

Multi-County Goods Movement Action Plan

Technical Memorandum 7: Mitigation Strategies for the Effects of Goods Movement on Local Communities & the Environment



Metro



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E.1 Introduction

This technical memorandum presents a set of strategies that can be utilized for mitigating the effects of goods movement activities in general, as well as mitigating the potential effects of those particular goods movement strategies proposed in Technical Memorandum 6. This memorandum provides a set of “good practices” that individual jurisdictions, transportation agencies, and the private sector can apply to minimize the potential negative consequences of infrastructure projects and industrial/manufacturing development.

As stated in Tech Memo 5b, during the outreach process (conducted as a part of Task 2), stakeholders within the MCGMAP region voiced strong concern over the impacts of goods movement on the environment, their communities, and their overall quality of life. Due to the serious environmental, public health impacts and traffic congestion issues, communities and policy makers have begun to demand mitigation and to challenge proposals for infrastructure capacity enhancement. The stakeholders within the affected communities are opposing key infrastructure improvement projects that could improve current circumstances; they are calling for slower growth and mitigation of existing impacts.

The stakeholder outreach process has highlighted the critical need to address community and stakeholder concerns regarding the environmental and community impacts of goods movement while pursuing infrastructure improvements. The mitigation of direct and indirect impacts of specific goods movement projects or related activities must become a part of the process from the early stages.

One result of the stakeholder outreach was the understanding by the project partners that a new approach was necessary in order to achieve the goals of simultaneous and continuous improvements to goods movement and the environment. Although this task focused on the identification of good practices (defined as practices that have shown proven positive results), the outreach and associated discussions identified a number of “new” approaches that should be considered.

The MCGMAP was tasked with identifying a set of good practices and action steps for mitigating the impacts of goods movement on the community and the environment. While specific costs or budgets for implementation of mitigation measures (e.g., cost-benefit analyses, environmental assessments) were not a part of the project scope, a detailed discussion of the costs associated with specific environmental and community impact mitigation members can be found within the recent study conducted by the Southern California Association of Governments (SCAG) entitled *Analysis of Goods Movement Emission reduction Strategies*. In addition, the *Clean Air Action Plan* (CAAP) provides a number of measures to mitigate environmental and community impacts in and around the Ports of Los Angeles and Long Beach.

Due to an emphasis on air quality and the related community health impacts within the Multi-County Goods Movement Action Plan study area, this memorandum also summarizes the status of federal, state, and regional level legislative and regulatory emission control efforts associated with the goods movement industry. Further, this memorandum addresses goods movement emissions relating to the 2008 Air Quality Management Plan (AQMP) currently





being drafted by the South Coast Air Quality Management District (SCAQMD), with a focus on PM 2.5 and ozone precursor emissions.¹

E.2 Mitigation

Types of Mitigation

The current mechanisms for identifying, avoiding, reducing, and mitigating environmental impacts should be improved and expanded. Most environmental impacts are identified and mitigated on a project-specific basis pursuant to state and federal regulations. This leads to a perception by stakeholders that mitigation measures are “band aids” that do not address broader regional concerns. Regional agencies and authorities try to develop plans and identify appropriate mitigation or avoidance measures; yet these measures are typically linked to projects or specific sectors. Therefore, mitigation measures for goods movement should focus on three aspects:

1. Project Specific
2. Regional Conformity
3. Broader Regional Issues

Community/Stakeholder Input

CEQA and NEPA are public disclosure tools. Each time a project is seriously considered, each regulation requires disclosure to the public. For EIRs/EISs, public scoping meetings are required, sponsored by the lead agency. Public circulation/comments periods are prescribed.

In some cases (such as the I-710 / Major Corridor Study Tier 2 Advisory Committee), stakeholder and community members are brought together to identify solutions to address environmental, community, and health impacts. This type of process can be folded into the CEQA/NEPA process to identify project-specific mitigation measures. It can also serve as a framework for addressing the broader cumulative concerns of a community or region.

Implementing and Funding Mitigation

The critical component for mitigation and avoidance measures is funding availability. Discrete projects with discrete mitigation or avoidance measures have the highest likelihood of funding (both from a public and private sector perspective). Therefore, in the development and identification of broader strategies to mitigate regional or cumulative impacts, it will be critical

¹ Ozone is not a pollutant directly emitted from mobile and non-mobile sources, but develops as a result of a combination of precursor emissions, such as nitrogen oxides (NOx) and reactive organic gases (ROG). Therefore, emissions budgets for ozone are not established by regulatory agencies.





to identify a nexus between projects or market segments and specific impacts. It will also be critical to bring all affected groups (stakeholders, community members, public agencies, private industry) together early in the process.

Mitigation Strategies

Numerous mitigation strategies are available to reduce the effects of goods movement on the community and the environment. A primary concern of community and environmental effects is air quality. Goods movement emissions, primarily mobile source emissions, are a significant source of pollution in the study area. The effects are especially egregious due to the potential health impacts resulting from pollutants. The goods movement industry is heavily dependent upon diesel fuel for mobility and operations. As discussed in Technical Memorandum 5B (TM 5b) of this action plan, diesel fuel results in the emissions of diesel particulate matter (DPM), which has been identified as a toxic air contaminant (TAC) by the state's Office of Environmental Health Hazard Assessment (OEHHA). Diesel fuel is also a significant contributor of nitrogen oxides (NO_x), the primary pollutant for ozone formation. Both DPM and NO_x are linked to various health issues especially in susceptible populations (the young and the elderly), including cancer, asthma, and preterm and low birth weight babies. Due to the current diesel fuel dependency within the goods movement industry, this action plan is targeting emissions reductions. In addition, this action plan addressed mitigation strategies for land use and institutional policies.

Emissions Reduction Strategies

The goods movement mobile sources targeted for emissions reduction include ships, harbor craft, rail, cargo handling equipment, and trucks. Aircraft, while a goods movement mobile source, generally have not yet been targeted for emissions reductions efforts primarily because emissions reporting do not identify aircraft as a significant source of pollutants in comparison to other mobile sources.²

Many emissions reduction strategies can be applied to goods movement, regardless of mode. Such strategies focus on fuel and engine technologies, as well as congestion reduction and operational approaches. Fuels and engine technologies concentrate on the reduction of particulate matter (PM), nitrogen oxides (NO_x), and sulfur oxides (SO_x) at the source. Congestion reduction and operational strategies can be considered to mitigate the negative effects of goods movement including corridor congestion, safety concerns from mixed-use traffic, and truck traffic diversion into neighborhoods, in addition to emissions reductions. Goods movement emissions reduction strategies are centered on various available engine technologies and alternative fuels, and are recognized as being potentially effective within the California Air Resource Board *Emission Reduction Plan for Ports and Goods Movement in California*, San Pedro Bay Ports *Clean Air Action Plan*, and South Coast Air Quality Management District

² The SCAQMD 2003 AQMP estimated that the 2005 annual average aircraft emissions in the SCAB contributed less than 3% NO_x, 1.6% SO_x, 0.6% PM_{2.5} of the total emissions from all sources in the Basin. For further discussion, refer to TM 5b Table 4, or the 2003 AQMP.





Draft 2007 Air Quality Management Plan. Such strategies include improved diesel fuels, shore-based electrical power for ships, hybrid technologies, and engine retrofits. A further listing of engine technologies and alternative fuels is available in the full technical memorandum.

Land Use Strategies

The effects of goods movement on local communities are largely a result of the proximity of goods movement corridors and facilities to the places where people live, work, and recreate. This result is unintended – most corridors and facilities were initially constructed in areas with sparse population. Over time, however, the dramatic growth in both population and trade has resulted in encroaching land uses that produce undesirable effects (as discussed in TM 5b.) In addition to the air quality impacts addressed in the previous section, undesirable community effects can also include noise and vibration, visual, safety, and natural resource impacts. Further, these effects can give rise to environmental justice concerns.

Potential land use strategies range from grade separations for noise/vibration and safety mitigation, buffers to improve aesthetics and reduce noise, and appropriate regulatory compliance during project planning activities to prevent the degradation of natural resources. A further listing of land use policies is available in the full technical memorandum.

Institutional Policy

Agencies that have regulatory and/or funding purview for goods movement-related activity can influence, either directly or indirectly, the environmental and community effects resulting from the goods movement industry. Many of these strategies have already been implemented or are suggested by various sources, including among others: CARB's Emission Reduction Plan, the Ports' CAAP, and SCAQMD Draft 2007 AQMP. Such institutional policies include establishing stricter emissions control regulations. Other institutional policies include enforcement, education, and monetary incentives or disincentives to enhance emissions reductions to achieve air quality goals. A further listing of institutional policies is available in the full technical memorandum.

E.3 Status of Emission Control Efforts

Several federal, state, and regional level legislative and regulatory emission control efforts associated with the goods movement industry have been initiated. As referenced in the previous section, emissions related to goods movement are primarily derived from diesel-fueled sources. The five major sources include: Ocean Going Vessels (OGVs, or ships), On-Road Heavy-Duty Vehicles (HDVs, or trucks), Cargo Handling Equipment (CHE), Harbor Craft (HC), and Railroad Locomotives (RL, or trains). The responsibility for the emissions control of the majority of these sources falls under the jurisdiction of local (South Coast Air Quality Management District, or SCAQMD), state (California Air Resource Board, or CARB), or federal (Environmental Protection Agency, or EPA) agencies.





E.4 Emissions Targets

Freight and port-related mobile sources such as ships, trucks, cargo handling equipment, harbor craft, and trains are major contributors to the emissions inventory in the South Coast Air Basin. In April 2006, CARB adopted its Emission Reduction Plan for Ports and Goods Movement in California (Emission Reduction Plan), which established the framework for actions to reduce the air quality and health impacts from the Ports and other goods movement activities in the state (as discussed in TM 5b). In June 2006, both the ports of Long Beach and Los Angeles released the San Pedro Bay Ports Clean Air Action Plan (CAAP), which set out emission reduction goals and control strategies necessary to reduce the emissions from port-related sources. Emission reductions from port-related sources are required in order to show attainment with the ambient air quality standards for new federal PM_{2.5} and the 8-hour ozone standards. The Draft 2007 Air Quality Management Plan (AQMP) contains port-related measures that build upon both the Emission Reduction Plan and CAAP with enhancements by the SCAQMD to reflect the reductions needed for attainment. Specifically, the Draft 2007 AQMP proposes that locomotives go beyond the Emission Reduction Plan and CAAP by requiring all locomotives operating in the SCAB to be Tier 3 equivalent by 2020. For ocean-going vessels, the Draft 2007 AQMP proposes that all ships operating within 40 nautical miles to operate on 0.2 percent sulfur fuel beginning in 2008, with another reduction to 0.1 percent sulfur beginning in 2010. In addition, the draft plan calls for ships to comply with the vessel speed reduction proposal specified in the CAAP, as well as similar retrofit penetration rates for 2014 and 2020 to what is called for in the State's Emission Reduction Plan.

The estimated emission reductions and final emissions targets needed from port-related sources to demonstrate attainment are³:

- NO_x – reduce 48.8 tons per day (tpd) by 2014, and 32.7 tpd by 2020
- SO_x – reduce 1.6 tpd by 2014, and 2.0 tpd by 2020
- PM_{2.5} – reduce 3.4 tpd by 2014, and 2.8 tpd by 2020

To achieve the emissions targets, SCAQMD is recommending the specific goods movement-related emissions reduction control measures for the 2007 AQMP, as summarized in Table 1.

³ Port emissions estimated by assigning all ships, harbor craft, and port-related cargo handling equipment emissions to port inventory. Emissions from trucks and locomotives operating at the ports are based on the percentage of international goods movement compared to all goods movement (international plus domestic) emissions from CARB's Emission Reduction Plan statewide estimate for trucks and locomotives.



TABLE 1
2007 AQMP Recommended Control Measures & Estimated Emissions Reductions
for Sources under State and Federal Jurisdiction

Control Measure Number	Control Measure Title	Estimated Reductions (tpd)	
		2014	2020
ONRD-07	Greater Use of Diesel Fuel Alternatives and Diesel Fuel Reformulation	NOx: 30.3 PM2.5: 2.3	NOx: 19.1 PM2.5: 1.2
ONRD-08	Accelerated Retrofits of Heavy-Duty Vehicles	NOx: 3.2 PM2.5: 0.2	NOx: 4.6 PM2.5: 0.3
ONRD-09	In-Use Emission Reductions from On-Road Heavy-Duty Vehicles	VOC: 0.3 NOx: 6.1 PM2.5: 0.1	VOC: 0.3 NOx: 5.1 PM2.5: 0.1
ONRD-10	Further Emission Reductions from Out-of-State/ International Registered Heavy-Duty Vehicles	NOx: 0.4 PM2.5: 0.03	NOx: 0.6 PM2.5: 0.03
ONRD-11	Enhanced Inspection and In-Use Emissions Tracking of Heavy-Duty Vehicles	VOC: 1.5 NOx: 16.7 PM2.5: 0.2	VOC: 1.4 NOx: 17.8 PM2.5: 0.1
ONRD-12	Further Emission Reductions from Heavy-Duty Trucks Providing Freight Drayage Services	VOC: 0.1 NOx: 2.6 PM2.5: 0.1	VOC: 0.1 NOx: 2.3 PM2.5: 0.1
OFFRD-05	Further Emission Reductions from Locomotives	NOx: 15.3 PM2.5: 0.5	NOx: 17.7 PM2.5: 0.7
OFFRD-06	Clean Marine Fuel Requirements for Ocean-Going Marine Vessels	NOx: 7.3 SOx: 45.6 PM2.5: 4.0	NOx: 9.3 SOx: 59.6 PM2.5: 5.2
OFFRD-07	Further Emission Reductions from Ocean-Going Marine Vessels and Harbor Crafts While at Berth	VOC: 0.5 NOx: 20.4 SOx: 0.6 PM2.5: 0.6	VOC: 0.7 NOx: 27.4 SOx: 0.8 PM2.5: 0.9
OFFRD-08	Further Emission Reductions from Cargo Handling Equipment	NOx: 1.0	NOx: 0.6
OFFRD-09	Vessel Speed Reduction	NOx: 17.4	NOx: 23.2
OFFRD-10	Further Emission Reductions from Ocean-Going Vessels	NOx: 13.9	NOx: 24.1

Source: SCAQMD 2007 Draft AQMP.

E.5 Conclusion

This technical memorandum provides a range of approaches to mitigate the environmental and community effects stemming from the goods movement industry. The approaches present a compendium of best practices that can be utilized by various agencies and jurisdictions. Many such approaches have been either recently adopted or is on the immediate horizon for adoption as they relate to emissions reductions.



Multi-County Goods Movement Action Plan

Technical Memorandum 7 – Mitigation Strategies for the Effects of Goods Movement on Local Communities and the Environment

Executive Summary

This technical memorandum, in conjunction with the other previous technical memorandums, will lead into the actual Action Plan itself – that is, the development of a plan that recommends goods movement improvement strategies for the study area that have positive economic impacts and which minimize the related environmental and community effects.





1.1 Purpose of Technical Memorandum 7

This technical memorandum presents a set of strategies that can be utilized for mitigating the effects of goods movement activities in general, as well as mitigating the potential effects of those particular goods movement strategies proposed in Technical Memorandum 6. This memorandum is not intended as a California Environmental Quality Act (CEQA)-type analysis of mitigating strategies nor will it identify specific obligations of individual member agencies. Rather, it is intended to delineate a range of approaches for addressing the community impacts of goods movement, which were summarized in Technical Memorandum 5b (TM 5b). This memorandum provides a set of “good practices” that individual jurisdictions, transportation agencies, and the private sector can apply to minimize the potential negative consequences of infrastructure projects and industrial/manufacturing development.

As stated in Tech Memo 5b, during the outreach process (conducted as a part of Task 2), stakeholders within the MCGMAP region voiced strong concern over the impacts of goods movement on the environment, their communities, and their overall quality of life. Due to the serious environmental, public health impacts and traffic congestion issues, communities and policy makers have begun to demand mitigation and to challenge proposals for infrastructure capacity enhancement. The stakeholders within the affected communities are opposing key infrastructure improvement projects that could improve current circumstances; they are calling for slower growth and mitigation of existing impacts.

The stakeholder outreach process has highlighted the critical need to address community and stakeholder concerns regarding the environmental and community impacts of goods movement while pursuing infrastructure improvements. The mitigation of direct and indirect impacts of specific goods movement projects or related activities must become a part of the process from the early stages.

One result of the stakeholder outreach was the understanding by the project partners that a new approach was necessary in order to achieve the goals of simultaneous and continuous improvements to goods movement and the environment. Although this task focused on the identification of good practices (defined as practices that have shown proven positive results), the outreach and associated discussions identified a number of “new” approaches that should be considered.

The MCGMAP was tasked with identifying a set of good practices and action steps for mitigating the impacts of goods movement on the community and the environment. While specific costs or budgets for implementation of mitigation measures (e.g., cost-benefit analyses, environmental assessments) were not a part of the project scope, a detailed discussion of the costs associated with specific environmental and community impact mitigation members can be found within the recent study conducted by the Southern California Association of Governments (SCAG) entitled *Analysis of Goods Movement Emission reduction Strategies*. In addition, the *Clean Air Action Plan (CAAP)* provides a number of measures to mitigate environmental and community impacts in and around the Ports of Los Angeles and Long Beach.





Due to an emphasis on air quality and the related community health impacts within the Multi-County Goods Movement Action Plan study area, this memorandum also summarizes the status of federal, state, and regional level legislative and regulatory emission control efforts associated with the goods movement industry. As always, such information is dynamic and time-sensitive; therefore, it is the intent of this memorandum to capture a “snap-shot” of such policy activities that are targeting the emissions of the goods movement industry. Further, this memorandum will address goods movement emissions relating to the 2008 Air Quality Management Plan (AQMP) currently being drafted by the South Coast Air Quality Management District (SCAQMD), with a focus on PM 2.5 and ozone precursor emissions.¹

Numerous mitigation strategies are available to reduce the effects of goods movement on the community and the environment. As presented in TM 5b, the effects are intertwined – that is, effects on the environment are also effects on the local community’s quality of life, and to separate the two when developing an action plan is moot.

A primary concern of community and environmental effects is that of air quality. Goods movement emissions, primarily mobile source, are a significant source of pollution in the study area. The effects are especially egregious due to the potential direct health impacts resulting from pollutants. The goods movement industry is heavily dependent upon diesel fuel for mobility and operations. As discussed in TM 5b, diesel fuel results in the emissions of diesel particulate matter (DPM), which has been identified as a toxic air contaminant (TAC) by the state’s Office of Environmental Health Hazard Assessment (OEHHA). Diesel fuel is also a significant contributor of nitrogen oxides (NOx), the primary pollutant for ozone formation. Both DPM and NOx are linked to various health issues especially in susceptible populations (the young and the elderly), including cancer, asthma, and preterm and low birth weight babies. Due to the current dependency of the goods movement industry on diesel fuel, the spotlight of this action plan, as with any such action plan, is emissions reduction.

¹ Ozone is not a pollutant directly emitted from mobile and non-mobile sources, but develops as a result of a combination of precursor emissions, such as nitrogen oxides (NOx) and reactive organic gases (ROG). Therefore, emissions budgets for ozone are not established by regulatory agencies.



2.1 Types of Mitigation

The current mechanisms for identifying, avoiding, reducing, and mitigating environmental impacts should be improved and expanded. Most environmental impacts are identified and mitigated on a project-specific basis pursuant to state and federal regulations. This leads to a perception by stakeholders that mitigation measures are “band aids” that do not address broader regional concerns. Regional agencies and authorities try to develop plans and identify appropriate mitigation or avoidance measures; yet these measures are typically linked to projects or specific sectors. Therefore, mitigation measures for goods movement should focus on three aspects:

1. Project Specific
2. Regional Conformity
3. Broader Regional Issues

Project Specific

For project specific mitigation, the California Environmental Quality Act (CEQA) and National Environmental Protection Act (NEPA) regulations force the project analysis and identification of mitigation. The project lead agency (for example, Caltrans for a highway project, ACE for the Alameda Corridor, the Port of Los Angeles for a port project, etc.) is required to identify mitigation measures as part of the environmental document (EA, EIR, EIS, etc.) If they don't identify mitigation measures that are deemed appropriate by a myriad of responsible agencies, trustee agencies, and other public agencies that have jurisdiction by law with respect to the project (reviewing agencies), then the lead agency will (a) not get there needed permits to do the project, and/or (b) face litigation. Once the lead agency adopts/certifies the environmental document and mitigation measures are identified, they must also, under CEQA, adopt a Mitigation Monitoring & Report Program (MMRP). Legally they are required to fulfill their duty and implement those measures at their own cost as part of the project. If they don't, they can face litigation. The state CEQA and federal NEPA processes/documents are legally binding. Also, the public can sue if (a) the process was not correctly adhered to, or (b) the project proceeds differently than outlined in the environmental document (including failure to implement mitigation measures.) Sometimes a project does not require any mitigation at all if there are no significant impacts identified in consultation with the experts (the environmental consultant and/or appropriate agencies).

Regional Conformity

From the California ARB²:

State and federal law require regional planning officials to prepare both a transportation plan to benefit public mobility and an air quality plan to benefit public health. Under the federal Clean Air Act, transportation activities that receive federal funding or approval must be found to be

² <http://www.arb.ca.gov/planning/tsaq/conformity/nutshell.doc>



fully consistent with the plan developed to meet federal clean air standards, known as the State Implementation Plan, or SIP.

The requirement that federal activities--especially transportation plans and projects--be shown to help communities attain federal air quality standards is known as conformity.

Conformity applies to federal transportation decisions in all areas that are designated "nonattainment" for specific pollutants (ozone, carbon monoxide, particulate matter) by the U.S. Environmental Protection Agency (U.S. EPA). These are areas that have recorded violations of the National Ambient Air Quality Standards. "Attainment" areas that have adopted air quality maintenance plans are also subject to conformity.

Areas that have exceeded the more stringent State of California air quality standards but are within national standards are not subject to conformity. The California Environmental Quality Act applies to plans and projects in these areas, however.

Adoption by a metropolitan planning organization (MPO) of a 20-year regional transportation plan (RTP), or a short-term federal transportation improvement program (TIP), must include a conformity analysis prepared by the MPO. In addition, sponsors of transportation projects that require a federal approval are responsible for assessing project conformity. Final determinations of conformity for RTPs, TIPs and projects are made by the Federal Highway Administration and the Federal Transit Administration.

Conformity assessments are part of a broader regional transportation planning process carried out by the MPO, or by another transportation agency in less urbanized areas. Because joint transportation and air quality planning assists both conformity assessments and air pollution reduction efforts, local air districts and transportation planning agencies regularly consult with each other and with involved state and federal agencies. Local transportation and air quality planning processes are also open to interested organizations and members of the public.

Project conformity is first tied to regional conformity. Generally the project must be part of the metropolitan planning organization's conforming RTP and TIP. Outside of metropolitan planning areas, projects need to be included in a regional emissions analysis performed by a neighboring MPO or the California Department of Transportation (Caltrans).

All "regionally significant" projects, regardless of funding source, should be accounted for in the regional emissions analysis. City and county public works agencies have responsibility for assuring that significant arterial projects are included in the analysis.

In carbon monoxide (CO) nonattainment and maintenance areas, project sponsors also need to demonstrate that their projects will not result in a localized violation of CO standards, or increase the frequency or severity of existing violations. UC Davis researchers have developed a carbon monoxide analysis protocol for making this assessment.

Caltrans has responsibility for assessing the conformity of state highway projects, and the actual conformity determination is made by the Federal Highway Administration. Transit





project conformity findings are made by the Federal Transit Administration.

Finally, some safety and rehabilitation projects, as well as certain projects with neutral or beneficial effects on air quality, are exempt from conformity. These project types are listed in the federal conformity regulation.

Federal funds cannot be spent for transportation plans, programs and projects that do not conform to the SIP. Federal funds for transit and highway improvements can be delayed, diverted, or even lost, as only SIP TCMs and a limited set of exempt projects and programs can be funded.

Because conformity failures have great implications for both mobility and air quality improvement, involved agencies work hard to correct them.

Successful conformity findings benefit from a dynamic, interactive regional planning process that considers both air pollution reduction and transportation needs. For this reason, affected regions are required to develop and include in the SIP specific procedures for consultation on conformity findings and transportation-air quality planning. With continual input from each other and from concerned members of the public, decision-makers can make informed choices that improve air quality and mobility at the same time.

Broader Regional Issues

Innovative strategies for avoiding / mitigating environmental impacts can include:

1. Mitigation banking
2. Creating land use buffers
3. Research grants

These strategies can be identified through activities such as the Southern California National Freight Gateway Framework Strategy effort currently being undertaken by Metro. This effort involves bringing a group of principal convenors together to develop preliminary scoping for topics including³:

- Processes and approaches for the coordination of environmental reviews and, more specifically, the addressing of cumulative and systemic environmental and community impacts and effects (e.g., those related to environmental justice) under NEPA and CEQA.
- Funding principles and alternatives (including fees and tolls; and, possible institution(s) to hold, disburse and monitor combined funds).

³ Lindell Marsh, January 31, 2007; “Results of Next Steps Meeting Convened on Monday, January 29, 2007”



2.2 Community/Stakeholder Input

CEQA and NEPA are public disclosure tools. Each time a project is seriously considered, each regulation requires disclosure to the public. For EIRs/EISs, public scoping meetings are required, sponsored by the lead agency. Public circulation/comments periods are prescribed.

In some cases (such as the I-710 / Major Corridor Study Tier 2 Advisory Committee), stakeholder and community members are brought together to identify solutions to address environmental, community, and health impacts. This type of process can be folded into the CEQA/NEPA process to identify project-specific mitigation measures. It can also serve as a framework for addressing the broader cumulative concerns of a community or region.

2.3 Implementing and Funding Mitigation

The critical component for mitigation and avoidance measures is funding availability. Discrete projects with discrete mitigation or avoidance measures have the highest likelihood of funding (both from a public and private sector perspective). Therefore, in the development and identification of broader strategies to mitigate regional or cumulative impacts, it will be critical to identify a nexus between projects or market segments and specific impacts. It will also be critical to bring all affected groups (stakeholders, community members, public agencies, private industry) together early in the process.

2.4 Emissions Reduction Strategies

The goods movement mobile sources targeted for emissions reduction include ships, harbor craft, rail, cargo handling equipment, and trucks. Aircraft, while a goods movement mobile source, generally have not yet been targeted for emissions reductions efforts primarily because emissions reporting do not identify aircraft as a significant source of pollutants in comparison to other mobile sources.⁴

Many emissions reduction strategies can be applied to goods movement, regardless of mode. Such strategies focus on fuel and engine technologies, as well as congestion reduction and operational approaches. Fuels and engine technologies concentrate on the reduction of particulate matter (PM), nitrogen oxides (NOx), and sulfur oxides (SOx) at the source. Congestion reduction and operational strategies can be considered to mitigate the negative effects of goods movement such as corridor congestion, safety concerns from mixed-use traffic, and truck traffic diversion into neighborhoods, in addition to emissions reductions. Table 1 presents various emissions reduction strategies that have been aggregated from multiple sources, including among others: California Air Resource Board *Emission Reduction Plan for Ports and Goods Movement in California*, San Pedro Bay

⁴ The SCAQMD 2003 AQMP estimated that the 2005 annual average aircraft emissions in the SCAB contributed less than 3% NOx, 1.6% SOx, 0.6% PM2.5 of the total emissions from all sources in the Basin. For further discussion, refer to TM 5b Table 4, or the 2003 AQMP.



Ports *Clean Air Action Plan*, and South Coast Air Quality Management District *Draft 2007 Air Quality Management Plan*.

**TABLE 1
Emissions Reduction Strategies**

FUELS & ENGINE TECHNOLOGIES

Ships

Low-Sulfur Diesel Fuels

Emulsified Diesel

Shore-based Electrical Power (Cold Ironing)

Dedication of Cleanest Fuels to California Service

Diesel oxidation catalyst retrofit

Diesel particulate filter (DPF) retrofit

Improved Original Equipment Manufacturer (OEM) Engines – main & auxiliary

Speed Reduction

Harbor Craft

Cleaner Engines

Biodiesel Fuel

Liquefied Natural Gas (LNG)

Liquefied Petroleum Gas (LPG)

Ethanol

Diesel oxidation catalyst retrofit

Diesel particulate filter (DPF) retrofit

Selective catalytic reduction (SCR) systems

Shore-based Electrical Power (Cold Ironing)

Cargo Handling Equipment

Fleet modernization with improved OEM Engines

Biodiesel Fuel

Liquefied Natural Gas (LNG)

Liquefied Petroleum Gas (LPG)

Fuel-cell

Electrification

Fischer-Tropsch fuel

Emulsified diesel





**TABLE 1
Emissions Reduction Strategies**

Diesel-electric
Diesel oxidation catalyst retrofit
Diesel particulate filter (DPF) retrofit
Rail
Biodiesel Fuel
Liquefied Natural Gas (LNG)
Compressed Natural Gas (CNG)
Fuel-cell
Electrification
Fischer-Tropsch fuel
Emulsified diesel
Diesel-electric hybrid (e.g., Green Goat)
Fleet modernization with improved OEM Engines
On-board engine diagnostics
Trucks
Fleet modernization with improved OEM Engines
Biodiesel Fuel
Liquefied Natural Gas (LNG)
Compressed Natural Gas (CNG)
Emulsified diesel
Propane fuel
Diesel-electric hybrid
Transport Refrigeration Unit (TRU) engine improvements
CONGESTION REDUCTION/OPERATIONS
Electronic cargo manifest
Grade separations at highway-rail crossings
Dedicated lanes, including possibility for automobile and truck tolls
Rail capacity expansion
Extended port and/or distribution gate hours (e.g., PierPass)
Shift operations to other ports
Modal shift from truck to rail
Shuttle trains in lieu of trucks between ports and warehouses (short-haul)
Virtual container yard





TABLE 1
Emissions Reduction Strategies

Increased on-dock rail
Creation of near-dock rail terminal
Engine idling restrictions for rail and trucks
Maglev technology
Efficiency through facility planning and design
Near-dock rail
Traffic Management Plan (TMP) – during project construction

Source: Jones & Stokes. 2006.

2.5 Land Use Strategies

The effects of goods movement on local communities are largely a result of the proximity of goods movement corridors and facilities to the places where people live, work, and recreate. This result is unintended – most corridors and facilities were initially constructed in areas with sparse population. Over time, however, the dramatic growth in both population and trade has resulted in encroaching land uses that produce undesirable effects (as discussed in TM 5b.) In addition to the air quality impacts addressed in the previous section, undesirable community effects include noise and vibration, visual, safety, and natural resource impacts. Table 2 identifies various strategies relating to land use that may be considered for mitigating the effects of goods movement. These land use strategies derive from various public agency studies and guidelines including the Federal Highway Administration, Federal Railroad Administration, and US Department of Transportation. Industry best practices and resource agency mandates are sources, as well.





TABLE 2
Land Use Strategies

LAND USE STRATEGIES

Noise & Vibration

 Railroad Quiet Zones

 Grade Separations – reduce noise from train horns & tire/rail interaction

 Noise barriers (e.g., sound walls, berms)

 Rubberized asphalt on highways

 Exhaust mufflers on trucks

 Tunneling of corridors

 Building and window insulation

 Prohibition of truck Jake brake usage

 Siting/orientation of amplification systems

 Noise control policy implementation during construction activities

Aesthetics

 Landscaping – avoid non-native or invasive vegetation.

 Barriers – landscaped berms; walls with possible artistic elements

 Below-grade facilities – prevent visual perception of rail or truck corridors

 Matte or diffuse building materials in locations of external lighting to prevent glare

 Property acquisition land use buffering

 Façade illumination from fixed downlight sources

 Shielding & aiming of light fixtures

 Low-level wattage lighting for landscaping and plazas

 Low-height pedestrian poles, bollards, and steplights

 Lighting design for minimum necessary illumination generation

Safety

 Grade separation

 Pedestrian crossing improvements

Natural Resources

 New, replaced, or replanted vegetation removed shall be native vegetation appropriate to the setting.

 On a project-specific basis, develop a Stormwater Pollution Prevention Plan (SWPPP) if required.



TABLE 2
Land Use Strategies

Comply with Section 404 of the Clean Water Act concerning activities that result in discharge of dredged, fill, or excavated material in waters of the US.
Comply with Section 402 of the Clean Water Act and National Pollutant Discharge Elimination System (NPDES) standards during and following construction to ensure that dirt, construction materials, pollutants, or other human-associated materials are not discharged from the project area.
Comply with California Department of Fish & Game Section 1600 et seq.
Comply with the Migratory Bird Treaty Act.
Comply with any locally adopted tree protection ordinances as required
Comply with Federal and State Endangered Species Acts
Comply with Federal and State Clean Water Acts
Comply with Coastal Zone Management Act
Comply with Natural Community Conservation Planning (NCCP) Act by coordinating with NCCP/Habitat Conservation Plan (HCP) organizations where applicable.
Recycled water usage for project construction activities and irrigation
Design facility elements to accommodate the natural filtration/attenuation of runoff to the maximum extent possible in order to prevent erosion and to preserve more stable soil conditions.
Cultural Resources
Verify the presence of existing or eligible historic resources. Any historic materials removed shall be replaced with materials that are consistent with the original historic design.
A certified archaeologist shall monitor project-related ground disturbing activities in areas of archeological sensitivity.
Excavation shall be monitored by a qualified paleontologic monitor in areas identified as likely to contain paleontologic resources.

Source: Jones & Stokes, 2006

2.6 Institutional Policy

Agencies that have regulatory and/or funding purview for goods movement-related activity can influence, either directly or indirectly, the environmental and community effects resulting from the goods movement industry. To achieve this end, Table 3 provides a listing of institutional policies that may be considered for mitigating the effects of goods movement. Many of these strategies have already been implemented or are suggested by various sources, including among others: CARB's Emission Reduction Plan, the Ports' CAAP, and SCAQMD Draft 2007 AQMP.



TABLE 3
Institutional Policy Listing

POLICY

Dedication of Cleanest Fuels to California Service
Implement Sulfur Emission Control Area (SECA)
Monetary incentives/disincentives for vehicle replacements, engine upgrades, and other technology retrofits
Regulatory engine idling reduction
Mandatory engine performance standards
Mandatory emission controls
Anti-idling training & awareness programs
Zoning and land use regulations for land use compatibility
Community reporting of engine idling violators
Enforcement of emissions control requirements
Environmental justice considerations & public outreach requirements
Establish public-private partnerships for practical and innovative strategies

Source: Jones & Stokes, 2006.



2.7 Applied Mitigation Measures

The following are a list of environmental and community mitigation measures that may be applied to projects and strategies discussed in Technical Memorandums 6a and 6b. These mitigation measures are suggested as a starting point and are not intended to constitute an exhaustive or prescriptive list. MCGMAP agencies and community members can jointly consider these and other mitigation measures to match the particular characteristics of specific goods movement projects. Therefore, a holistic approach to projects – one that maximizes the benefits and minimizes the impacts – can be realized.

Expansion of On-Dock Rail at Ports

- On-dock rail vehicles and support equipment to use alternative fuels, such as electrification, diesel-electric hybrid, or compressed natural gas, to achieve reductions in emissions-related pollutants, including PM, NO₂, and SO₂.
- Implementation of on-board engine diagnostics on rail vehicles to adjust and optimize engine operations that minimize pollutant emissions.
- On-site maintenance of rail cars and support equipment to be located away from open bodies of water and storm drains. Outfit storm drains within the vicinity with secondary pollution prevention measures.
- Implement and enforce idling restrictions for rail, cargo trucks, and support equipment.
- Permit only trucks meeting certain engine and fuel technology standards to access on-dock facilities.
- Design on-dock expansion to facilitate and maximize efficient vehicle throughput to minimize dwelling time of rail, truck, and support vehicles. Reevaluate existing design to optimize site and avoid piece-meal expansion approaches for a fully integrated, smart design.

Additional Intermodal Facilities/Freight Yards

- Vehicles and support equipment to use alternative fuels, such as electrification, diesel-electric hybrid, or compressed natural gas, to achieve reductions in emissions-related pollutants, including PM, NO₂, and SO₂.
- On-site maintenance of freight vehicles and support equipment to be located away from open bodies of water and storm drains. Outfit storm drains within the vicinity with secondary pollution prevention measures.
- Design intermodal facilities/freight yards to facilitate and maximize efficient vehicle throughput to minimize dwelling time of rail, truck, and support vehicles.
- Orient facility lighting and amplification systems to avoid/minimize spillover to surrounding land uses.
- Use non-invasive plant species to create visual, landscaped buffer between the facility and nearby properties.
- Construct physical barriers with artistic elements around the facility for aesthetic and noise benefits.



- Site freight facility in non-residential areas. Design facility access that avoids or minimizes use of roadway facilities heavily utilized by local traffic.

Addition of Mainline Rail Capacity

- Implement Federal Railroad Administration-approved Quiet Zones.
- Rail engines to use on-board engine diagnostics and alternative fuels to minimize emissions pollutants.

Modification of Port Operation/Delivery Hours

- If port hours are extended, create truck routes on arterials and prohibit truck diversion onto residential streets.

Construction of Exclusive Truck Lanes

- Permit only trucks meeting certain engine and fuel technology standards to access exclusive truck lanes.

Allow Use of LCVs on Dedicated Facilities

- Construct noise barriers on LCV dedicated facilities in areas near residences, schools, and community facilities.

Additional Rail Grade Separations

- Adopt and implement Traffic Management Plan (TMP) to effectively address traffic issues during construction of the grade separation. Coordinate and consult with local Department of Transportation, school board, and fire and police departments to identify alternative routes for vehicles, emergency vehicles, school buses, and pedestrians in advance of grade separation construction.

Implement Institutional Changes to Improve Feasibility of Large Scale/Mega Projects

- Obtain state legislative authority to apply Carl Moyer program funds to retrofit private-owner truck fleet.

Additional Freeway Lanes/Capacity

- Construct noise barriers in areas near residences, schools, and community facilities.
- Where possible, avoid right-of-way (ROW) acquisitions by expanding freeway facilities toward the inside shoulders and median instead of expanding towards the outside shoulders and abutting properties.
- Use rubberized asphalt on freeway lanes to reduce traffic noise.
- Construct “greenbelt” between freeway expansion and neighboring properties to provide a spatial and aesthetic buffer.

Increase Port/Rail Yard Freight Capacity

- Permit “clean” ships only to access new docks and terminals.



3.1 Status

Several federal, state, and regional level legislative and regulatory emission control efforts associated with the goods movement industry have been initiated. As referenced in the previous section, emissions related to goods movement are primarily derived from diesel-fueled sources. The five major sources include: Ocean Going Vessels (OGVs, or ships), On-Road Heavy-Duty Vehicles (HDVs, or trucks), Cargo Handling Equipment (CHE), Harbor Craft (HC), and Railroad Locomotives (RL). The responsibility for the emissions control of the majority of these sources falls under the jurisdiction of local (South Coast Air Quality Management District, or SCAQMD), state (California Air Resource Board, or CARB), or federal (Environmental Protection Agency, or EPA) agencies. Below is a list of recently adopted regulatory measures that will reduce emissions from the goods movement industry.

Ocean Going Vessels (Ships)

- *Emissions Standard for Marine Propulsion Engines*
The International Maritime Organization (IMO) established limits for NO_x in Annex VI to the International Convention for the Prevention of Pollution from Ships in 1997. IMO limits apply to marine vessel engines over 130 kilowatts (kW) installed on vessels built on or after 2000. Depending upon the engine speed in revolutions per minute (rpm), the NO_x standards vary between 17.0 g/kW-hr (for < 130 rpm) to 9.8 g/kW-hr (for ≥2000 rpm). While a majority of countries have ratified the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI, it has yet to be fully ratified by the United States. It has been approved by the U.S. Senate (7 April 2006), an important step toward ratification. Despite the formal status of Annex VI, it is believed that engines manufactured after 2000 will meet the standard due to the retroactive nature of the regulation (i.e., once fully in effect engines must comply, and the simplest way for that to occur is for them to be manufactured to comply).
- *Vessel Speed Reduction (VSR) Program*
In May of 2001, a Memorandum of Understanding (MOU) between the Port of Los Angeles (POLA), Port of Long Beach (POLB), EPA, CARB, SCAQMD, the Pacific Merchant Shipping Association (PMSA), and the Marine Exchange of Southern California was signed. This MOU calls for OGVs to voluntarily reduce speed to 12 knots at a distance of 20 nautical miles (nm) from Point Fermin. Reduction in speed demands less power on the main engine, which in turn reduces NO_x emissions and fuel usage. The positive affects of this program are expected to not only benefit the San Pedro Bay Ports area, but will also extend to other coastal areas such as Ventura and San Diego counties.
- *Low Sulfur Fuel for Marine Auxiliary Engines*
In December of 2005, CARB adopted low sulfur fuel requirements for marine auxiliary engines within 24 nm of the California coastline. Starting in January of 2007, it requires use of marine diesel oil (MDO) or marine gas oil (MGO) with sulfur content of equal or less than 0.5 percent sulfur by weight, followed by use of marine gas oil with sulfur content of equal or less than 0.1 percent sulfur in 2010. The use of low sulfur fuel will reduce emissions of NO_x, DPM, and SO_x.

On-Road Heavy-Duty Vehicles (Trucks)

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

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

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

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

- *Ultra-Low Sulfur Diesel (ULSD) Fuel Requirement*

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

Cargo Handling Equipment

- *Emissions Standards for Non-Road Diesel Powered Equipment*

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

- *Cargo Handling Equipment (CHE) Regulation*

In December of 2005 CARB adopted a regulation to reduce emissions from CHE such as yard tractors and forklifts starting in 2007. The regulation calls for the replacement or retrofit of existing engines with engines that use Best Available Control Technology (BACT). Beginning

January 1, 2007 the regulation will require that newly purchased, leased, or rented CHE be equipped with either a 2007 or later on-road engine, a Tier 4 off-road engine or the cleanest verified diesel PM emissions control system, which reduces DPM by 90 percent and NOx by at least 70 percent for yard tractors. For non-yard tractors cargo handling equipment currently verified technologies reduces PM by 85 percent.

Harbor Craft

- *Emission Standards for Harbor Craft Engines*

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

- *Low Sulfur Fuel Requirement for Harbor Craft*

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

Railroad Locomotives

- *Emissions Standards for New and Remanufactured Locomotives and Locomotive Engines*

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

- *Low Sulfur Fuel Requirement for Intrastate Locomotives*

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

- *Statewide 2005 Memorandum of Understanding*



In order to accelerate the implementation of Tier 2 engines in the South Coast Air Basin, CARB and EPA entered into an enforceable memorandum of understanding (MOU) in 1998 with two major freight railroads [Union Pacific (UP) and Burlington Northern Santa Fe (BNSF)] in California. This MOU requires UP and BNSF to concentrate introduction of the Tier 2 locomotives in the SCAB, which will achieve a 65 percent reduction in NOx by 2010.

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

In addition to these regulations, CARB is pursuing additional regulations that would reduce port- and goods movement-related emissions. These regulations would affect equipment in the following categories:

- Port trucks (through a fleet rule and incentive program)
- Harbor craft
- Ship main engines (through fuel and engine emissions requirements)
- Ship auxiliary engines at dock (through cold ironing, engine controls, or other effective technologies)

CARB anticipates completing these rulemaking actions by the end of 2007. The recently adopted CARB regulations, anticipated CARB rulemakings, and the measures in the San Pedro Bay Ports Clean Air Action Plan (discussed in TM 5b) will provide a vital and complimentary combination to the overall effort to meet both State and San Pedro Bay Ports air quality improvement goals.

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



4.1 Emissions Targets

Freight and port-related mobile sources such as ships, trucks, cargo handling equipment, harbor craft, and locomotives are major contributors to the emissions inventory in the South Coast Air Basin. In April 2006, CARB adopted its Emission Reduction Plan for Ports and Goods Movement in California (Emission Reduction Plan), which established the framework for actions to reduce the air quality and health impacts from the Ports and other goods movement activities in the state (as discussed in TM 5b). In June 2006, both the ports of Long Beach and Los Angeles released the San Pedro Bay Ports Clean Air Action Plan (CAAP), which set out emission reduction goals and control strategies necessary to reduce the emissions from port-related sources. Emission reductions from port-related sources are required in order to show attainment with the ambient air quality standards for PM_{2.5} and the 8-hour ozone standard. The Draft 2007 Air Quality Management Plan (AQMP) contains port-related measures that build upon both the Emission Reduction Plan and CAAP with enhancements by the SCAQMD to reflect the reductions needed for attainment. Specifically, the Draft 2007 AQMP proposes that locomotives go beyond the Emission Reduction Plan and CAAP by requiring all locomotives operating in the SCAB to be Tier 3 equivalent by 2020. For ocean-going vessels, the Draft 2007 AQMP proposes that all ships operating within 40 nautical miles to operate on 0.2 percent sulfur fuel beginning in 2008, with another reduction to 0.1 percent sulfur beginning in 2010. In addition, the draft plan calls for ships to comply with the vessel speed reduction proposal specified in the CAAP, as well as similar retrofit penetration rates for 2014 and 2020 to what is called for in the State's Emission Reduction Plan. The estimated emission reductions and final emissions targets needed from port-related sources to demonstrate attainment are shown in Table 4.



TABLE 4
Preliminary Port-Related Emissions Targets (tpd)¹

Pollutant	Estimated Year/Emissions Target ²	
	2014	2020
NO_x		
Baseline Inventory	119.9	128.7
Emission Reductions	71.1	96.0
NO_x Port Emissions Target	48.8	32.7
SO_x		
Baseline Inventory	47.8	62.4
Emission Reductions	46.2	60.4
SO_x Port Emissions Target	1.6	2.0
PM_{2.5}		
Baseline Inventory	7.9	9.3
Emission Reductions	4.5	6.5
PM_{2.5} Port Emissions Target	3.4	2.8

¹ tpd = tons per day

² Port emissions estimated by assigning all ships, harbor craft, and port-related cargo handling equipment emissions to port inventory. Emissions from trucks and locomotives operating at the ports are based on the percentage of international goods movement compared to all goods movement (international plus domestic) emissions from CARB's Emission Reduction Plan statewide estimate for trucks and locomotives.

Source: SCAQMD Draft 2007 AQMP.

To achieve the emissions targets in Table 4 above, SCAQMD is recommending the following goods movement-related emissions reduction control measures for the 2007 AQMP. The estimated emissions reduction of each control measure is summarized in Table 5:

- **ONRD-07 – GREATER USE OF DIESEL FUEL ALTERNATIVES AND DIESEL FUEL REFORMULATION:** This measure calls for a two-phase approach to achieve additional emission benefits from engines powered by diesel fuel. The first phase would have CARB adopt by mid-2007, enhanced diesel fuel specifications. The proposal reflects the achievement of tighter in-use aromatic controls being feasible and the improvements in sulfur control technology now allowing for diesel fuel to be refined down to the detection limit of sulfur. Additionally, recent test data indicates that higher cetane levels are associated with lower emissions of volatile organic compounds (VOC) and NO_x. The proposed reformulation will also reflect the application of the latest refining technology to





reduce polycyclic aromatic hydrocarbons, which have been associated with higher levels of mutagenicity and toxic impacts relative to other diesel components, such as paraffinic compounds.

The second phase of the control measure calls for greater use of alternatives to diesel fuel including gas-to-liquid fuels, dimethyl ether, alternative fuels, or other emulsified diesel fuel that provide additional oxides of nitrogen or particulate matter reductions. User or supplier incentives would be established to ensure that at least 50 percent of current volume of conventional diesel fuel – approximately 1.5 billion gallons statewide annually – would be displaced with diesel alternatives.

- **ONRD-08 – ACCELERATED RETROFITS OF HEAVY-DUTY VEHICLES:** This measure calls for accelerated retrofit programs for heavy-duty vehicles operating primarily in the South Coast jurisdictional boundaries. This measure covers all heavy-duty vocations except for Class 8 over-the-road trucks that provide freight drayage services. This measure would target approximately 20,000 heavy-duty diesel vehicles, between 1988 through 2009 model-year for retrofitting by 2014. In addition, for calendar year 2020, an additional 20,000 heavy-duty diesel vehicles will be targeted for retrofitting. The retrofit requirement would include a 30 percent reduction in oxides of nitrogen and either a 25 percent or 85 percent reduction in particulate matter, depending on the model year of the vehicle.
- **ONRD-09 – IN-USE EMISSION REDUCTIONS FROM ON-ROAD HEAVY-DUTY VEHICLES:** This measure would call for accelerated replacement of on-road heavy-duty vehicles with vehicles meeting the 2010 on-road heavy-duty exhaust emissions standards, beginning in 2010. The proposal calls for resources to be directed at replacing the older “captive” fleet used for short to medium distance hauling. About 12,000 heavy-heavy-duty diesel and medium-heavy-duty diesel vehicles would be targeted for replacement in the jurisdictional boundaries of the SCAQMD over a 10-year period. It is envisioned that half the truck replacement would be diesel powered and the remaining half would be alternative fuel powered.
- **ONRD-10 – FURTHER EMISSION REDUCTIONS FROM OUT-OFSTATE/INTERNATIONAL REGISTERED HEAVY-DUTY VEHICLES:** This measure calls for the development of a federal incentives program similar to the state’s Carl Moyer Program for heavy-duty vehicles registered outside of California. The federal program would provide funding assistance to either retrofit or replace older over-the-road trucks with commercially available control technologies. There are a number of retrofit technologies that are commercially available that could be used to potentially support this program.
- **ONRD-11 – ENHANCED INSPECTION AND IN-USE EMISSIONS TRACKING OF HEAVY-DUTY VEHICLES:** This measure would have CARB develop an expanded inspection and maintenance program for heavy-duty-diesel vehicles. The current tools that CARB has available include the current smoke inspection program which the proposal calls for expansion of, to include the following: 1) a visual under-the-hood inspection of





the emission control devices, 2) an electronic check of the truck's onboard computer, and 3) use of remote sensing technology to assess in-use heavy-duty diesel trucks emissions. An added component to this measure is to incorporate a not-to-exceed limit for 1998 and older trucks to ensure in-use emissions are kept to a minimum.

- **ONRD-12 – FURTHER EMISSIONS REDUCTIONS FROM HEAVY-DUTY TRUCKS PROVIDING FREIGHT DRAYAGE SERVICES:** This measure calls for the retrofit or replacement of existing over-the-road trucks providing drayage services at marine ports, intermodal facilities, or warehouse distribution centers. This measure contains elements of ONRD-08 and ONRD-09. A similar program is proposed in the [Draft] San Pedro Bay Ports Clean Air Action Plan. The state is currently developing a regulation on trucks operating at marine ports. The proposed control measure would complement statewide actions.
- **OFFRD-05 – FURTHER EMISSION REDUCTIONS FROM LOCOMOTIVES:** This measure calls for all locomotives operating in the Basin to meet Tier 3 equivalent emissions by 2014. In addition, the measure proposes that all locomotives moving in and out of the twin ports in the Southern California region be equipped with Tier 3-equivalent controls by 2011. Existing technologies can reduce oxides of nitrogen and particulate matter emissions by over 90 percent.
- **OFFRD-06 – CLEAN MARINE FUEL REQUIREMENTS FOR OCEAN-GOING MARINE VESSELS:** This measure would require all ocean-going vessels to use 0.2 percent sulfur content marine distillate fuels beginning in 2008. Ocean-going vessels would be required to switch to the cleaner fuel when traveling within 40 nautical miles of Point Fermin.
- **OFFRD-07 – FURTHER EMISSION REDUCTIONS FROM OCEAN-GOING MARINE VESSELS AND HARBOR CRAFT WHILE AT BERTH:** This control measure would require ocean-going vessels and harbor craft to use shore-side power or other equivalently clean alternative technology while at berth. It is envisioned that a specific number of berths can be equipped with shore-side power by 2014 and a majority of the berths will provide shore-side power by 2020.
- **OFFRD-08 – FURTHER EMISSION REDUCTIONS FROM CARGO HANDLING EQUIPMENT:** This control measure seeks additional emission reductions from cargo handling equipment beyond the state regulation. This measure would implement the proposed San Pedro Bay Ports Clean Air Action Plan beyond the five-year horizon of the Clean Air Action Plan. The Plan calls for accelerated turnover of existing equipment with engines that meet 2007 or 2010 on-road emissions standards or Tier 4 off-road emissions standards.
- **OFFRD-09 – VESSEL SPEED REDUCTION:** This measure would implement a 12 knot speed limit to ocean-going vessels traveling within 40 nautical miles of Point Fermin. A majority of ocean-going vessels are currently complying with a 12-knot speed limit



within 24 nautical miles on a voluntary basis. Implementation of the proposed measure would further reduce oxides of nitrogen emissions.

- **OFFRD-10 – FURTHER EMISSION REDUCTIONS FROM OCEAN-GOING MARINE VESSELS:** This measure seeks further emission reductions of oxides of nitrogen or particulate matter from ocean-going vessels and harbor craft. Current technologies such as advanced slide valve designs can provide immediate emissions benefits on the order of 30 percent. Combining this technology with other control technologies such as water injection can lead to a greater than 50 percent reduction in oxides of nitrogen emissions.

TABLE 5
2007 AQMP Recommended Control Measures & Estimated Emissions Reductions
for Sources Under State and Federal Jurisdiction

Control Measure Number	Control Measure Title	Estimated Reductions (tpd)	
		2014	2020
ONRD-07	Greater Use of Diesel Fuel Alternatives and Diesel Fuel Reformulation	NOx: 30.3 PM2.5: 2.3	NOx: 19.1 PM2.5: 1.2
ONRD-08	Accelerated Retrofits of Heavy-Duty Vehicles	NOx: 3.2 PM2.5: 0.2	NOx: 4.6 PM2.5: 0.3
ONRD-09	In-Use Emission Reductions from On-Road Heavy-Duty Vehicles	VOC: 0.3 NOx: 6.1 PM2.5: 0.1	VOC: 0.3 NOx: 5.1 PM2.5: 0.1
ONRD-10	Further Emission Reductions from Out-of-State/ International Registered Heavy-Duty Vehicles	NOx: 0.4 PM2.5: 0.03	NOx: 0.6 PM2.5: 0.03
ONRD-11	Enhanced Inspection and In-Use Emissions Tracking of Heavy-Duty Vehicles	VOC: 1.5 NOx: 16.7 PM2.5: 0.2	VOC: 1.4 NOx: 17.8 PM2.5: 0.1
ONRD-12	Further Emission Reductions from Heavy-Duty Trucks Providing Freight Drayage Services	VOC: 0.1 NOx: 2.6 PM2.5: 0.1	VOC: 0.1 NOx: 2.3 PM2.5: 0.1
OFFRD-05	Further Emission Reductions from Locomotives	NOx: 15.3 PM2.5: 0.5	NOx: 17.7 PM2.5: 0.7
OFFRD-06	Clean Marine Fuel Requirements for Ocean-Going Marine Vessels	NOx: 7.3 SOx: 45.6 PM2.5: 4.0	NOx: 9.3 SOx: 59.6 PM2.5: 5.2
OFFRD-07	Further Emission Reductions from Ocean-Going Marine Vessels and Harbor Crafts While at Berth	VOC: 0.5 NOx: 20.4 SOx: 0.6 PM2.5: 0.6	VOC: 0.7 NOx: 27.4 SOx: 0.8 PM2.5: 0.9
OFFRD-08	Further Emission Reductions from Cargo Handling Equipment	NOx: 1.0	NOx: 0.6



TABLE 5
2007 AQMP Recommended Control Measures & Estimated Emissions Reductions
for Sources Under State and Federal Jurisdiction

Control Measure Number	Control Measure Title	Estimated Reductions (tpd)	
		2014	2020
OFFRD-09	Vessel Speed Reduction	NOx: 17.4	NOx: 23.2
OFFRD-10	Further Emission Reductions from Ocean-Going Vessels	NOx: 13.9	NOx: 24.1

Source: SCAQMD 2007 Draft AQMP.





5.1 CONCLUSION

This technical memorandum provides a range of approaches to mitigate the environmental and community effects stemming from the goods movement industry. The approaches present a compendium of best practices that can be utilized by various agencies and jurisdictions, many of which have been either recently adopted or is on the immediate horizon for adoption as they relate to emissions reductions.

This technical memorandum, in conjunction with the other previous technical memorandums, will lead into the actual Action Plan itself – that is, the development of a plan that recommends goods movement improvement strategies for the study area that have positive economic impacts and which minimize the related environmental and community effects.

