The ARB adopted and planned regulations presented previously in Table 9 will also result in a reduction of the regional potential cancer risks that result from exposures to emissions from the Port. Similar to the figures provided for the West Oakland community, Figure 16 provides the projected emissions trends for Port emissions and Figure 17 presents the regional future population-weighted potential cancer risks due to Port emissions. As is shown, the emissions from Port operations are forecasted to decline over the next several years as adopted and planned regulations are implemented. These reductions in emissions will result in the reduction of the potential cancer risks due to exposures to diesel PM. Over the broader San Francisco Bay area included in the model domain, the population-weighted cancer risks will be reduced by about 70 percent in 2020. This is largely due to the expected reduction in OGV emissions from ARB's cleaner fuel requirements for OGV.

Figure 16: Projected 2010, 2015, and 2020 Diesel PM Emissions for Port (Part I) Source Categories

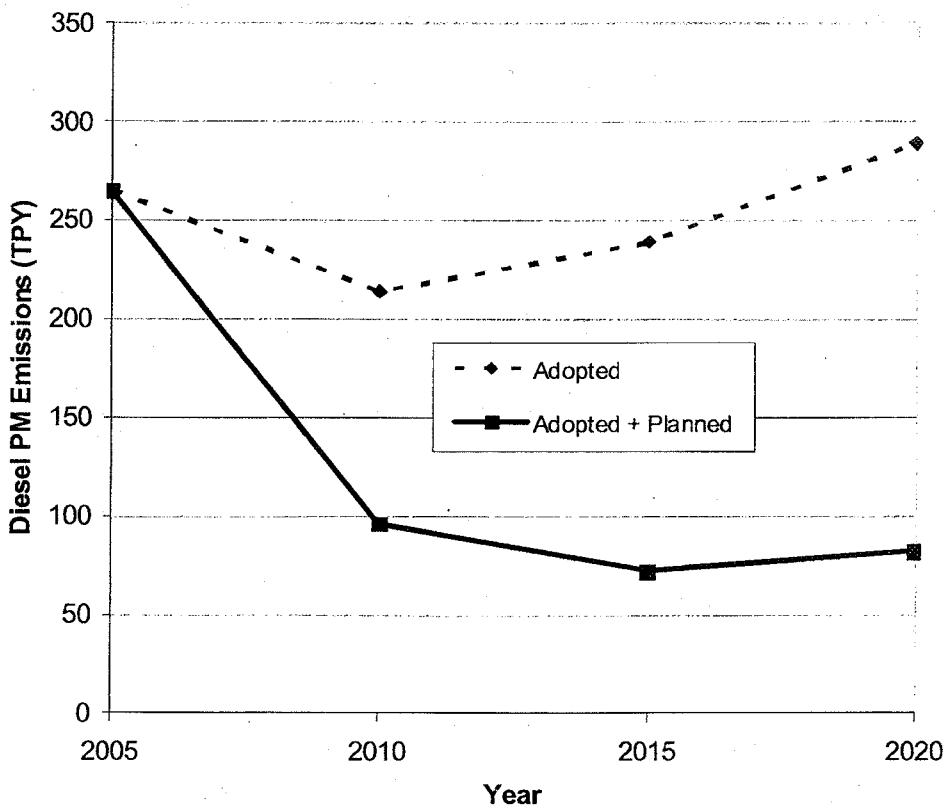
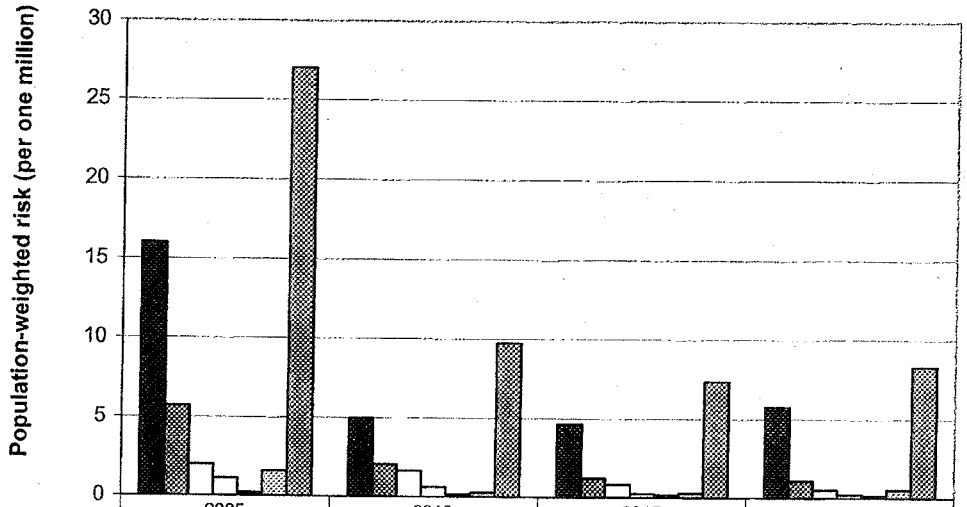


Figure 17: Projected Population-weighted Potential Cancer Risk by Category for Port Operations in the Regional Domain



	2005	2010	2015	2020
OGV-Transiting	16	5.0	4.6	5.8
OGV-Hotelling	5.7	2.1	1.2	1.1
Harbor Craft	2.0	1.6	0.8	0.5
CHE	1.1	0.6	0.2	0.2
In-Port Locomotive	0.2	0.2	0.2	0.1
In-Port Truck	1.6	0.3	0.3	0.5
Total	27	9.7	7.3	8.3

Year

Notes: Total area for the regional domain = 1,564,000 acres; total population for the regional domain = 5 million. CHE = cargo handling equipment.

B. Non-Cancer Health Impacts

Regional Non-Cancer Health Impacts from Port of Oakland Emissions

As discussed previously, a substantial number of epidemiologic studies have found a strong association between exposure to ambient particulate matter (PM) and adverse health effects (CARB, 2002; CARB, 2006). As part of this study, ARB staff conducted an analysis of the potential non-cancer health impacts associated with exposures to the model-predicted ambient levels of directly emitted diesel PM (primary diesel PM) within the modeling domain for diesel PM resulting from Port operations (Part 1). Several counties are located within the modeling domain including San Francisco, Marine and parts of Alameda, Sonoma, Napa, Solano, Contra Costs, and Santa Clara counties. The non-cancer health effects evaluated include premature death, hospital admissions, asthma-related and other lower respiratory symptoms, work loss days, and minor restricted activity days.

Consistent with U.S. EPA (EPA, 2004), ARB has been using the PM-mortality relationship from Pope et al. (Pope, 2002) since the adoption of the Emission Reduction Plan for Ports and Goods Movement (GMERP) (CARB, 2006). The methodology for estimating premature death and other health impacts is described in Appendix A of the GMERP. Ambient levels of directly emitted diesel PM from Port operations were predicted for each 500 meter by 500 meter grid cell within the modeling domain (100 km x 100 km) using the CALPUFF model. The population within each grid cell that was older than 30 years (about 3 million people) was determined from U.S. Census Bureau year 2000 census data. Using U.S. EPA's BENMAP program, we estimated the number of annual premature deaths and several other non-cancer health effects that are likely to occur within the modeling domain due to exposure to the directly emitted diesel PM emissions from Port operations. The health effect estimates are based on concentration-response functions derived from published epidemiological studies relating changes in ambient concentrations to changes in health endpoints, the population affected, and the baseline incidence rates.

The estimated regional non-cancer health impacts for directly emitted diesel PM from Port operations are presented in Table 11. As is shown in Table 11, we estimate that, in the modeling area, there would be about 18 premature deaths (for ages 30 and older), 8 hospital admissions due to respiratory and cardiovascular causes, 290 asthma-related and other lower respiratory symptoms, 2,600 days of work loss; and 15,000 minor restricted activity days.

Table 11: Estimated Non-cancer Health Impacts Resulting from Maritime Port of Oakland 2005 Diesel PM Emissions

Endpoint	# of Cases per Year (Mean)	# of Cases per Year 95 % Confidence Interval
Premature Death	18	5-32
Hospital Admission (Respiratory & Cardiovascular)	8	4-12
Asthma - Related & Other Lower Respiratory Symptoms	290	110-460
Acute Bronchitis	24	0-54
Work Loss Day	2,600	2,200-3,100
Minor Restricted Activity Days	15,000	13,000 – 18,000

To put the premature deaths estimates in context, ARB estimated in the Goods Movement Report that directly emitted diesel PM contributed to 1,200 premature deaths per year statewide, or about 160 premature deaths in the San Francisco Bay Area per year. (CARB, 2006)

Several assumptions were used in our estimation. They involve the selection and applicability of the concentration-response functions to California data, exposure estimation, subpopulation estimation, baseline incidence rates, and the threshold. These are briefly described below.

- Premature death calculations were based on the concentration-response function of Pope et al. (Pope, 2002). The ARB staff assumed that concentration-response function for premature mortality in the model domain is comparable to that in the Pope's study. It is known that the composition of PM can vary by region, and not all constituents of PM have the same health effects. However, numerous studies have shown that the mortality effects of PM in California are comparable to those found in other locations in the United States, justifying our use of Pope et al's results. Also, the U.S. EPA has been using Pope's study for its regulatory impact analyses since 2000. For other health endpoints, the selection of the concentration-response functions was based on the most recent and relevant scientific literature. Details are in CARB's PM Staff Report (CARB, 2002).

- The ARB staff assumed the model-predicted exposure estimates could be applied to the entire population within each modeling grid. That is, the entire population within each modeling grid of 500 m x 500 m was assumed to be exposed uniformly to modeled concentration. This assumption is typical of this type of estimation.

- The ARB staff included only directly emitted PM and did not account for secondary PM formed from NOx and SOx emissions.

- The ARB staff assumed the baseline incidence rates were uniform across each modeling grid, and in many cases across each county. This assumption is consistent with methods used by the U.S. EPA for its regulatory impact assessment. The incidence rates match those used by U.S. EPA.

It should be noted that because the estimates apply to a limited modeling domain (100 km by 100 km), the affected population is small, and hence the overall estimated health impacts are smaller than estimates made on a statewide basis. In addition, to the extent that only a subset of health outcomes is considered here, the estimates should be considered an under-estimate of the total public health impact.

C. Uncertainty and Limitations

Risk assessment is a complex process which requires the integration of many variables and assumptions. Due to these variables and assumptions, there are uncertainties and limitations with the results. Generally, the assumptions are designed to be health protective so that the estimates of risks to individuals are not underestimated. Below is a discussion of uncertainty associated with the key elements used in a risk assessment. These key elements are the heath risk values, the air dispersion modeling used to predict diesel PM concentrations, and the model input parameters.

Uncertainty Associated with Health Values

Scientists often use animal studies to predict how a chemical affects humans in the development of health values that are then used in a risk assessment. Scientists

cannot be sure that humans will respond exactly the same way as animals do to a chemical. Also, animals used in these studies are often given very high doses of a chemical to produce negative health effects. These doses are much higher than what people are actually exposed to in the environment. When available, as is the case with diesel PM, scientists use studies of people exposed at work to develop health values to estimate potential cancer risk from environmental exposures. This can introduce uncertainty in the potential risk estimated for the general public because there is a wide range of responses among all individuals, and there can be a wider range of responses in the general public than in the workers in an epidemiology study. In addition, for diesel PM, the actual worker exposures to diesel PM were based on limited monitoring data and were mostly derived based on estimates of emissions and duration of exposure. Different epidemiological studies also suggest somewhat different levels of risk. When the Scientific Review Panel (SRP) identified diesel PM as a toxic air contaminant, they endorsed a range of inhalation cancer potency factors (1.3×10^{-4} to 2.4×10^{-3} $(\mu g/m^3)^{-1}$) and a risk factor of 3×10^{-4} $(\mu g/m3)^{-1}$, as a reasonable estimate of the unit risk.[6] From the unit risk factor an inhalation cancer potency factor of 1.1 $(mg/kg\text{-}day)^{-1}$ may be calculated.

Uncertainty Associated with Air Dispersion Modeling

As mentioned previously, there is no direct measurement technique for diesel PM. This analysis used air dispersion modeling to estimate the concentrations to which the public is exposed. While air dispersion models are based on the state-of-the-art formulations, there are uncertainties associated with the models. The primary purpose of this study was to prioritize emission sources/categories from the Ports operation which are to be regulated. The U.S. EPA CALPUFF model was selected for use in this study because it is the most applicable for the region being modeled and the variety of emission sources addressed. In addition, it currently is one of several U.S. EPA's recommended air dispersion model at this time.

Uncertainty Associated with the Model Inputs and Domain

The model inputs include emission rates, emission release parameters, meteorological conditions, and dispersion coefficients. Each of the model inputs has uncertainty associated with it. Among these inputs, emission rates and meteorological conditions have the greatest affect on the modeling results. Emission rates for each source were calculated from the emission inventory developed for the HRA. The emission inventory has several sources of uncertainty including: emission factors, equipment population and age, equipment activity, load factors, and fuel type and quality. The uncertainties in the emission inventory can lead to over predictions or under predictions in the modeling

[6] The Scientific Review Panel (SRP/Panel) is charged with evaluating the risk assessments of substances proposed for identification as toxic air contaminants by the Air Resources Board (ARB) and the Department of Pesticide Regulation (DPR). In carrying out this responsibility, the SRP reviews the exposure and health assessment reports and underlying scientific data upon which the reports are based, which are prepared by the ARB, DPR, and the Office of Environmental Health Hazard Assessment (OEHHA) pursuant to the sections 39660-39661 of the Health and Safety Code and sections 14022-14023 of the Food and Agricultural Code.

results. To minimize uncertainty, we relied on the most current information available. There are two emission source categories, harbor craft and on-road trucks, where we have identified areas for improvement. Brief discussions on these are provided below.

On-road Trucks: Part III on-road truck (port drayage truck and on-road non-port-related trucks) emissions were estimated for individual roadway links within the modeling domain. Developing these emissions required obtaining information about truck travel on individual roadway links, which are developed by local transportation agencies using travel demand models. We used a roadway network developed by Bay Area local transportation agencies. As with most travel demand model networks, roadway maps are accurate for freeway and major arterials, while smaller streets are represented schematically and do not necessarily follow actual travel routes. As a result, the spatial allocation of emissions from minor arterials and roadways in this risk assessment is less accurate than for freeways and major arterials.

While developing the inventory we compiled total truck vehicle miles traveled estimates on the local agency transit network and compared those results to EMFAC2007, which is the federally accepted model for estimating regional emissions for air quality and transportation conformity assessments. Results suggested a significant difference between total vehicle miles traveled estimates representing Alameda County in the network and in EMFAC2007. The local agency network contained more than twice as many truck vehicle miles traveled than EMFAC2007. To evaluate this difference we compiled available truck count data and compared results to the local agency network. Results were mixed, indicating that while for most roadways vehicle miles traveled appeared to be overestimated, some appeared to be underestimated. We considered reducing truck volumes on the roadway network for consistency with EMFAC, but ultimately decided that this would generate as much uncertainty as it would resolve. As a result, we decided to use the local agency network as provided to us. We believe the truck activity on the roadway network we used, while potentially overestimating the total vehicle miles traveled, provided the best representation of trucking operations within the modeling domain. As such, we believe it accurately characterizes all of the trucking emissions within the West Oakland community.

One of the questions to be addressed by this risk assessment was the allocation of responsibility for trucking emissions between Ports and Railyards, and other businesses. Very little information was available to accomplish this task. The Port of Oakland had quantified emissions on Port property to and from port property to the freeway on-ramps. Because they had not conducted an origin-destination survey we had no information on the routes trucks took to and from the freeways through the modeling domain, and in the West Oakland community. ARB staff had estimated trips and emissions associated with Port of Oakland trucks for development of ARB's 2007 Drayage Truck Rule (CARB, 2007C). Trip estimates were consistent with those developed by the Port of Oakland in the Part I inventory. ARB's drayage truck inventory was used to estimate drayage truck emissions in the West Oakland community, assuming that all trips leaving the Port of Oakland traveled through the modeling domain on freeways through the community without using minor arterials or secondary roadways. This approach may underestimate the magnitude of emissions from trucks serving the Port of Oakland, because port-truck operations within the community are not

well characterized even though clearly some are occurring. Since drayage truck emissions were subtracted from the total emissions on the network, any potential underestimate in drayage truck emissions in the Part I inventory implies an equal overestimate in Part III inventories.

In late 2007, ARB and BAAQMD began discussing the need for improved estimates of truck volumes and origins/destination within West Oakland. As a result of these discussions, the BAAQMD initiated a contract designed to count trucks and survey idling behavior. Both ARB and BAAQMD have recommended to the Port of Oakland that they conduct origin-destination studies of trucks servicing the port of Oakland in order to improve Port truck emissions estimates both within West Oakland and in the Bay Area and San Joaquin Valley. Results from these efforts were not available to refine this risk assessment, but could be used in the future to do so.

Harbor Craft: Commercial harbor craft include passenger ferries, tug boats, tow boats, push-boats, crew vessels, work boats, pilot vessels, supply boats, research vessels, United States Coast Guard vessels, hovercraft, emergency response vessels, and barges. ARB staff estimated emissions from harbor craft for the Bay Area using the statewide commercial harbor craft emission estimation methodology. More detailed information about the development of this emissions inventory can be found in the document titled, Emissions Estimation Methodology for Commercial Harbor Craft Operating in California (CARB, 2007B). This document can be accessed at http://www.arb.ca.gov/regact/2007/chc07/appb.pdf.

There are no comprehensive databases of commercial harbor craft population or activity. As described in CARB (2007B) we developed the inventory by compiling several incomplete population databases, and conducting a survey or commercial harbor craft operations. By necessity, the statewide inventory assumes that vessels operate only in the vicinity of their home port, whereas we believe some harbor craft transit between ports, especially in the Bay Area. As a result, inventory estimates may not accurately reflect where actual vessel operations occur. The statewide inventory also assumes engine operation parameter averages by vessel type are indicative of operations in the Bay Area. This may or may not be true. Finally, the statewide commercial harbor craft inventory provides no information on spatial allocation within regions. To develop a spatial allocation we a limited data set of GPS-based second by second vessel traffic data that is generated as a result of national vessel safety programs. We used these data, representing a limited number of vessels, to estimate the spatial activity patterns of all commercial harbor craft in the Bay Area. The ARB is actively working on improving commercial harbor craft emissions inventories by integrating new data sources, conducting new surveys, and taking advantage of new data that will be provided as a result of the recently adopted commercial harbor craft regulation.

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APPENDIX A

West Oakland Community Health Risk Assessment Emission Inventory Summary

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APPENDIX A

West Oakland (Diesel) HRA Emissions Summary

Emissions Summary Overview

PROJECT PART	DIESEL PM (tons per year)*
Estimated Total for PART I -- Port of Oakland (seaport) **	265
Estimated Total for PART II -- UP Rail Yard	11
Estimated Total for PART III -- In and Adjacent To West Oakland Community (Non Port or UP)***	597
Estimated Total for Project (Parts I, II, and III)	873

* Totals are rounded. Modeled emissions are different than emissions reported in Appendices A and D since the size of the modeling domain is slightly smaller than the overall region in which emissions were estimated.

** Total includes emissions that were calculated in Part III of the assessment. These diesel PM emssions include the fraction of port-related on-road trucking emissions and those associated with port-associated distribution centers. The emission contributions from these sources are approximately 4.2 tons per year of diesel PM.

*** Approximately 1.2 TPY of diesel PM emissions from port-associated major construction, standby generators, and miscellaneous diesel maintenance equipment are included in this total.

PART I - Emissions Summary By Category*

PART I - PORT OF OAKLAND DIESEL EMISSION SOURCES	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
OGV		
Transiting (from Outer Buoys)	104.5	1,916 vessel visits (calls)
Maneuvering	41.5	1,916 vessel visits (calls)
Hotelling (Berthing)	60.6	1,916 vessel visits (calls)
Anchorage	1.9	125 vessel anchorages
Total	**209**	
Harbor Craft		
Tug (OGV assist)	12.9	6,630 tug trips (in and out)
Dredging-including material transport	0.4	68 tug trips (in and out)
Total	**13**	
Cargo Handling Equipment		
Picks/other	6.4	149 pieces of equipment
RTG Cranes (including BNSF)	3.3	36 pieces of equipment
Yard Trucks and Other Equipment	11.5	337 pieces of equipment
Total	**21**	
Diesel Trucking		
Surface Roads On road truck movement (Freeway exits to terminals)	4.9	2,620,483 marine terminal trips (in and out)
Gate Idling (on terminal)	0.6	912,288 rail facility trips (in and out)
In Terminal Truck movement	8.8	
In Terminal Idling	1.6	
Diesel traffic on freeways associated with the Port (calculated during the Part III analysis)**	2.8	
Port-Related Distribution Center: Oakland Maritime Support Services (calculated during the Part III analysis)**	1.4	
Total	**20**	
Rail (BNSF-excluding Rail CHE)		
Refueling Area	0.1	
Train Arrival/Departure	1.0	
Switching engines	1.0	
Total	**2.0**	
Estimated Total for PART 1 --- Port of Oakland	**265**	

* Totals are rounded.

** Emissions related to Port activities.

PART II - Emissions Summary By Category*

PART 2 - UNION PACIFIC RAIL YARD DIESEL EMISSION SOURCES	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Locomotives		
Switchers	1.9	4 switchers
Line Hauls	1.6	(--)
Service/Testing	0.5	(--)
Total	**3.9**	(--)
TRU and Refrigerator Cars	**3.2**	(--)
Diesel Trucks	**1.9**	Aproximately 350,000 Trucks
Cargo Handling Equipment**	**2.2**	(--)
Stationary/Point Sources (Emergency Generators)	**0.019**	1 emergency generator
Estimated Total for PART II -- UP Railyard	**11**	

* Totals are rounded.

** Includes Heavy Off-road Equipment

PART III - Emissions Summary By Category*

PART III - WEST OAKLAND COMMUNITY DIESEL EMISSION SOURCES (PART I Subtracted)	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Freeways and Roadways		
Roadway Network - Diesel Heavy Duty Trucks and Buses		
Freeways 80, 580, 880, and 980		Miles Traveled per Day
Trucks	83.3	313,861
Buses	5.8	19,973
Total	**89**	approx. 334,000 miles per day
Off-port Ocean Going Vessels		
Transiting (to/from Outer Buoy)	151.3	1,637 vessel visits
Maneuvering (to/from Outer Buoy)	46.5	1,637 vessel visits
Hotelling	37.9	1637 vessel visits
Anchorage	10.6	933 vessel anchorages
Total	**246**	
Harbor Craft - Transit and Hotelling		Number of Vessels
Commercial Fishing	30.2	859
Charter Fishing	18.6	155
Crew and Supply	3.0	9
Ferries	36.1	21
Excursion Vessels	30.0	118
Pilot Vessels	1.0	4
Tow Boats	18.5	24
Tug Boats	87.7	49
Work Boats	1.9	35
Others	10.7	65
Total	**238**	1,337
Cargo Handling Equipment		
Schnitzer (trucks, dozers, loaders, etc.,)	3.72	
Compass Container (fork lifts and side picks)	0.29	
Port Maintenance Facility (misc. equipment)**	0.05	
Cable Moore	0.01	
East Bay Resources	0.03	
Mutual Express	0.02	
Roadway Express	0.20	
Total	**4.3**	approx. 80 pieces of equipment
Off-Port Locomotives		Miles Traveled per Day
Amtrak locomotives - Off-Port, Off-Railyard	0.55	33
UP locomotives - Off-Port, Off-Railyard (includes Amtrak as through trains)	0.66	approx. 175
BNSF locomotives - Off-port, 0ff-BNSF Railyard	0.11	approx. 23
Total	**1.3**	

* Totals are rounded.

** Emissions related to Port activites.

PART III - Emissions Summary By Category*

PART III - WEST OAKLAND COMMUNITY DIESEL EMISSION SOURCES (PART I Subtracted)	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Off-Port Locomotives (continued)		
Amtrak Maintenance Facility (total)		
Passenger Train Movemment (inside facility)	0.17	approx. 13 trains/day M-F and 7 trains/day Sat-Sun
Switcher Activity	0.40	1 switcher on site
Shuttle Wagon Activity	0.01	1shuttle wagon on site
Maintenance and Testing	0.14	approx. 360 trains/month
Locomotive Idling	2.67	approx. 13 trains/day M-F and 7 trains/day Sat-Sun
Total	**3.4**	
Trucking (within facility) and Distribution Centers		
A M & S Transportation Co.		Trucks per Day
Idling (in facility)	0.00159	25
Truck movement (in facility)	0.00206	25
TRU (in facility)	0.00640	20
California Cereal Products		
Idling (in facility)	0.00086	5
Truck movement (in facility)	0.00062	5
California Waste		
Idling (in facility)	0.00617	44
Truck movement (in facility)	0.00552	44
Central Concrete Co.		
Idling (in facility)	0.00874	56
Truck movement (in facility)	0.00164	56
Compass Container		
Idling (in facility)	0.00014	2
Custom Alloy and Scrap		
Idling (in facility)	0.00280	20
Truck movement (in facility)	0.00130	20
East Bay MUD		
Idling (in facility)	0.00791	84
Truck movement (in facility)	0.01164	84
East Bay Resources		
Idling (in facility)	0.00006	1
Truck movement (in facility)	0.00002	1
Eastshore Charter Lines		
Idling (in facility)	0.00084	6
Truck movement (in facility)	0.00015	6

* Totals are rounded.

PART III - Emissions Summary By Category*

PART III - WEST OAKLAND COMMUNITY DIESEL EMISSION SOURCES (PART I Subtracted)	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Golden Bear Produce		Trucks per Day
Idling (in facility)	0.00252	90
Truck movement (in facility)	0.00153	90
TRU (in facility)	0.00703	22
Greyhound Bus Station		
Idling (in facility)	0.00505	55
Bus movement (in facility)	0.00032	55
J&A Truck Repair		
Idling (in facility)	0.00070	5
Truck movement (in facility)	0.00010	5
J&O Truck/Tire		
Idling (in facility)	0.00070	5
Truck movement (in facility)	0.00010	5
JAC Truck Repair		
Idling (in facility)	0.00070	5
Truck movement (in facility)	0.00010	5
JB Truck Repair		
Idling (in facility)	0.00070	5
Truck movement (in facility)	0.00010	5
KMC Paper (Chang's)		
Idling (in facility)	0.00025	2
Truck movement (in facility)	0.00004	2
Lehman Transportation		
Idling (in facility)	0.00235	12
Macy Movers Inc.		
Idling (in facility)	0.00084	6
Truck movement (in facility)	0.00018	6
Matheson Postal Service		
Idling (in facility)	0.00420	30
Truck movement (in facility)	0.00188	30
Morgan Southern		
Idling (in facility)	0.00070	5
Truck movement (in facility)	0.00019	5
Mutual Express		
Idling (in facility)	0.00308	22
Truck movement (in facility)	0.00114	22
Narayan's Trucking		
Idling (in facility)	0.00534	30
National Recycling Corp.		
Idling (in facility)	0.00009	10
Truck movement (in facility)	0.00026	10

* Totals are rounded.

PART III - Emissions Summary By Category*

PART III - WEST OAKLAND COMMUNITY DIESEL EMISSION SOURCES (PART I Subtracted)	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Oakland Maritime Support Services (OMSS)**		Trucks per Day
Idling (in facility)*		1,250
Truck movement (in facility)*		1,250
Online Trucking		
Idling (in facility)	0.00420	30
Quintero Trucking		
Idling (in facility)	0.00198	30
Truck movement (in facility)	0.00087	30
Roadway Express Inc.		
Idling (in facility)	0.00074	25
Truck movement (in facility)	0.00170	25
Saroni Co.		
Idling (in facility)	0.00061	7
Truck movement (in facility)	0.00015	7
TRU (in facility)	0.00448	7
Schnitzer (idling)		
Idling (in facility)	0.09687	Approx. 230
Sutta Co.		
Idling (in facility)	0.00133	11
Truck movement (in facility)	0.00052	11
Svenhard's Bakery		
Idling (in facility)	0.00224	16
Truck movement (in facility)	0.00141	16
Tighe Drayage Co.		
Idling (in facility)	0.00126	3
Truck movement (in facility)	0.00013	3
TRU (in facility)	0.00576	3
US Postal Service		
Idling (in facility)	0.06303	1,034
Truck movement (in facility)	0.31500	1,034
VA Transportation/Joint Intermodal		
Idling (in facility)	0.00112	8
Truck movement (in facility)	0.00022	8
Total Diesel Trucking (within facility) and Distribution Centers	**0.6**	

* Totals are rounded.

** Emissions at this facility are Port-associated. These emissions (1.4 TPY) have been added into Part I (see pages 1 and 2).

PART 3 - Emissions Summary By Category*

PART III - WEST OAKLAND COMMUNITY DIESEL EMISSION SOURCES (PART I Subtracted)	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Stationary Diesel Sources		
Plant No.		
591 EBMUD	0.1248	8 Total: (3 prime engines, 5 standby generators)
5202 USPS-vehicle maint	0.0208	2 Total: (standby generators)
8001 EBMUD	0.0151	3 Total: (standby generators)
10997 County of Alameda	0.0113	2 Total: (2 standby generators)
10998 County of Alameda	0.0113	1 Total: (standby generator)
11887 Duke Energy	0.0100	1 Total: (standby generator)
13712 EBMUD (portable)	0.0038	3 Total: (standby generator, 2 reciprocating engines)
15538 BNSF railway**	0.0005	1 Total: (standby generator)
15760 SSA terminals**	0.0004	1 Total: (standby generator)
Total	**0.2**	
Construction Activity		
66 Franklin St.	0.06	10 Total: (drill rig, crane, 2 welders, 4 forklifts, paver, backhoe)
206 2nd St.	0.02	1 Total: (gradeall lifter)
Harbor View Lofts	0.11	9 Total: (2 dozers, concrete saw, excavator, drill rig, backhoe, welder, forklift, paver)
300 Harrison St.	0.11	9 Total: (2 dozers, concrete saw, excavator, drill rig, backhoe, welder, forklift, paver)
8 Orchids	0.11	9 Total: (2 dozers, concrete saw, excavator, drill rig, backhoe, welder, forklift, paver)
Ettie St./Mandela Parkway	0.11	9 Total: (2 dozers, concrete saw, excavator, drill rig, backhoe, welder, forklift, paver)
Wheelink	0.11	9 Total: (2 dozers, concrete saw, excavator, drill rig, backhoe, welder, forklift, paver)
Bay Bridge Construction	12.11	112 Total: (6 cranes, 24 welders, 10 forklifts, cement mixer, 24 generators, 5 crew boats, 12 light plants, 25 air compressors)

* Totals are rounded.

** Emissions related to Port activites.

PART III - Emissions Summary By Category*

PART III - WEST OAKLAND COMMUNITY DIESEL EMISSION SOURCES (PART I Subtracted)**	DIESEL PM (tons per year)	NUMBER AND DESCRIPTION OF EMISSION SOURCES
Berth 22 Wharf Reconstruction**	0.15	38+ Total: (cranes, crushers, loaders, pavers, trucks, tugs, etc.)
Wharf and Embankment Strengthen (WESP)**	0.02	4 Total: (pile driver, hammer, misc. equipment)
Berth 32/33 Rehabilitation**	0.05	3 Total: (crane, hammers)
Demolition of Building D-833 and Berth 59**	0.16	19 Total: (Two phased project: excavators, pavers trucks, misc. equipment.)
Berth 30 Terminal Expansion**	0.18	Unspecified - scaled from Berth 22 project by material used
Former Union Pacific Roundhouse**	0.49	Unspecified - scaled from projects at Berths 22 and 59; Building D-833 demolition
Dredging and Dredge Materials Disposal**	0.16	Undefined**
Total	**14**	
Estimated Total for PART 3 --- West Oakland	**597**	

* Totals are rounded.

* Emissions related to Port activites. See the document of the Port's website that discusses the emissions from Port Construction Projects in 2005.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER AN UPDATE ON THE AIR RESOURCES BOARD'S 2006 EMISSION REDUCTION PLAN FOR PORTS AND GOODS MOVEMENT IN CALIFORNIA

The Air Resources Board (the Board or ARB) will conduct a public meeting at the time and place noted below to consider a staff update on Implementation of the 2006 Emission Reduction Plan for Ports and Goods Movement.

DATE: April 24, 2008

TIME: 9:00 a.m.

PLACE: California Department of Transportation
111 Grand Avenue
1st Floor, Auditorium
Oakland, California 94612

This item will be considered at a one-day meeting of the Board, which will commence at 9:00 a.m., April 24, 2008. Please consult the agenda for the meeting, which will be available at least 10 days before April 24, 2008, to determine the order of agenda items.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. Please contact ARB's Disability Coordinator at 916-323-4916 by voice or through the California Relay Services at 711, to place your request for disability services. If you are a person with limited English and would like to request interpreter services, please contact ARB's Bilingual Manager at 916-323-7053.

This is the third update on implementation of the Emission Reduction Plan for Ports and Goods Movement in California (Plan) approved by the Board on April 20, 2006. The Plan is designed to identify and initiate specific actions to reduce the emissions and health risk associated with pollution from the ships, trucks, locomotives, harbor craft, and cargo equipment that operate at ports and move goods throughout the State. The Plan includes an analysis of the health impacts from goods movement and identifies strategies to cut emissions in each sector to protect public health.

ARB staff will present an oral report at the meeting. This presentation will describe progress made by ARB in developing and implementing the strategies to meet the Board's health goals for goods movement, as well as international, national, and local initiatives to cut emissions. Staff will also report on the funding sources available for incentives to accelerate progress.

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by email before the meeting. To be considered by the Board, written comments and email submissions not physically submitted at the meeting must be received **no later than 12:00 noon, April 23, 2008**, and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Facsimile submittal: (916) 322-3928

Please note that under the California Public Records Act (Government Code section 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and other search engines.

The Board requests, but does not require 30 copies of any written submission. Also, the ARB requests that written and email statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have time to fully consider each comment. Further inquiries regarding this matter should be directed to Cynthia Marvin, Assistant Division Chief, Planning and Technical Support Division, at (916) 322-7236 or cmarvin@arb.ca.gov.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date: April 8, 2008

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER APPROVAL OF MODIFIED TRANSPORTATION CONFORMITY BUDGETS CONTAINED IN THE 2007 AIR QUALITY MANAGEMENT PLAN FOR ATTAINING THE FEDERAL 8-HOUR OZONE AND PM2.5 STANDARDS IN THE SOUTH COAST AIR BASIN

The California Air Resources Board (ARB or Board) will conduct a public hearing to consider approval of modifications to the transportation conformity budgets contained the 2007 Air Quality Management Plan (AQMP) for attaining the federal 8-hour ozone and PM2.5 ambient air quality standards in the South Coast Air Basin. The plans were approved by the Board on September 27, 2007; the conformity budgets were approved by the Board on November 15, 2007. If adopted, ARB will submit these modified elements to the U.S. Environmental Protection Agency (U.S. EPA) for approval as a revision to the California State Implementation Plan (SIP).

DATE: April 24, 2008

TIME: 9:00 a.m.

PLACE: California Department of Transportation
111 Grand Avenue
1st Floor, Auditorium
Oakland, California 94612

This item will be considered at a one-day meeting of the Board, which will commence at 9:00 a.m. April 24, 2008. Please consult the agenda for the meeting, which will be available at least 10 days before April 24, 2008, to determine the order in which the items will be considered.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. Please contact ARB's Disability Coordinator by voice at (916) 323-4916, or through the California Relay Services at 711, to place your request for disability services. If you are a person with limited English and would like to request interpreter services, please contact ARB's Bilingual Manager at (916) 323-7053.

On September 27, 2007, the ARB approved plans for attaining the federal fine particulate matter (PM2.5) and 8-hour ozone standards in the South Coast Air Basin. These attainment demonstration plans rely on emission reductions from new control measured identified and committed to in the 2007 AQMP adopted by the South Coast Air Quality Management District (SCAQMD), and in the ARB's 2007 State Strategy. On November 15, 2007, ARB adopted transportation conformity budgets for the South Coast Air Basin. The conformity budgets adopted in November 2007 are

consistent with the PM2.5 and 8-hour ozone attainment demonstration plans for the South Coast Air Basin as approved by the Board on September 27, 2007. The adopted conformity budgets reflect anticipated on-road vehicle emission reductions from new control measures identified in ARB's State Strategy. Both the attainment demonstration plans and the conformity budgets have been submitted to the U.S. EPA as proposed revisions to the SIP.

U.S. EPA staff has expressed concerns about these budgets related to issues they have raised about the State Strategy used in the attainment demonstration plans. U.S. EPA staff indicated that these concerns could prevent the agency from approving or finding adequate conformity budgets based on the State Strategy.

ARB staff is now recommending that the Board adopt two sets of conformity budgets for the South Coast Air Basin at the April 24, 2008 hearing. The first set reflects the 2007 SIP submittal for the South Coast Air Basin, including the locally adopted 2007 AQMP and the 2007 State Strategy adopted by ARB. The second set of budgets reflects control measures adopted as of October, 2006 – the rules that formed the baseline emission inventory used in the development of the 2007 SIP. Both the SIP-based and baseline budgets provide sufficient reductions to meet the Clean Air Act's reasonable further progress test. Staff recommends that the Board submit both sets of budgets to U.S. EPA with a request that U.S. EPA approve the baseline budgets only if it cannot approve or find adequate in their entirety the budgets based on the 2007 SIP. Because the baseline budgets do not reflect new measures committed to in the 2007 SIP and are therefore less constraining than SIP-based budgets, staff recommends the Board commit that, if U.S. EPA approves the baseline budgets, ARB staff will work with staff of the AQMD, the Southern California Association of Governments, U.S. EPA, and the Federal Highway Administration to resolve budget adequacy issues, and that the State will submit updated transportation conformity budgets within the next 12 months.

The newspaper notices for this item indicated that proposed revisions to transportation conformity budgets for the Coachella Valley would also be considered at this hearing. The Board adopted transportation conformity budgets for the Coachella Valley on November 15, 2007 as part of the Early Progress Plan for the Coachella Valley. ARB staff has determined that it will not be necessary to revise these budgets.

ARB staff will present oral statements at the meeting. Copies of the proposed conformity budgets may be obtained from the Board's Public Information Office, 1001 "I" Street, 1st Floor, Environmental Services Center, Sacramento, CA 95814, (916) 322-2990, by April 14, 2008. The proposed conformity budgets may also be obtained from ARB's internet site at **http://www.arb.ca.gov/planning/sip/sip.htm**.

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by e-mail before the meeting. To be considered by the Board, written comments submissions not physically submitted at the meeting must be received **no later than 12:00 noon, April 23, 2008,** and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street
Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/comm/bclist.php

Facsimile submittal: (916) 322-3928

Please note that under the California Public Records Act (Government Code section 6250 et seq.), your written and oral comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request. Additionally, this information may become available via Google, Yahoo, and any other search engines.

The Board requests, but does not require, 30 copies of any written submission. Also, ARB requests that written and email statements be filed at least ten days prior to the meeting so that ARB staff and Board members have time to fully consider each comment. Further inquiries regarding this matter should be directed to Dennis Wade, Air Pollution Specialist, at (916) 327-2963.

CALIFORNIA AIR RESOURCES BOARD

James N. Goldstene
Executive Officer

Date:
April 8, 2008

Proposed Revisions
Transportation Conformity Budgets for South Coast Air Basin

On November 15, 2007, the Air Resources Board (ARB or Board) adopted conformity budgets for the South Coast Air Basin. The conformity budgets the Board approved are consistent with plans for attaining the federal fine particulate matter (PM2.5) and 8-hour ozone standards in the South Coast Air Basin that the Board had approved on September 27, 2007. However, staff at the U.S. Environmental Protection Agency (U.S. EPA) has expressed concerns about these budgets, stemming from U.S. EPA concerns about the State Strategy used in the attainment demonstration plans.

Although ARB staff and staff of the South Coast Air Quality Management District (AQMD) do not believe that U.S. EPA's concerns are properly part of conformity budget review, ARB and AQMD staffs have worked with staff of the Southern California Association of Governments (SCAG) and U.S. EPA staff to identify budgets that reflect California's commitment to meeting the air quality standards, and address U.S. EPA concerns.

Based on this effort, ARB staff is now recommending the adoption of two sets of conformity budgets for the South Coast Air Basin. The first set reflects the 2007 State Implementation Plan (SIP) submittal for the South Coast Air Basin, including the locally adopted 2007 Air Quality Management Plan (AQMP) and the 2007 State Strategy adopted by ARB. The second set of budgets reflects control measures adopted as of October, 2006 – the rules that formed the baseline emission inventory used in the development of the 2007 SIP. Both the SIP and baseline-based budgets provides sufficient reductions to meet the Clean Air Act's reasonable further progress test.

Staff recommends that ARB direct staff to forward the two sets of budgets to U.S. EPA with the request that both sets of budgets be considered simultaneously. Further, staff recommends that the Board request that EPA approve the all budgets based on the 2007 SIP, and that U.S. EPA should approve all the baseline budgets only if it cannot approve or find adequate in their entirety the budgets based on the 2007 SIP. The baseline budgets are less protective and constraining than SIP-based budgets since they do not reflect new measures committed to in the 2007 SIP. Therefore, the baseline budgets would be forwarded to U.S. EPA with a commitment that if U.S. EPA selects this approach, then staff of the AQMD, SCAG, ARB, U.S. EPA and the Federal Highway Administration (FHWA) would work together to resolve issues affecting budget adequacy, and submit updated transportation conformity budgets within the next 12 months to reflect such resolution.

Finally, staff's proposal does make two revisions to the 2007 SIP budgets approved in November 2007. The first revision would restore the budgets

proposed for 2008 and 2009 to the baseline levels; this was done at the request of U.S. EPA. The second is minor, and recalibrates the 2007 SIP budgets using the EMFAC2007 motor vehicle emissions model. EMFAC2007 is the basis for motor vehicle emission inventories used in the attainment demonstration and reasonable further progress plans, and will be used to compare the impacts of proposed transportation projects against the conformity budgets.

The Need for the Dual Path Approach

U.S. EPA's concerns and hesitancy to act on the already submitted budgets create a conformity timing problem. SCAG must to adopt its new Regional Transportation Plan (RTP) in May, 2008 to avoid a lapse in conformity. The adopted RTP must include a demonstration that the plan conforms to the SIP. If approved by the Board, the dual path approach allows SCAG staff to do conformity analyses comparing the impacts of the proposed RTP to both the SIP-based budgets and the baseline budgets, which will then allow SCAG to adopt the RTP. Finally, once U.S. EPA acts on one of the sets of budgets, that set will become the conformity budgets and the need to carry two sets of budgets will stop.

Proposed Budgets

SIP-Based Budgets

The preferred budgets reflect emission reduction commitments made in the ARB's adopted 2007 State Strategy for attaining the national PM2.5 and 8-hour ozone standards, and local controls identified in the South Coast's 2007 Air Quality Management Plan. The SIP-based budgets differ from the budgets ARB adopted in November, 2007, as described below.

1. The budgets for 2008 (PM2.5) and 2009 (ozone) reflect the baseline program: they do not include any reductions from new measures adopted as part of the 2007 SIP.
2. The budgets have been recalibrated using ARB's EMFAC2007 motor vehicle emissions model, which has been approved for the SIP and which is the tool that will be used to compare the impacts of new projects to the conformity budgets. The budgets approved in November were calculated using the South Coast's Controlled Emission Projection Algorithm (CEPA) program.

SIP-based transportation conformity budgets, shown in Attachment 1, are provided for the South Coast Air Basin for the following years:

- Annual PM2.5 Standard: 2009, 2012, 2014, 2023, and 2030
- 8-Hour Ozone Standard: 2008, 2011, 2014, 2017, 2020, and 2023

Baseline Budgets

The proposed baseline budgets reflect rules that were adopted as of October, 2006 – the baseline program prior to the development of the 2007 SIP. Because these budgets would not reflect the PM2.5 or 8-hour ozone attainment demonstrations, these budgets would be forwarded to U.S. EPA with a commitment that AQMD, SCAG, ARB, EPA, and FHWA will work together to resolve AQMP issues affecting budget adequacy, and submit an updated transportation conformity budgets within the next 12 months to reflect such resolution. These budgets were also calculated using the EMFAC2007 motor vehicle emissions model.

Baseline transportation conformity budgets, shown in Attachment 2, are provided for the South Coast Air Basin for all milestone years up to the attainment year as follows:

- Annual PM2.5 standard: 2009 and 2012.
- 8-hour Ozone standard: 2008, 2011, 2014, 2017, and 2020.

Transportation conformity budgets identified for 2012 and 2020 will be used as the PM 2.5 and ozone transportation conformity budgets for PM2.5 and ozone, respectively, for all subsequent milestone years. Under U.S. EPA's conformity regulations, the agency has the option of approving only some of the budgets submitted. Should U.S. EPA approve conformity budgets for select years, e.g. for 2008 and 2009 only, emission budgets for all future milestone years will remain the same as the last milestone year approved.

Coachella Valley

Based on U.S. EPA's anticipated approval of the 2012 Coachella Valley conformity budgets in the Early Progress Plan approved ARB approved on February 28, 2008, no further action is needed on the Coachella Valley budgets.

Staff Recommendation

ARB staff recommends that the Board approve the dual path approach at its April 24, 2008 hearing, and direct staff to forward the revised budgets to U.S. EPA with a request that 1) U.S. EPA give primary consideration to the SIP-based budgets, and 2) U.S. EPA approve the baseline budgets only if U.S. EPA staff determines that it would recommend disapproval of the SIP-based budgets in their entirety.

Revised on March 28, 2008 to correct typographical errors.

Attachment 1

South Coast Air Basin
Transportation Conformity Emission Budgets: PM2.5
SIP Based
(Annual Average - Tons Per Day)

		2009	2012	2014	2023	2030
ROG	Baseline Inventory	196.2	162.6	146.1	101.9	85.4
	State Strategy Reductions	N/A	-23.5(1)	-24.0	-12.1	-9.2
	Adjustments to Baseline*	-0.2	-0.5	-0.7	-1.4	-2.1
	Conformity Budget* **	**196**	**139**	**122**	**89**	**75**

		2009	2012	2014	2023	2030
NOx	Baseline Inventory	427.1	350.8	305.7	174.7	141.8
	State Strategy Reductions	N/A	-60.9(2)	-91.9	-33.7	-9.4
	Adjustments to Baseline*	-14.6	-14.0	-13.4	-10.4	-11.7
	Conformity Budget**	**413**	**276**	**201**	**131**	**121**

		2009	2012	2014	2023	2030
PM2.5	Baseline Inventory	17.8	17.5	17.2	16.4	17.0
	Re-entrained Road Dust (paved)	18.6	18.8	19.0	20.8	21.4
	Re-entrained Road Dust (unpaved)	1.0	1.0	1.0	1.0	1.0
	Road Construction Dust	0.2	0.2	0.2	0.2	0.3
	State Strategy Reductions	N/A	-0.6	-4.6	-1.6	-0.4
	Adjustments to Baseline*	-0.2	-0.2	-0.28	-0.4	-0.5
	Adjusted Inventory	37.4	36.7	32.5	36.4	38.7
	Conformity Budget**	**38**	**37**	**33**	**37**	**39**

* Reductions from rules adopted prior to December, 2006 that are not reflected in EMFAC2007.

** Rounded up to the nearest ton.

(1) Originally noticed as -24.6 tons ROG reduction; ROG conformity budget originally noticed as 138 tons

(2) Originally noticed as -61.6 tons NOx reduction

Attachment 1 (cont.'d)

South Coast Air basin
Transportation Conformity Emission Budgets: 8 Hour Ozone
SIP Based
(Summer Planning - Tons Per Day)

		2008	2011	2014	2017	2020	2023*
ROG	Baseline Inventory	214.2	176.0	150.1	131.1	117.0	106.1
	State Strategy Reductions	N/A	-14.0(1)	-24.6	-20.2	-15.6	-12.4
	Adjustments to Baseline**	-0.1	-0.4	-0.7	-1.0	-1.2	-1.5
	Conformity Budget* **	**215**	**162**	**125**	**111**	**101**	**93**

		2008	2011	2014	2017	2020	2023*
NOx	Baseline Inventory	441.3	367.7	299.9	243.5	200.2	171.8
	State Strategy Reductions	N/A	-33.6(2)	-91.4	-65.3	-45.7	-33.5
	Adjustments to Baseline**	-14.7	-14.3	-13.4	-12.0	-10.4	-10.5
	Conformity Budget * **	**427**	**320**	**196**	**167**	**145**	**128**

* 2023 budget is applicable to all future years beyond 2023.
** Reductions from rules adopted prior to December, 2006 that are not reflected in EMFAC2007.
*** Rounded up to the nearest ton.
(1) Originally noticed as -14.9 tons ROG reduction; ROG conformity budget originally noticed as 161 tons
(2) Originally noticed as -34.1 tons NOx reduction

Attachment 2

South Coast Air Basin
Transportation Conformity Emission Budgets: PM2.5
Baseline Based
(Annual Average - Tons Per Day)

		2009	2012
ROG	Baseline Inventory	196.2	162.6
	State Strategy Reductions	N/A	N/A
	Adjustments to Baseline*	-0.2	-0.5
	Conformity Budget**	**196**	**163**

		2009	2012
NOx	Baseline Inventory	427.1	350.8
	State Strategy Reductions	N/A	N/A
	Adjustments to Baseline*	-14.6	-14.0
	Conformity Budget **	**413**	**337**

		2009	2012
PM2.5	Baseline Inventory	17.8	17.5
	Re-entrained Road Dust (paved)	18.6	18.8
	Re-entrained Road Dust (unpaved)	1.0	1.0
	Road Construction Dust	0.2	0.2
	State Strategy Reductions	N/A	N/A
	Adjustments to Baseline*	-0.2	-0.2
	Adjusted Inventory	37.4	37.3
	Conformity Budget **	**38**	**38**

* Reductions from rules adopted prior to December, 2006 that are not reflected in EMFAC2007.
** Rounded up to the nearest ton.

Attachment 2 (cont.'d)

South Coast Air basin
Transportation Conformity Emission Budgets: 8 Hour Ozone
Baseline Based
(Summer Planning - Tons Per Day)*

		2008	2011	2014	2017	2020
ROG	Baseline Inventory	214.2	176.0	150.1	131.1	117.0
	State Strategy Reductions	N/A	N/A	N/A	N/A	N/A
	Adjustments to Baseline**	-0.1	-0.4	-0.7	-1.0	-1.2
	Conformity Budget ***	**215**	**176**	**150**	**131**	**116**

		2008	2011	2014	2017	2020
NOx	Baseline Inventory	441.3	367.7	299.9	243.5	200.2
	State Strategy Reductions	N/A	N/A	N/A	N/A	N/A
	Adjustments to Baseline**	-14.7	-14.3	-13.4	-12.0	-10.4
	Conformity Budget ***	**427**	**354**	**287**	**232**	**190**

* No reductions assumed for California's 2007 SIP on-road measures.
** Reductions from rules adopted prior to December, 2006 that are not reflected in EMFAC2007.
*** Rounded up to the nearest ton.