2. BACKGROUND INFORMATION

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

2.1. Statement of Air Quality Problem and Existing Conditions

The Port is located within the South Coast Air Basin (SoCAB). The SoCAB consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties and all of Orange County. The SoCAB covers an area of approximately 6,000 square miles and is bounded on the west by the Pacific Ocean; on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains; and on the south by the San Diego County line.¹

Air quality at a given location can be characterized by the concentration of various pollutants in the air. Units of concentration are generally expressed as parts per million by volume (ppm) or micrograms per cubic meter of air (µg/m³). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate national or state ambient air quality standard. These standards represent the allowable atmospheric concentrations determined to be protective of public health and welfare, on the basis of recent available information. They include a reasonable margin of safety to protect the more sensitive individuals in the population, and are required by law to be periodically reviewed and updated.

The EPA establishes the National Ambient Air Quality Standards (NAAQS). The ARB establishes the California Ambient Air Quality Standards (CAAQS), which are generally more stringent and include more pollutants than the NAAQS. Pollutants that have corresponding national or state ambient air quality standards are known as criteria pollutants. The criteria pollutants of primary concern include ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter less than 2.5 microns in diameter (PM₂.₅), and particulate matter less than 10 microns in diameter (PM₁₀). PM₁₀ produced by diesel fuel combustion is also important because of its toxicity in humans. Other criteria pollutants include, lead (Federal and California standards), vinyl chloride and sulfates (California standard only).

Local Air Monitoring Levels

The EPA designates all areas of the United States according to whether they meet the NAAQS. A non-attainment designation means that a primary NAAQS has been exceeded more than once per year in a given area. The EPA currently designates the SoCAB as an “extreme” non-attainment area for 1-hour O₃ “severe 17” for 8-hour O₃ and a “serious” non-attainment area for both CO and PM₁₀. The SoCAB has also recently been designated a non-attainment area for PM₂.₅. The SoCAB is in attainment of the NAAQS for SO₂, NO₂ and lead. The SCAQMD recently requested the EPA to redesignate the SoCAB from non-attainment to attainment of the federal 1- and 8-hour average CO standards. ARB also designates areas of the state according to whether they
meet the CAAQS. A non-attainment designation means the CAAQS has been exceeded more than once in three years. ARB currently designates the SoCAB as a non-attainment area for ozone and PM$_{10}$. The SoCAB is in attainment of the CAAQS for CO, SO$_2$, NO$_2$ and lead.

---

**Stakeholder Comments Received:**

**Pacific Energy Partners**

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

---

**Toxic Air Contaminants**

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

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

The federal Clean Air Act requires all areas that are classified as non-attainment for the NAAQS to develop a plan for implementing standards for achieving attainment of non-attainment pollutants. As discussed above, the SoCAB is considered a non-attainment area for the NAAQS for O$_3$, CO, PM$_{10}$ and PM$_{2.5}$. The plan, known as the SIP, requires a full accounting of all emissions of non-attainment pollutants in the air basin, and presents proposed plans, programs, and strategies to meet the NAAQS. The California SIPS have been accounting for the emissions from the Port’s emissions sources. Emission inventories that are compiled for the SIP report SoCAB-wide emissions for mobile
sources. These inventories do not disaggregate or separate out the emissions from trucks, rail and cargo equipment that stem from Port-related activity. The latest 2003 Air Quality Management Plan for SoCAB indicates that significant reductions from both on-road and off-road mobile sources, including the ports, are needed for this region to demonstrate attainment with ozone and PM$_{2.5}$ ambient air quality standards.

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

Stakeholder Comments Received:

Rail Industry

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

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

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

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

1 The two sites with lowest estimated potential cancer risk based on monitoring data are Anaheim and Long Beach and these estimated risk values are virtually identical as shown in Figure 3-4.
In order for the NNI policy to be effectively designed to achieve a reduction in air toxics emanating from the Port, it is critical to accurately identify and describe the sources of air toxics, including as appropriate DPM, contributing to the Port’s emission inventory. Second, the modeling approach used to predict the concentration of air toxics in the air in and around the Port now and into the future, with a reasonable degree of certainty, must incorporate accurate data and representative assumptions. Lastly, actual monitoring data must be collected to validate the accuracy of the modeled estimates to determine whether the control strategy as developed and implemented is effective in achieving the predicted results. If actual monitoring data vary from modeling input, refinements to the modeling and control strategy will be warranted.

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

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

South Coast Air Quality Management District

Response to Industry Comments Regarding MATES-II Results

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

The monitoring and modeling analyses conducted for MATES-II represented the state-of-knowledge at the time. Measurement and modeling methodologies are continually enhanced. As such, the monitoring and modeling analyses for MATES-III will be based on the most current state-of-technology, which includes new laboratory methods and newer computer simulation models. The newer methodologies may give different values, but we have no reason to believe that they will alter the validity of the overall conclusions of MATES-II.
**Action Required**
With the release of the MATES II findings, the local communities of San Pedro and Wilmington began lobbying for action to be taken to reduce the risks associated with exposure to DPM. In response to concerns raised by the local communities, Mayor Hahn responded when he declared the NNI Policy and directed the Board of Harbor Commissioners to take the necessary steps to meet that goal.

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

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

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

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

---

**Stakeholder Comments Received:**

**Pacific Merchant Shipping Association**

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

**Rail Industry**

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

2.2. Emissions Inventory

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

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

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

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

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

The Port will move forward in July 2005 to start the 2004 update to the inventory with the intent on gathering data to better resolve several assumptions and issues that were identified during the inventory development (and documented in the report) and post report publishing comments. There are several areas of interest that will be improved. For example, ocean-going vessels (OGV) transit emissions are based on the conservatively high assumption that all ships transit the fairway (between the study area and the precautionary zone) at sea-speed (97 percent of the Lloyd’s published speed).
This condition did not exist in 2001 as not all ships transited at sea-speed (a physically impossible condition) and in the 2004 update actual radar speeds from the Marine Exchange will be used for every ship calling on the Port. Therefore, the over-estimated transit emissions will be corrected by the use of actual speeds, which will have a significant effect. Another area of interest is reviewing the rail emissions within the South Coast Air Quality Basin, as the data provided for the 2001 baseline did not include “throttle-notch” data (activity was provided in a “ton-mile” format) which is the preferred agency method for estimating rail locomotive emissions. The resulting estimated rail emissions in the baseline inventory appear to under-estimate the emissions when compared with the Air Quality Management Plan developed by SCAQMD. Other examples to be better defined include OGV hotelling engine loads, heavy-duty diesel truck speeds on Port and nearby highways, load factors, and emissions factors.

Stakeholder Comments Received:

Rail Industry

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

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

2.3. Emissions Source Categories

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

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

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

Ocean-Going Vessels

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

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

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

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

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

Stakeholder Comments Received:

Rail Industry
Railroad Locomotives (R) - The rail category includes locomotives operated by the two Class 1 railroads, BNSF Railway (BNSF) and Union Pacific Railroad (UP), to transport Port-related and other freight traffic within the Basin as part of performing interstate rail service on their respective rail systems which extend throughout the western United States and into Canada and Mexico.
Heavy-Duty Vehicles –(HDV)
This category is used for diesel-fueled on-road trucks, including those trucks that carry Port related cargo throughout the SoCAB. A Port-specific HDV model year distribution was developed by ARB and the SCAQMD by querying over 7,000 license plate numbers obtained from local terminals against the California Department of Motor Vehicles (DMV) registration database. For estimating on-terminal HDV emissions, terminal operators were interviewed regarding on-terminal traffic patterns, including time spent waiting at the entry gate, time and distance on-terminal while dropping off and/or picking up cargo, and time spent waiting at exit gates. Off and on-terminal emissions were estimated by multiplying the appropriate emission factor by the time and distance parameters established for the terminal operators. Truck emissions are included to the first cargo delivery drop-off location beyond the Port.

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

Estimates were developed for emissions from all sources (excluding Other) occurring within Port boundaries and within the South Coast Air Basin. Inventory estimates for NO\textsubscript{X} and PM\textsubscript{10} are shown in the Table 2-1 below:

Table 2-1. NO\textsubscript{x} and PM\textsubscript{10} Emissions by Source Category, tons per year (2001 Inventory Estimates)

<table>
<thead>
<tr>
<th>Source Category</th>
<th>NO\textsubscript{x} In-Port</th>
<th>Regional NO\textsubscript{x}</th>
<th>PM\textsubscript{10} In-Port</th>
<th>Regional PM\textsubscript{10}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean-Going Vessels</td>
<td>1,967.6</td>
<td>6,922.7</td>
<td>68.8</td>
<td>560.9</td>
</tr>
<tr>
<td>Harbor Craft</td>
<td>1,968.0</td>
<td>3,530.7</td>
<td>99.7</td>
<td>178.0</td>
</tr>
<tr>
<td>Cargo Handling Equipment</td>
<td>1,862.6</td>
<td>1,862.6</td>
<td>111.6</td>
<td>111.6</td>
</tr>
<tr>
<td>Railroad Locomotives</td>
<td>445.9</td>
<td>2,465.8</td>
<td>9.9</td>
<td>60.1</td>
</tr>
<tr>
<td>Heavy-Duty Vehicles</td>
<td>872.5</td>
<td>4,463.5</td>
<td>24.4</td>
<td>87.9</td>
</tr>
<tr>
<td>Total Port-Related</td>
<td>7,116.6</td>
<td>19,245.3</td>
<td>314.4</td>
<td>998.6</td>
</tr>
</tbody>
</table>

Stakeholder Comments Received:

South Coast Air Quality Management District
Table 2-1 - Please double check the OGV emissions. Based on the "calculator", the region wide emissions should be 6898 and 558 tons per year of NO\textsubscript{x} and PM\textsubscript{10}, respectively (unless we do not have the latest version).
The Inventory percentage of total emissions by source category is shown below for NOx in Figure 2-1 and for PM$_{10}$ in Figure 2-2:

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

- **Ocean-Going Vessels**: 36%
- **Heavy-Duty Vehicles**: 23%
- **Cargo Handling Equipment**: 10%
- **Harbor Craft**: 18%
- **Railroad Locomotives**: 13%

**Figure 2-2. Percentage of Port PM$_{10}$ Emissions by Source Category (2001 Inventory Estimates)**

- **Ocean-Going Vessels**: 56%
- **Cargos Handling Equipment**: 11%
- **Railroad Locomotives**: 6%
- **Harbor Craft**: 18%
- **Heavy-Duty Vehicles**: 9%
2.4. Port and Emissions Growth Projections

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

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

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

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

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

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

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

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

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

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

2.5. Development of Emissions Growth Scenarios by Source Category

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

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

**Stakeholder Comments Received:**

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

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

**Stakeholder Comments Received:**

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

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

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

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

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

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

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

![Graph showing PM$_{10}$ emissions growth for harbor craft from 2001 to 2025.]

**Stakeholder Comments Received:**

**Pacific Merchant Shipping Association**

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

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

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

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

![Figure 2-5. Cargo Handling Equipment Activity and Emissions Growth Projections](image)

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

For the emissions growth projections, the 2010 modeling assumes full implementation of the Memorandum of Understanding (MOU) with long-haul rail companies, wherein the 2010 fleet will achieve Tier 2 locomotive engine standards on a fleet average basis. Prior to 2010, the Class 1 locomotive fleet turns over in accordance with the Regulatory...
Support Document developed for 1998 EPA locomotive standards. There is no change assumed in the Pacific Harbor Line locomotive fleet. Tier 3 locomotive engine standards, when adopted, will act to reduce the emissions growth shown, but the effects of these standards have not been included due to uncertainty over what standards will eventually be promulgated. Figure 2-6 depicts the projected activity growth under Scenario 3 and the PM$_{10}$ emissions growth scenarios developed for locomotives.

**Figure 2-6. Locomotive Activity and Emissions Growth Projections**

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity Growth (%)</th>
<th>Emissions Growth (tons PM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>100</td>
<td>42</td>
</tr>
<tr>
<td>2005</td>
<td>123</td>
<td>49</td>
</tr>
<tr>
<td>2008</td>
<td>174</td>
<td>56</td>
</tr>
<tr>
<td>2010</td>
<td>208</td>
<td>72</td>
</tr>
<tr>
<td>2012</td>
<td>226</td>
<td>76</td>
</tr>
<tr>
<td>2025</td>
<td>355</td>
<td>81</td>
</tr>
</tbody>
</table>

**Stakeholder Comments Received:**

**Rail Industry**

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

A major problem with the TWG's approach lies in the fact that the Alameda Corridor is only one piece of a complex goods movement system. In order to arrive at a realistic estimate of future growth at the Port, the TWG must look at both ports, make reasonable assumptions for allocation of traffic between trucks and rail, and apply those assumptions consistently using the same methodology and the same input variables for both modes. That was not done here.
In addition, the TWG improperly reduced the emissions benefits from the Alameda Corridor that were developed by ACTA from 18 percent to 12 percent*. These air quality benefits represent the reductions in emissions over the emissions that would have occurred if rail freight had continued to be transported over the existing rail lines. The full 18 percent reduction in PM emissions that is attributable to the Alameda Corridor should have been applied to reduce the emissions growth projections for rail in Figure 2-6.

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

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

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

---

*Alameda Corridor Air Quality Benefits Report, Weston Solutions, April 13, 2005.*
Figure 2-7. Heavy-Duty Vehicle (Trucks) Activity and Emissions Growth Projections

Stakeholder Comments Received:

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

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

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

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

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

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

Figure 2-8. Total NOx Emissions

![Figure 2-8. Total NOx Emissions](image)
Figure 2-9. Total NOx Emissions, Adjusted For Implementation of Control Measures

Figure 2-10. Total PM$_{10}$ Emissions
Stakeholder Comments Received:

Rail Industry

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

2.6.1. Need for Updates

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

It is critical to emphasize that the most accurate estimate of projected emissions growth for all source categories must be a top priority and ongoing goal of the NNI program. This is essential to ensure that appropriate, properly balanced and feasible control measures are identified and implemented.
The Port has recently approved moving forward with a Port-wide Emissions Inventory Update in 2005/2006. The updated information resulting from the completion of the 2004 Emissions Inventory will significantly benefit the technical work contributing to the Plan and the evaluation process.

**Stakeholder Comments Received:**

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

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

### 2.7. Limitations and Constraints

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

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

---


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