California Environmental Protection Agency
AIR RESOURCES BOARD

Final Statement of Reasons for Rulemaking

Including Summary of Comments and Agency Responses

PUBLIC HEARING TO CONSIDER THE ADOPTION OF PROPOSED REGULATIONS TO REDUCE EMISSIONS FROM DIESEL AUXILIARY ENGINES ON OCEAN-GOING VESSELS WHILE AT-BERTH AT A CALIFORNIA PORT

Public Hearing Date: December 6, 2007
Agenda Item Number: 07-12-06

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I. GENERAL

In this rulemaking, the Air Resources Board (the Board or ARB) is adopting two identical regulations under different titles in the California Code of Regulations (CCR): 1) section 2299.3, title 13, CCR; and 2) section 93118.3, title 17, CCR. Both sections will be referred to collectively hereafter as the "regulation."

The regulation will reduce the public's exposure to air pollutants from ships docked or "hotelled" at California's major ports. Specifically, the regulation will significantly reduce emissions of oxides of nitrogen (NOx) and diesel particulate matter (diesel PM) from diesel-fueled auxiliary engines used aboard ocean-going ships while docked or at-berth at a California port. In addition, CO_2 (a greenhouse gas) emissions from at-berth ocean-going vessels will also be reduced. The regulation supports the Board's *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (approved in September 2000), the Goods Movement Emission Reduction Plan (2006), and the State's Assembly Bill (AB) 32 (2006) targets for greenhouse gas reductions.

This rulemaking was initiated by the October 19, 2007, publication of a notice for a public hearing on December 6, 2007 ("45-day Notice"). A "Staff Report: Initial Statement of Reasons" (Staff Report) and "Technical Support Document" (TSD) were also made available for public review and comment starting October 19, 2007. The Staff Report, which is incorporated by reference herein, describes the rationale for the proposal. Appendix A to the Staff Report contained the text of the proposed regulations, which adds a new section 2299.3 to title 13, CCR, and an identical new section 93118.3 to title 17, CCR. The TSD, which is incorporated by reference herein, describes the basis of the proposal in more detail. All of the documents referenced above were posted on October 19, 2007, to the ARB's internet site for this rulemaking: http://arb.ca.gov/regact/2007/shorepwr07/shorepwr07.htm.

At the December 6, 2007, hearing, the Board received written and oral comments on staff's proposed regulation. At the conclusion of the hearing, the Board adopted Resolution 07-57, in which it approved the adoption of the originally proposed regulation

with suggested modifications discussed at the hearing. ARB staff suggested the modifications in response to public comment. The modifications were set forth in a five-page document entitled "Staff's Suggested Modifications to the Original Proposal,'" distributed at the hearing, and included as Attachment B to the Resolution. In accordance with section 11346.8 of the Government Code, the Board directed the Executive Officer to incorporate the modifications into the proposed regulatory text and to make such modifications available for a supplemental comment period of at least 15 days. The Executive Officer was then directed either to adopt the regulations with such additional modifications as may be appropriate in light of the comments received, or to present the regulations to the Board for further consideration if warranted in light of the comments.

The text of the modifications to the originally proposed regulation, the incorporated documents, and additional supporting documents were made available for a supplemental 15-day comment period by issuance of a "Notice of Public Availability of Modified Text and Availability of Additional Documents" ("15-day Notice"). The 15-day Notice with four attachments were mailed on August 22, 2008, to all parties identified in section 44(a), title 1, CCR, and to other persons generally interested in the ARB's rulemaking concerning ocean-going vessels. These four attachments included a copy of Resolution 07-57 with Attachment B entitled "Staff's Suggested Modifications to the Original Proposed Regulation Order," the revised regulatory language, and two documents that staff added to the rulemaking record. All documents were also published on August 22**,** 2008, on ARB's website. An email message announcing and linking to this posting was transmitted to the more than 2,000 parties that have subscribed to ARB's "shorepower" list serve for notification of postings pertaining to emissions from docked ocean-going vessels.

The 15-day Notice gave the name, telephone, and fax number of the ARB contact person from whom interested parties could obtain the complete texts of the additional incorporated documents and the modifications to the original proposal, with all of the modifications clearly indicated. The deadline for submittal of comments on the staff's suggested modifications was September 8, 2008.

Four written comments were received during the supplemental 15-day comment period. Staff did not make additional modifications in response to those comments.

After considering the comments, the Executive Officer issued Executive Order R-08-013, adopting new section 2299.3 to title 13, CCR, and new section 93118.3 to title17, CCR, and adopting the incorporated documents.

This Final Statement of Reasons (FSOR) updates the Staff Report by identifying and providing the rationale for the modifications made to the originally proposed regulatory text as a result of public comment and staff analysis after the Staff Report was issued. This FSOR also summarizes written and oral comments the Board received on the proposed regulatory text during the formal rulemaking process and the ARB's responses to those comments.

Documents Incorporated by Reference.

The following documents are incorporated by reference in the regulation:
(1) “Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines," 13 CCR 2700 et seq.;
(2) 40 Code of Federal Regulations (CFR) Part 94, “Control of Emissions from Marine Compression-Ignition Engines”; (3) Annex VI of the 1973 International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78); (4) ARB Method 100 – Procedures for Continuous Gaseous Emission Stack Sampling,” 17 CCR 94114; (5) International Standard ISO 8178-1(E):1996, “Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 1: Test-Bed Measurement of Gaseous and Particulate Exhaust Emissions”; (6) International Standard ISO 8178-2(E):1996, “Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 2: Measurement of Gaseous and Particulate Exhaust Emissions at Site”; (7) International Standard ISO 8178-4(E):1996, “Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 4: Test Cycles for Different Engine Applications”; (8) Bay Area Air Quality Management District Source Test Procedure ST-1B, “Ammonia Integrated Sampling,” dated January 1982; (9) International Standard ISO 8754:2003(E), “Petroleum Products – Determination of Sulfur Content – Energy-Dispersive X-Ray Fluorescence Spectrometry,” Second Edition, 2003-07-15; and (10) International Standard ISO 8217, “Specifications of Marine Fuels Requirements for Marine Residual Fuels,” (as revised in 2005).

One document has been omitted from the original list of incorporated-by-reference documents listed in the Informative Digest section of the 45-day Notice. The Bureau of Customs and Border Protection’s Form 1300 has been eliminated because the requirement for submitting these forms to the ARB was removed in staff’s modifications to the original proposal. The ISO marine fuel specification listed in (10) above has been added to the original list because it was referenced in definitions added to the regulation in staff’s modifications to the original proposal.

The 10 documents listed above are readily available from the ARB upon request and were made available in the context of this rulemaking in the manner specified in Government Code section 11346.5(b). The documents are incorporated by reference because it would be cumbersome, unduly expensive, and otherwise impractical to print them in the CCR. Existing ARB administrative practice has been to have specifications, test procedures, and similar documents incorporated by reference rather than printed in the CCR because these specifications and test procedures are highly technical and complex. They include “nuts and bolts” engineering protocols and laboratory practices and have a very limited audience. Because the ARB has never printed complete test procedures and similar documents in the CCR, the directly affected public is accustomed to the incorporation format utilized therein. These test procedures and similar documents as a whole are extensive, and it would be both cumbersome and expensive to print these lengthy, technically complex procedures for a limited audience

in the CCR. In addition, printing portions of the test procedures that are incorporated by reference would be unnecessarily confusing to the affected public.

Fiscal Impacts

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the regulatory action will create costs to some local agencies. The governmental agencies affected by the proposed regulation are the port authorities, which are departments under the applicable cities. The ports affected by the proposed regulation are the Ports of Hueneme, Long Beach, Los Angeles, Oakland, San Diego, and San Francisco. Also affected is the cruise terminal at the Port of Long Beach which is owned by the City of Long Beach. In general, the tenants operate the terminals, and the port may make major infrastructure improvements, the costs for which may be recovered from the tenants through the lease agreements. The other ports own and manage the operation of the port, so these ports have other fee mechanisms to recover their capital investments.

The total cost expected to be expended by the port authorities to add shore-power equipment to their facilities ranges between $4 million to $86 million for the affected ports. The fiscal impact is defined as the costs incurred to the local agencies in the three fiscal years starting with the 2008/2009 fiscal year. Staff anticipates that the port authorities would begin to make payments during fiscal years 2008/2009, 2009/2010, and 2010/2011 for the necessary shore-power equipment to satisfy the 2014 milestone. The fiscal costs range from $1 million to $12 million for this three year period.

No State agencies will be affected by the proposed regulation as a result of a State agency operating an ocean-going ship. However, the ARB will need additional resources to adequately enforce the provisions of the regulation. ARB's Fiscal Year (FY) 2008-2009 budget includes two staff positions to perform compliance outreach and other enforcement efforts for this and several other newly adopted regulations that target emissions from port and other goods-movement related activities. These two positions are to be funded at $140,000 per position per year or $280,000 annually. Staff estimates that the workload for performing the necessary outreach and other enforcement activities for this regulation specifically will require 1/7 of each PY or 2/7 PY total ($40,000).

Consideration of Alternatives

The proposed regulation was the subject of discussions involving ARB staff, local air districts, affected shipping companies, terminal operators, ports and others. A discussion of two alternatives to the regulatory proposal is found in Analysis of Alternative Regulatory Approaches, Section I, Chapter X (pp. X-24 through X-25) of the Technical Support Document. ARB staff recommended against both alternatives.

The two alternative regulatory approaches were: 1) targeting the highest-emitting ships to obtain the necessary reductions, or 2) using best available control technology (BACT) on auxiliary engines while the ship is hotelling.

ARB originally considered approach 1 before choosing the "visits or emissions reduction" approach contained in the proposed regulation. Approach 1 would "tag" the ships that make the most visits to specific ports and make them use shore power or an equivalent control technology to reduce hotelling emissions. For example, a requirement under this regulatory approach might state "container ships making more than four visits to a California port in 2014 must turn off their engines or use an alternative control technology." ARB estimated that this regulatory approach would be as effective as the proposed regulation, but abandoned this approach because of the complexity and difficulty of tracking the ships that would be required to reduce emissions. Many of these ships could be repositioned elsewhere, while other ships would replace them in California service, creating excessive recordkeeping requirements and practical enforcement challenges.

The second alternative that ARB staff considered is requiring ship companies to install BACT on their auxiliary engines. For the purpose of determining a potential cost-effectiveness of this approach, staff chose selective catalytic reduction (SCR) for NOx emissions reductions and diesel oxidation catalyst (DOC) for diesel PM emissions reductions. Staff estimated the average cost-effectiveness for NOx reductions using SCR to range from $11,000 to $21,000 per ton reduced, which may be considered comparable to the $12,800 per ton achieved by the proposed regulation. The cost-effectiveness for diesel PM reductions using this approach, estimated at $1.7 million per ton, is more than twice as high as the $690,000 per ton of diesel PM emissions achieved with the proposed regulation. Considering the unproven application of these technologies for marine engines, fewer total emissions reductions, and much higher cost-effective values for diesel PM emissions reductions, staff rejected this alternative regulatory approach.

The Board has determined that no other alternatives considered by the agency or that have otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board.

II. MODIFICATIONS MADE TO THE ORIGINAL PROPOSAL AND ADDITIONAL DOCUMENTS MADE PUBLICLY AVAILABLE

Various modifications were made to the original proposal to address comments received during the 45-day public comment period and to clarify the regulatory language. These modifications are described below and include staff-proposed modifications that the Board approved on December 6, 2007, changes that the Board directed staff to make, and subsequent modifications made in response to public comments and to improve the proposed regulation's clarity. The 15-day Notice,

together with a copy of the proposed regulation with changes indicated, was posted on August 22, 2008, for a period of public review and comment that ended on September 8, 2008. Notification was sent to persons who had expressed an interest in the regulation during the course of rule development and review, including all individuals described in subsections (a)(1) through (a)(4) of section 44, Title 1, CCR. By these actions, the modified regulations were made available to the public for a supplemental comment period pursuant to Government Code section 11346.8. ARB not make additional substantive changes in response to public comments received but, certain nonsubstantive changes were subsequently made and are detailed in subsection B below.

A. Availability of Modified Text

The following is a description of the substantive modifications provided for public comment from August 22, 2008 through September 8, 2008, arranged by section number. Identical modifications were made to proposed section 2299.3, title 13, CCR, and to the proposed Airborne Toxic Control Measure in section 93118.3, title 17, CCR. All references below to section 2299.3 and section 93118.3 are to the indicated sections in title 13 and 17, CCR, respectively

Applicability and General Exemptions: Subsections 2299.3(b) and 93118.3(b)

Staff moved the fleet de minimis vessel visit criteria, originally in section (d)(1)(D), to the general exemption section of the regulation, because this was a more logical location for the language.

Container-ship fleets making fewer than 25 visits to a California port, refrigerated-cargo-ship fleets making fewer than 25 visits to a port, and passenger-ship fleets making fewer than five visits to a port are exempt from the requirements of the regulation. At the Board hearing, the Board directed staff to change the de minimis fleet visit requirements from a port-visit basis to a statewide-visit basis, depending on staff's economic analysis of such a modification. Staff performed an economic analysis of such a change to the regulation and presented the results in Attachment III to the 15-day Notice. Staff concluded the ships that would be affected are infrequent visitors to California, the estimated emission reduction benefits would be small, and the cost-effectiveness of amending the de minimis visit criteria on a statewide basis would be substantial. Consequently, staff kept the original de minimis fleet visit criteria that are based on port visits.

Definitions: Subsection 2299.3(c) and 93118.3(c)

Eight definitions were modified, three were deleted, and five were added to the definitions section of the regulation.

Modified Definitions

The term “marine diesel fuel” has been changed to “marine gas oil or marine diesel oil” in the definition of “baseline fleet emissions” and “post-baseline fleet emissions” to be consistent with the emission rates specified in section (e)(3). Additional changes were made to the definition of “post-baseline fleet emissions” to clarify that various control techniques can be used to reduce fleet emissions in the equivalent emissions reduction compliance option.

The definition of “emergency event” has been modified to include a more comprehensive list of events where the utility may not be able to provide power to the port. The definition of “fleet” has been modified to clarify that a fleet is based on one type of vessel and includes both owned and chartered vessels and that the master’s control of a vessel does not constitute “direct control,” as that term pertains to fleet operators. The definition of “person” has been modified to clarify the inclusion of consortiums and other business relationships that are found in the shipping industry. The definitions for “terminal” and “terminal operator” have been modified to clarify the intent that affected terminals should also include facilities used for loading and unloading of passengers, as passenger vessels are affected by the regulation. A clerical correction was made to the definition of “utility” to correct the Public Resources Code section number referenced in this definition. The definition of “visit” has been modified to clarify that when a vessel makes separate and sequential visits to berths at a port within a specified amount of time, the fleet can count these types of visits as one visit for purposes of calculating the number of visits the fleet’s vessels made to the port.

Deleted Definitions

Definitions for “IMO,” “Landlord Port,” and “Operate an Auxiliary Diesel Engine” were deleted from the regulation. These terms are not located in the regulation, and are, therefore, not necessary to define.

Added Definitions

A definition has been added for “baseline fleet power generation” because this term is used in the new reduced onboard power generation calculation requirements. A definition of “charter agreement” has been added because this term is now used in the definition of “fleet.” A definition of “marine diesel oil” has been added because this term is now used in the emission rates specified in section (e)(3). A definition of “marine gas oil” has been added because this term is used in the emission rates specified in section (e)(3). A definition of “regulated California waters” has been added because the term is used in the exemption to the regulation for vessels passing through these waters without stopping at a California port (i.e., “innocent passage”).

Vessel In-Use Operational Requirements: Subsection 2299.3(d) and 93118.3(d)

Reduced Onboard Power Generation Option (d)(1):

This subsection was modified so that at-berth operational requirements for auxiliary engines are based on a combination of limiting engine use during a specific percentage of a fleet's vessel visits, and reducing power generation from the fleet's vessels' auxiliary engines by the same percentage. Staff added this second requirement because onboard electricity generation is directly related to emissions and is, therefore, a better measure of emissions reduction than visits alone. Staff believes that requiring a fleet to reduce the onboard power generated while at berth, in combination with requiring auxiliary engines to be shut down for a specific number of vessel visits, will result in emission reductions that are more aligned with staff's emission reduction targets. Staff renamed this compliance option the "reduced onboard power generation option."

Staff made numerous changes to section d(1) to address the new operational requirements and to restructure some requirements for clarity. The original requirements for 2014 and 2020 have been modified to account for the new onboard power reduction requirement and new requirements for 2017 have been added to assure a reasonable rate of progress between the 2014 and 2020 requirements. The three-hour or five-hour auxiliary engine use limitations requirements that were in the original 2014 and 2020 requirements have been moved to a new area within this section to reduce redundancy. The emergency event and federal inspection delay exemptions to the three-hour or five-hour auxiliary engine use limitations that were in section (e) of the original regulation have been moved to this section because this is now a more logical location for these requirements. Based on the Board's directive, staff added language to this section to clarify that when a vessel visit meets the emergency event exemption criteria when intending to connect to grid-based shore power, that visit will be counted as a "shore-power visit" but the emissions from that visit will be excluded from the fleet's onboard power reduction requirements. The same treatment will apply to visits meeting the federal inspection delay exemption. Staff also clarified in this section that a shore-power-equipped ship is required to use shore power whenever it visits a berth equipped with compatible shore power except when the shore-power-equipped berth at the terminal is already occupied with a vessel receiving shore power, or when shore power equipment on a vessel fails and the master of the ship is unable to repair it during the visit.

Equivalent Emissions Reduction Option (d)(2):

In response to public comments, staff consolidating the three emission reduction options to one technology-neutral compliance option and schedule to streamline the emission-reduction option and to provide more flexibility to affected fleets. Staff renamed this option the "equivalent emissions reduction option." Fleets choosing the equivalent emissions reduction option will now have only one compliance schedule and can achieve the percent emission reductions by choosing one or more control

techniques, including grid-based shore power, non-grid-based shore power (distributed generation), and alternative ship-side or shore-side control technologies. Based on the Board's directive, staff added language to this section to clarify that the at-berth emissions from a vessel that experienced an emergency event when it intended to use grid-based shore power as a control technique can be excluded from the fleet's baseline and post-baseline emissions calculations. Staff added incentives for early reduction efforts by fleets, by allowing them to accumulate and use emission credits to satisfy future emission reduction requirements for early or excess reductions achieved under this option. Staff also added a limit for ammonia slip when Selective Catalytic Reduction (SCR) is used as an onboard alternative emissions control technology to be consistent with the requirement already in the regulation for SCR used with non-grid shore power equipment, (d)(2)(E)4.

Limitation on Changing Compliance Options (d)(3):

Staff added provisions to limit the conditions under which a fleet can switch from the reduced onboard power generation option to the equivalent emissions reduction option. The new language is intended to prevent fleets from circumventing the earlier emissions reduction targets of the equivalent emissions reduction option by initially choosing the reduced onboard power generation option, then subsequently switching to the equivalent emissions reduction option.

Calculations for Power Reductions and Emissions Reductions: Subsections 2299.3(e) and 93118.3(e)

Reduced Onboard Power Generation Calculations (e)(1):

Staff added procedures for a fleet to follow to calculate the percent reduction of its vessels' at-berth auxiliary engine power generation to demonstrate compliance with the new power reduction requirement in this option. The default power loads by ship category and the measured power requirements that were originally in the emission reduction calculations section have been moved to this section because the information will now be needed in the power reduction calculations. Staff also clarified that onboard power generated during visits experiencing an emergency event or federal agency delay exemption to the three- or five-hour engine limitation shall be excluded from the fleet's power reduction calculations as previously discussed in changes to section (d)(1).

Equivalent Emissions Reduction Calculations (e)(2):

Staff added language to this section to clarify that the at-berth emissions from a vessel that experienced an emergency event when it intended to use grid-based shore power as a control technique, can be excluded from the fleet's baseline and post-baseline emissions calculations as previously discussed in changes to section (d)(2). To encourage early reduction efforts, staff added provisions for fleets to obtain fleet emission credits (FEC) for early and excess emission reductions that can be applied

toward the fleet's future compliance requirements. Staff has clarified the default emission rates for diesel PM to address the fact that at-berth auxiliary engines can operate on marine gas oil fuel and marine diesel oil fuel. The default power requirements by vessel category and measured power requirements have been removed from this section because they are now included in the reduced onboard power generation calculations as discussed above. In response to public comment, staff added language to allow the use of alternative test methods to those specified in the regulation for determining engine emission rates. Finally, language has been added to clarify that the Executive Officer may request periodic testing of distributed generation equipment used to provide non-grid shore power to a vessel.

Terminal Plan Requirements: Subsections 2299.3(f) and 93118.3(f)

Staff modified the terminal plan requirements for two purposes: 1) to align with the new reduced onboard power generation and equivalent emissions reduction options; and 2) to include more criteria for terminal operators to follow when developing the plan.

Staff revised Table 2 to reflect the fleets' new compliance options and dates. The plan requirements are now specific to either the "reduced onboard power generation option" or the "equivalent emissions reduction option." A schedule has been added for reviewing and approving terminal plans.

The reduced onboard power generation option plan requirements, (f)(2), expand upon the requirements in the original grid-based shore power option, which includes a discussion of modifications to the terminal infrastructure, the port infrastructure, and the utility infrastructure that are needed to allow affected fleets to satisfy requirements in (d)(1). Additional discussion must now be included on ship activity at the terminal and projected power demands. The terminal plan must also include a discussion of currently available power at the terminal. In addition, it must provide a schedule for each activity needed to implement any necessary improvements to the terminal, port, or utility infrastructure to supply any additional power that will be needed at the terminal by the 2014, 2017 and 2020 compliance dates.

The equivalent emissions reduction option plan, (f)(3), must now include information on ship activity at the terminal and a description of, and implementation schedule for, the control techniques that will be used to reduce the at-berth emissions of affected fleets so that the fleets can satisfy the requirements in (d)(2) by the 2010, 2012, 2014, 2017, and 2020 compliance dates.

Reporting and Recordkeeping Requirements: Subsection 2299.3(g) and 93118.3(g)

The vessel plan, annual statement of compliance, and recordkeeping requirements have been modified to align with the new provisions in the reduced onboard power generation and equivalent emissions reduction options. Staff also modified this section

to clarify some requirements. A discussion of the reporting and recordkeeping requirements for each compliance option follows:

Reduced Onboard Power Generation Option (g)(1):

Staff has clarified that a vessel fleet plan is required for each California port that is visited by the fleet, where the fleet's visits do not fall below the de minimis fleet visit exemptions specified in (b)(3)(E), to conform the plan submittal dates to the new compliance dates in this option, and to provide more detail on the information to be included in the initial plans and updates. This detailed information will better assist ARB staff in determining the fleet's ability to meet the requirements for the applicable compliance dates.

Staff has clarified that the annual statement of compliance must demonstrate that the fleet is in compliance with the regulatory requirements at each California port visited by the fleet. Additional information on each vessel in the fleet is now required in the annual statement to assist ARB staff with determining the fleet's compliance with the new provisions in the reduced onboard power option.

Staff made a number of changes to the recordkeeping section to clarify the requirements, eliminate submittal of unnecessary information, and to ensure ARB staff has the necessary information to verify emergency event and federal agency delay exemptions to the three-hour or five-hour engine use limitations, and to verify onboard shore-power equipment failures.

Equivalent Emissions Reduction Option (g)(2):

Staff modified the vessel plan requirements to clarify that a vessel fleet plan is required for each California port that is visited by the fleet, where the fleet's visits do not fall below the de minimis fleet visit exemptions specified in (b)(3)(E), to conform the plan submittal dates to the new compliance dates in this option, and to provide more detail on the information to be included in the initial plans and updates. This detailed information will better assist ARB staff in determining the fleet's ability to meet the requirements for the applicable compliance dates. In addition, staff added language to ensure that fleets switching from the reduced onboard power compliance option to the equivalent emissions reduction option submit an update vessel plan that complies with the requirements in this section.

Staff conformed the initial submittal date for the annual statements of compliance to the new compliance dates in this option, clarified that the annual statement of compliance must demonstrate that the fleet is in compliance with the emission reduction requirements at each California port it visits, and clarified the compliance period for the baseline and post-baseline emission calculations. To better assist ARB staff with determining the fleet's compliance with the equivalent emissions reduction option, specific information is now required for each vessel in the fleet. In addition, the fleet

must indicate if fleet emission credits (FEC) will be used to meet the applicable reduction requirements.

Staff made a number of changes to the recordkeeping requirements to clarify the requirements, eliminate submittal of unnecessary information, and to ensure ARB staff has the necessary information to verify emergency events.

Violations: Subsections 2299.3(h) and 93118.3(h)

Staff added formulas for determining the number of violations within the applicable compliance period when a fleet or ship is found to be out of compliance. Adding the formulas provided a more reasonable approach to determining violations to the regulation requirements than the assumption that the fleet was out of compliance every day within the compliance period. Formulas were developed for five noncompliance scenarios: fleets failing to achieve the baseline power reduction requirements; fleets failing to achieve the limited engine use visits percentages; fleets failing to achieve both of these requirements; fleets failing to achieve the applicable emission reduction percentages; and shore-power equipped ships failing to use shore power during a visit to a berth that had compatible shore power.

Supporting Documents and Information

In accordance with Government Code section 11347.1, the following documents were added to the rulemaking record with public notification provided in the 15-Day Notice:

- Staff's Cost Analysis and Conclusions for Potentially Modifying the De Minimis Fleet Visits Criteria from an Individual Port Basis to a Statewide Basis.

- Examples of Calculating Number of Violations.

Other Changes in Modified Text

In addition, certain subsections and paragraphs were rearranged and other minor modifications were made throughout the regulatory text to improve clarity; to correct spelling, typographical errors, punctuation, and grammar; to make numbering adjustments; and to correct citations and references. These modifications were included in the strikeout/underline version of the regulatory text that was provided for public comment with the 15-day Notice.

B. Nonsubstantive Changes

ARB has made minor nonsubstantive changes to the final regulation order to correct punctuation, typographical errors, to make numbering adjustments, and to improve accuracy and clarity. The changes made do not materially alter any requirement, right,

responsibility, condition, prescription, or other regulatory element of any California Code of Regulations provisions.

III. SUMMARY OF COMMENTS AND AGENCY RESPONSES TO THE ORIGINAL PROPOSAL

The Board received numerous written and oral comments during the 45-day rulemaking comment period (October 19, 2007 to December 6, 2007). A list of commenters is set forth in Table I below, identifying the date and form of all comments that were timely submitted. Following the list is a summary of each objection or recommendation made regarding the proposed action, together with an explanation of how the proposed action has been changed to accommodate the objection or recommendation, or the reasons for making no change. The comments have been grouped by topic. Comments were received from government agencies, ports, industry representatives, individuals, and environmental organizations supporting and objecting to specific terms of the proposed regulation. Suggestions received ranged from not adopting a regulation to control at-berth emissions from ocean-going vessels to strengthening and accelerating the requirements in the regulation. Many commenters expressed support of ARB adopting a regulation to control at-berth emissions from ocean-going vessels, but also wanted specific changes to the requirements in the regulation. ARB did receive seven individual support letters and 75 identical form letters solely expressing support for the regulation. For brevity, the form letters are not included in Table I.

Table I: Comments Received During the 45-day Comment Period

Abbreviation	Commenter
ALA	Bonnie Holmes-Gen American Lung Association of California Oral testimony: December 6, 2007
ALLEN	Gina Allen Written testimony: November 12, 2007
ANDERSON	Stephen and Betty Anderson Written testimony: December 3, 2007
AZA	Amy Zimmerman Amy Zimmerman & Associates Written testimony: November 9, 2007
BAAQMD1	Jack Broadbent Bay Area Air Quality Management District Written testimony: October 10, 2007
BAAQMD2	Jack Broadbent Bay Area Air Quality Management District Written testimony: November 16, 2007
BCLAC1	Enrique Chiock Breathe California of Los Angeles County Written testimony: October 26, 2007
BCLAC2	Nicole Shahenian Breathe California of Los Angeles County Oral testimony: December 6, 2007
CAL1	Robert Cross CleanAir Logix Written testimony: December 3, 2007
CAL2	Eric Witten CleanAir Logix Oral testimony: December 6, 2007
CAMP	Scott Johns Clean Air Marine Power Oral testimony: December 6, 2007
CCA	Tim Carmichael Coalition for Clean Air Oral testimony: December 6, 2007
CCP	Rupal Patel Communities for Clean Ports Oral testimony: December 6, 2007
CLB1	Bonnie Lowenthal Vice Mayor City of Long Beach Written testimony: December 5, 2007

CLB2	Rhey Lee Office of Vice Mayor Bonnie Lowenthal City of Long Beach Oral testimony: December 6, 2007
CLIA	Terry Dale Cruise Lines International Association Written testimony: December 4, 2007
CMTA	Joseph Lyons California Manufacturers and Technology Association AB 32 Implementation Group Oral testimony: December 6, 2007
CSB	John Larson City of Seal Beach Written testimony: November 5, 2007
DW	Bob Hoffman Dock Watts Oral testimony: December 6, 2007
EHC	Joy Williams Environmental Health Coalition Oral testimony: December 6, 2007
ENVORG1	Jane Williams California Communities Against Toxics Angela Johnson Meszaros California Environmental Rights Alliance Robina Suwal California Safe Schools Jesse Marquez Coalition for a Safe Environment Joel Bush Communities for Clean Ports Cynthia Babich Del Amo Action Committee Elina Green Long Beach Alliance for Children with Asthma Martha Dina Arguello Physicians for Social Responsibility Shabaka Heru Society for Positive Action Written testimony: October 19, 2007
ENVORG2	Tom Plenys Coalition for Clean Air Diane Bailey Natural Resources Defense Council Bonnie Holmes-Gen American Lung Association of California Jesse N. Marquez

	Coalition for a Safe Environment Joel Bush Communities for Clean Ports Elina Green Long Beach Alliance for Children with Asthma Tina Andolina Planning and Conservation League Bill Magavern Sierra Club California Don Anair Union of Concerned Scientists Written testimony: October 4, 2007
ENVORG3	Candice Kim Coalition for Clean Air Diane Bailey Natural Resources Defense Council Bonnie Holmes-Gen American Lung Association of California Jesse Marquez Coalition for a Safe Environment Joel Bush Communities for Clean Ports Angelo Logan East Yard Communities for Environmental Justice Joy Williams Environmental Health Coalition John Kaltenstein Friends of the Earth Elina Green Long Beach Alliance for Children with Asthma Joel Ervice Regional Asthma Management and Prevention Initiative Statewide Bill Magavern Sierra Club California Don Anair Union of Concerned Scientists Written testimony: December 5, 2007
ERM	Larry Hottenstein ERM Written testimony: December 5, 2007
FOE1	Teri Shore Friends of the Earth Written testimony: October 10, 2007

FOE2	John Kaltenstein Friends of the Earth Oral testimony: December 6, 2007
GARDNER	Valerie Gardner Written testimony: December 3, 2007
IBEW	Kevin Norton International Brotherhood of Electrical Workers Oral testimony: December 6, 2007
LAPEER	Georgianna La Peer Written testimony: November 27, 2007
MAERSK	Jim Flanagan Maersk Inc. Oral testimony: December 6, 2007
NRDC	Diane Bailey Natural Resources Defense Council Oral testimony: December 6, 2007
OMCC	Joseph Haraburda Oakland Metropolitan Chamber of Commerce Written testimony: October 16, 2007
PERATA	Senator Don Perata California State Senate Written testimony: November 30, 2007
PGE1	Mark Krausse Pacific Gas and Electric Company Written testimony: October 16, 2007
PGE2	Wendy Mitchen Pacific Gas and Electric Company Oral testimony: December 6, 2007
PMSA1	John McLaurin Pacific Merchant Shipping Association Written testimony: December 3, 2007
PMSA2	T.L. Garrett Pacific Merchant Shipping Association Oral testimony: December 6, 2007
POAKLAND1	Omar Benjamin Port of Oakland Written testimony: October 15, 2007
POAKLAND2	Matt Davis Port of Oakland Oral testimony: December 6, 2007
POLA	Ralph Appy Port of Los Angeles Written testimony: December 6, 2007
POLB1	Thomas Jelenic Port of Long Beach Oral testimony: December 6, 2007

POLB2	Robert Kanter Port of Long Beach Written testimony: December 6, 2007
SCAQMD1	Barry Wallerstein South Coast Air Quality Management District Written testimony: December 5, 2007
SCAQMD2	Henry Hogo South Coast Air Quality Management District Oral and Written testimony: December 6, 2007
SES	Seiichi Tsurumi Sound Energy Solutions Written and Oral testimony: December 6, 2007
TILLMAN	Cheryl Tillman Written testimony: November 12, 2007
UCS	Don Anair Union of Concerned Scientists Oral testimony: December 6, 2007
WOEIP	James Fine Brian Beveridge West Oakland Environmental Indicators Project Written testimony: November 7, 2007

A. Support for the Regulation

1. **Comment:** In support of regulation as proposed. (CAL2, CLB1, CLB2, CAMP, CSB, IBEW, PGE2)

Response: Duly noted and appreciated.

B. Legal Authority

2. **Comment:** The Board's ability to regulate marine sources, derived from Health & Safety Code Sections 43013, 43018, and 39666, explicitly authorizes ARB to regulate marine sources only to the extent that it is not preempted by federal law. The regulation would require many vessels to retrofit or perform modifications to conform to its standards or to conform to an Emission Reduction Option under this rule. The requirements for vessels to retrofit or perform modifications to their ships and engines are beyond the authority of the State and are facially inconsistent with any assertion that this regulation presents a simple "in-use" regulation. Moreover, such retrofits and or modifications can affect the stability, structural integrity and general safety of the ship. Any imposed requirements or changes that can result in such impacts are the purview of the U.S. Coast Guard and the classification societies as designated by a ship's flag state. (PMSA1)

Response: ARB disagrees that the regulation would require vessels to retrofit or perform modifications to their ships and engines. The regulation is not prescriptive. There are two compliance paths: the Reduced Onboard Power Option and the Equivalent Emissions Reduction Option. The first option requires the vessel operators to shut down their auxiliary engines while in port. Presumably, the vessels would have their electrical requirements met in some other manner, such as utilizing shore-based power. The second option simply establishes emission-reduction goals. The regulation does not tell vessel operators how to meet these goals, nor does it tell operators what equipment they must use to meet these goals or how to operate such equipment. The regulation provides operators with flexibility to meet these goals, permitting them to use any number of alternative emission control strategies that they choose.

Furthermore, the regulation expressly states in (b)(2): "Nothing in this section shall be construed to amend, repeal, modify, or change in any way any applicable U.S. Coast Guard requirements. Any person subject to this section shall be responsible for ensuring compliance with both U.S. Coast Guard regulations and the requirements of this section, including but not limited to, obtaining any necessary approvals, exemptions, or orders from the U.S. Coast Guard."

As discussed in Chapter IV of the Technical Support Document, there are many vessels that already use shore power while docked, which means that the use of shore power as an emissions reduction option does not violate Coast Guard regulations. Moreover, vessel operators have flexibility to use alternative emission control strategies to achieve

emission reductions. Thus, there is no reason to believe that a vessel operator will have difficulties in complying with both the regulation and existing Coast Guard regulations.

3. **Comment:** The retrofit requirements of the proposed regulation will be preempted under Section 209(e) of the Clean Air Act. Congress further added Paragraph (e)(2), which allows California to adopt standards and other requirements relating to the control of such engines, other than those identified in subpart (1), upon receiving authorization of U.S. EPA. (PMSA1)

Response: ARB disagrees. While the U.S. EPA has determined that California engine retrofit requirements must receive U.S. EPA authorization, this regulation does not require vessel operators to retrofit or modify marine engines.

Section 209(e) of the federal Clean Air Act (CAA) generally prevents states from adopting emission standards for new nonroad engines. Marine vessel engines are by definition considered nonroad engines. However, Section 209(e) does not prohibit states and their political subdivisions from regulating the use of marine engines once placed into service. Such in-use requirements, whether adopted by a state or local government, including California or its political subdivisions, are not subject to potential federal preemption and therefore do not need U.S. EPA authorization to implement. Permissible in-use requirements include, but are not limited to, hours of usage and daily mass emission limits. The limit to such in-use requirements is that they can neither place additional requirements on the original engine manufacturer nor require a retrofit of the engine.

Although some may interpret the regulation as imposing in-use operational requirements, there is still no conflict with the U.S. EPA regulation governing engines used on ocean-going vessels. The U.S. EPA regulation (40 CFR Part 94) applies only to new engines; regulates only NOx, particulate matter (PM), total hydrocarbons (THC), and carbon monoxide (CO); and is less stringent than the regulation for controlling NOx and diesel PM. The federal regulation applies to manufacturers of new engines (i.e., generally, those for which equitable title has not yet been transferred) and rebuilders of engines, whereas the regulation applies to engines that are already installed on vessels that are operating in regulated California waters. Thus, there is no conflict with the U.S. EPA regulation because compliance with both the State regulation and the federal regulation is reasonably feasible.

Nevertheless, the CAA specifically allows California to seek a waiver of potential preemption for its nonroad engine regulations, including marine vessel engine regulations. To do so, California first adopts its regulations and then seeks authorization from U.S. EPA to enforce its regulations. ARB intends to seek a waiver from U.S. EPA for this regulation after it becomes effective.

4. **Comment:** During the adoption of EPA's Nonroad Emission-Control Program's rulemaking regarding control of emissions from marine engines, U.S. EPA determined that marine emission control proposals "should be considered in the

broader context of EPA's nonroad emission-control programs, international activities, including MARPOL Annex VI, our previous marine emission control program, European Union initiatives, and activities at the state level." (Federal Register, Vol 67, No. 103 at pp. 37553.) The Air Resources Board should consider the adoption of their marine emission control proposal in at least as broad of a rulemaking context as U.S. EPA in order to fairly evaluate their rulemaking using the proper totality of the record. (PMSA1)

Response: The Board adopted the regulation in a broad rulemaking context after staff developed the regulation in a transparent and public process. During the regulatory development process, ARB was aware of other related activities taking place on an international scale, including MARPOL Annex VI and efforts by the International Organization of Standardization (ISO) to develop a standardized shore-to-ship power system.

The 1997 MARPOL standards were established by the International Maritime Organization (IMO) at the International Convention on the Prevention of Pollution from Ships. The standards provide limits on NOx emissions from ships, depending on engine speed. The 2005 U.S. EPA category 3 standards are an implementation of international standards agreed to by 136 countries; the agreement is commonly known as MARPOL Annex VI. Ships built on or after 2000 are required to emit approximately 6-12 percent less NOx, depending on engine speed. Although ARB was aware of these developments, their relevance to the regulation was minimal.

ARB believes that the international efforts to develop standardized connections for shore power are more relevant. Recognizing the importance of standardizing shore power connection at ports throughout the world, the ISO formed a working group under its Technical Committee 8, Ships and Marine Technology, to develop a standardized shore-to-ship power system. The Port of Los Angeles is a member of this working group. Subcommittees have been formed to explore a number of issues related to developing a shore-to-ship power standard, including power demand, voltage, reliability, power transfer, equipment location, power outlets, and cable management systems. The objective is to establish Publicly Available Specifications (PAS), which will allow ports and carriers to refer to an official document that provides shore-to-ship power specifications.

ARB believes that the Board used the proper totality of the record when adopting the regulation.

C. Do Not Adopt Regulation

5. **Comment:** The Clean Air Action Plan adopted by the ports should be allowed to proceed in a timely manner. Voluntary efforts will largely achieve the goals set in the Plan. ARB should step back from the proposed regulation. (PMSA2)

Response: The San Pedro Bay Ports Clean Air Action Plan (Plan), adopted by the Ports of Los Angeles and Long Beach in November 2006, addresses only those two ports. Furthermore, the emissions reductions estimated in the Plan by FY 2010/2011 (4.1 tons per day [TPD] of NOx and 0.09 TPD of diesel PM) represent less than 25 percent of the total hotelling emissions in these ports. The ARB regulation to reduce hotelling emissions will achieve 75 percent emission reductions by 2020 at these two ports and four additional ports: San Diego, Oakland, San Francisco, and Hueneme. The Plan is a good start but is inadequate to protect public health in communities surrounding California's major ports.

6. **Comment:** In lieu of adopting the regulation, PMSA recommends developing a memorandum of understanding (MOU) between the marine industry and the Board. The MOU would be fully actionable and comprehensive and consistent with Port plans, and would be developed such that early adopters are not punished, recognizes that some ships and marine terminals will be better suited for shore side power in the short-term than others, and acknowledges the lack of an international standard. (PMSA1)

Response: ARB disagrees that an MOU would be as effective and health-protective as the adopted regulation. This regulation helps to achieve several health-related goals of the Board, including reducing diesel PM, reducing emissions from goods-movement activities, achieving and maintaining ambient air quality standards, and reducing Greenhouse Gas (GHG) emissions to help mitigate the effects of global climate change. These goals and the regulation's ability to help fulfill them are explained in Chapter I of the Technical Support Document (TSD). An MOU would not achieve all of the benefits of the regulation and would, therefore, be less effective.

D. Exemptions to Ports

7. **Comment:** I do not think it is wise to extend exemptions to any port users for any reason at the expense of our children and communities. These regulations need to reflect our determination to illuminate problems resulting from port pollution if not as an enforceable solution as a goal. (ANDERSON)

Response: ARB believes that some general and specific exemptions to the regulation are needed. The regulation identifies general exemptions to its requirements: (1) vessels in "innocent passage," (2) vessels owned or operated by local, State, federal or foreign governments in government non-commercial service, (3) steamships, (4) auxiliary engines using natural gas, and (5) vessels in fleets not meeting the de minimis vessel-visit criteria. Exemptions 1 - 4 are discussed in Chapter VI of the TSD. Exemption 5 exempts container-ship fleets making fewer than 25 visits to a California port, refrigerated-cargo-ship fleets making fewer than 25 visits to a port, and passenger-ship fleets making fewer than five visits to a port from the requirements of the regulation. This exemption was originally included in a different section of the regulation but was moved to the general exemption section because it was a more logical location.

The regulation also includes exemptions to specific provisions in the regulation so that vessels are not penalized for violations that are due to unforeseen events beyond the vessel's control. These exemptions include visits experiencing an emergency event or a delay by a federal agency. The regulation requires vessels complying with the Reduced Onboard Power Generation option to run their auxiliary engines no more than three to five hours while docked at a berth, depending on the type of power switching capability of the vessel. The regulation provides an exemption to the three- or five-hour operation limits for visits experiencing an emergency event or a delay by a federal agency as defined below:

a. An emergency event has been defined as those times when the utility cannot provide power because of a transmission or distribution emergency, when the utility must reduce grid-based shore power to the port because of a natural disaster, or when the utility must reduce grid-based power to the port in response to the California Independent System Operator or the Los Angeles Department of Water and Power declaring a Stage 3 emergency or to avoid a Stage 3 emergency. These types of events are expected to occur infrequently.

b. A ship's departure may be delayed due to obligations imposed by federal agencies such as the U.S. Coast Guard or some other branch of the Department of Homeland Security. As with emergency events, these types of delays are expected to occur infrequently.

ARB believes that these exemptions allow flexibility to address certain rare circumstances but are sufficiently limited so that the emissions occurring during the exempted events will be minimal.

E. Other Ship Categories

8. **Comment:** Tankers, bulk carriers, and tugs should not be exempt from this regulation. Tankers remain a major contributor to port emissions, accounting for roughly 20 percent of ship visits to California. Further, 45 percent of tanker visits are to Bay Area ports. Bulk carriers are also a significant contributor to hotelling emissions and are expected to be the second largest NOx contributor of the various vessel categories in 2010—second only to container ships. Finally, ARB has continued to delay including shore power for tugs, first as part of the harbor craft regulation and now in the current form of this rule. ARB must step in to ensure these sources do not emit pollution while sitting idle for extended periods of time in California's harbors. (ENVORG2)

9. **Comment:** Include tanker ships docking at refineries and car carrying ships. (WOEIP)

10. **Comment:** In San Diego, the bulk ships are a large part of the current problem, and, in fact, comprise all the ships that berth in National City. Cement ships make relatively few calls but stay in port for seven to ten days at a time. The port's current maritime business plan identifies growth opportunities in bulk fruit, steel and other bulk cargo, so it seems probable the source of emissions will increase. We urge the Board to address bulk carriers in the near future with a rule requiring shore power or equivalent reductions. (EHC)

11. **Comment:** Place high priority on the second phase of regulation for tankers, vehicle carriers, tugboats, and cargo ships. (FOE2)

12. **Comment:** We are concerned that delaying rulemaking on tankers, bulk ships, and vehicle carriers would delay achievement of the targeted SIP emission reductions and, therefore, urge the Board to place high priority on these vessel categories and proceed expeditiously with developing and adopting this second phase of the regulation as early as possible in 2008. (SCAQMD1)

13. **Comment:** The ISOR indicates that container ships, refrigerated-cargo ships, and passenger ships are the most attractive candidates for cold-ironing because these ships spend a sufficient number of hours at berth, and have an ample power demand while hotelled. However, the regulation only applies to three types of ships and does not address the frequency of ships based on stated criteria related to emissions. (PMSA1)

14. **Comment:** If a vessel meets criteria at any of California's public ports or private marine terminals it is hard to understand why some vessels should be exempt based on the location of their port call versus others who may meet fewer of the criteria calling at a listed port. (PMSA1)

Response: ARB initially intended to develop a regulation affecting all six vessel categories; however, during the regulatory process, it became apparent that two distinct regulatory approaches were necessary to achieve emission reductions from all of the vessel categories. ARB chose to first address container ships, passenger ships, and refrigerated-cargo ships—vessel categories that account for more than 80 percent of the emissions from hotelling vessels and for whom shore power is a cost-effective emissions reduction technique. These vessel categories are similar in that they have high power demands (4-15 MW) and that the vessels in their fleets make frequent visits to the same ports on a regular basis. By addressing these three vessel categories, the regulation specifically applies to the six ports at which these vessels regularly call.

In contrast, the other ship categories—vehicle carriers, bulk and general-cargo ships, and tankers—typically have lower power demands (0.5-1 MW) and have few vessels in their fleets that visit California ports regularly. To have kept all six vessel categories in one regulation would have created a more complex and unwieldy regulation, significantly delaying its development and implementation (thus delaying emission benefits).

ARB has now begun the regulatory process to develop a cost-effective regulation to reduce hotelling emissions from the other three vessel categories. Since all California ports receive visits from ships in the remaining three categories, there will be more ports evaluated than the six identified in the regulation. Furthermore, ARB is also evaluating shore power for tug boats as part of this regulatory process. ARB expects to bring a regulation for the Board's consideration to reduce at-berth ship emissions for the other ship categories in 2009.

F. Fleet De Minimis Visits Limits

15. **Comment:** This regulation in its current form exempts container fleets that visit a port less than 25 times per year and passenger ships that visit less than five times per year. This could result in a significant loophole because polluting ships may not be required to comply. Requirement should apply to each vessel rather than to fleets so that cruise lines and shippers cannot create subsidiaries to evade public health compliance. (BCLAC2)

16. **Comment:** The regulation in its current form exempts container fleets that visit a port less than 25 times per year and passenger ships that visit less than five times per year. We are concerned that this may evolve into a significant loophole and recommend that the requirement be expanded to include a per vessel threshold of two visits on top of the fleet wide requirements so that cruise lines and shippers cannot create subsidiaries to evade the rule. (ENVORG3)

17. **Comment:** "Fleets," for the purpose of this regulation, are specific to the port visited (Los Angeles and Long Beach are considered one port), not the shipping company and therefore could create a problem for the smaller ports like Oakland. A shipping company could choose to visit Oakland less often, in order to be exempt from the regulation while visiting that port. Discourage gaming by changing the definition of "fleet" for purposes of exemption from this regulation, to be all ships in the company fleet visiting any California port. (PGE1)

18. **Comment:** Suggest that for container ships, the 25 visits per port be changed to 25 visits to California in a year. Do the same for passenger cruise ships and extend to all of California ports. (UCS)

19. **Comment:** Close loophole that exempts container fleets visiting less than 25 times and passenger ships that visit less than five times per year. We feel this threshold is too high and could potentially be gamed. Hoping that thoughtful consideration could be given to ratcheting that threshold down at the very least during final compliance in 2020. Our preferred threshold would be any more than two visits per year to any California port. (NRDC)

20. **Comment:** All visiting passenger ships should use shore power at berth. Container and reefer ships should also face a per vessel threshold of two visits

on top of fleet requirements to inhibit companies from circumventing the rule. (FOE2)

21. **Comment:** This rule should require all cruise vessels visiting California to use shore power while at berth. (BCLAC2, ENVORG3)

22. **Comment:** Strengthen the criteria for passenger ships. Strengthen the criteria that there should be a per ship rather than per visit requirement. (ALA)

23. **Comment:** Add threshold for individual ships. (EHC)

24. **Comment:** If these exemptions are approved as is, ARB staff should monitor their use to ensure they are not abused. (FOE2)

25. **Comment:** ARB must evaluate annually that container ship visits for fleets falling below the 25 visits to a port de minimis limit do not exceed three percent of all container ship visits to California. (ENVORG2)

26. **Comment:** In 2006, the Port of Oakland had approximately 1,900 unique ship calls, of which 93 percent were of fleets composed of 25 or more vessels. A very small fraction would not be subject to this rule. (POAKLAND2)

Response: Staff proposed to exempt from the requirements of the regulation container-ship fleets making less than 25 visits to a California port, refrigerated-cargo-ship fleets making less than 25 visits to a port, and passenger-ship fleets making less than five visits to a port. At the Board hearing, the Board expressed its intent to modify these de minimis values to apply on a statewide basis, not an individual port basis, but directed staff to determine if this proposed modification would be cost effective.

ARB conducted an economic analysis of modifying the de minimis visit criteria to a statewide basis and determined the following:

- As adopted, the regulation captures 96 percent of the vessel visits for the three ship categories, and reduces NOx and PM emissions by an estimated 75 percent in 2020.

- If the regulation were modified using statewide de minimis visit criteria, less than one percent of vessel visits would be additionally affected, resulting in less than one percent additional NOx and PM reductions.

- The cost of capturing these additional vessels and visits would result in cost-effectiveness values that would be up to 20 times higher than the average values of the adopted regulation.

Based on the high cost-effectiveness values determined for those fleets that would be affected by a statewide de minimis visit criteria and the small amount of emission

reductions that can be generated, ARB chose not to change the visit criteria to a statewide basis. A detailed discussion of the analysis was included as Attachment III to the 15-day Package.

ARB believes that adding a two-visit threshold per ship to the fleet de minimis visit criteria or that the criteria be changed to apply to individual ship visits instead of fleet visits would also result in high cost-effectiveness values with little additional emission reduction benefits.

With respect to the passenger vessel visit comments requiring all passenger ships to connect to shore power when visiting a California port, nearly all of the passenger-vessel visits (95 percent) and the associated emissions have been captured in this regulation. There are companies whose visiting fleets made fewer than three visits to a given port in 2006, many of them making only a single visit to California that whole year. Those visits are a small percentage of the total, and were not found to be cost-effective for this regulation.

With regard to the loophole and monitoring concerns of several commenters, ARB has addressed them in the regulation through the compliance reports and collection of the ports' wharfinger data. ARB is requiring that the shipping companies submit compliance statements and the ports submit wharfinger data annually to the ARB. ARB will be able to determine if fleets are modifying their operations to stay below the 25-port-visit or five-port-visit de minimis criteria. ARB can also monitor if the 25-visits limit continues to capture the majority of the visits in the three ship categories, as it does now. If, during the regulation's implementation, ARB determines that vessel fleets appear to be circumventing the requirements of the regulation by manipulating their vessel visits to California ports, ARB will consider proposing to the Board modifications to the regulation to prevent these practices in the future.

27. **Comment:** The requirement of 25 visits per year needs to be detailed. Is this to any California port or 25 visits per port? Twenty-five visits is too many, as it suggests, depending on interpretation, that a ship may visit the Port of Oakland nearly every other week without being required to adopt shore power. These "de minimis" levels are loopholes that should be eliminated from the rule. (WOEIP)

Response: The 25-visit limit applies to an entire fleet that visits a single port, not to an individual ship. The majority of vessels calling on the Port of Oakland are part of fleets that exceed the 25-ship-visits limits. Please see previous response for discussion about de minimis criteria.

G. Compliance Schedules

Note: Because staff received a multitude of comments on its originally proposed compliance schedules—and subsequently modified the schedules before the Board hearing—staff has listed all of these related comments together before responding to them. To do otherwise would create significant redundancy in the responses.

Additional responses to specific comments are provided after the general discussion of the compliance schedules.

Accelerate Schedules

28. **Comment:** Why wait another seven to ten years to fix a problem when we have the resources and technology to help it now. (ALLEN)

29. **Comment:** Significant emissions reductions are possible now with alternative technologies that will result in air quality relief today and not seven years from now. (CCP)

30. **Comment:** The proposed regulation allows industry to postpone emission reductions until 2014 when utility-based grid power is available. (AZA, TILLMAN)

31. **Comment:** The regulation should encourage early action by ports, shipping companies and technology providers as soon as possible, rather than waiting for the state mandate to go into effect in 2014. Early emission reductions are perhaps the most important emission reductions given the extremely high levels of emission from ships in ports. (FOE1)

32. **Comment:** Phase in early compliance instead of deferring all compliance until 2014. (BCLAC2)

33. **Comment:** Accelerate compliance timeframe. (ALA, SES, CCA, UCS)

34. **Comment:** Timeline is too slow and too lax. The timeline requires no dockside emission reductions until 2014 in spite of the fact that technologies for immediate reductions are available and financially feasible. (WOEIP)

35. **Comment:** The compliance schedule for grid-power systems is too relaxed. (BAAQMD1)

36. **Comment:** The 2010 and an interim 2012 deadline will send a clear signal to ports, terminal operators, and shipping lines to shift toward shore power quickly and incrementally. (BCLAC2, ENVORG2, ENVORG3)

37. **Comment:** Implementation of the San Pedro Port's Clean Air Action Plan will be hastened and more certain if ARB requires these more immediate, short-term reductions. (ENVORG2, ENVORG3)

38. **Comment:** Need interim targets for grid-based power option because of long lead time for shore power and should make these the same as non-grid-based alternatives. (SCAQMD2)

39. **Comment:** In ARB's March 2006 report, *Evaluation of Cold Ironing Ocean Going Vessels at California Ports*, ARB found that 20 percent of ship calls utilizing cold-ironing by 2010 is both technologically feasible and cost effective. (CCP, ENVORG1)

40. **Comment:** ARB's Goods Movement Emission Reduction Plan (GMERP) committed to a shore power strategy that would require at least 20 percent of ship visits to use shore power by 2010. ARB must incorporate this specific provision into the regulation. (ENVORG2, ENVORG3).

41. **Comment:** ARB should set aggressive short-term and interim deadlines beginning in 2010 and 2012 to meet goals set in the GMERP. (ENVORG1, FOE1)

42. **Comment:** Early emission reduction target of 2010 will assist GMERP goal of 20 percent of ship visits using shore power by 2010. (FOE2, ALA, BCLAC2)

43. **Comment:** CARB may not meet its diesel risk reduction plan's (DRRP) 2010 target of 75 percent reduction of health risk from diesel PM unless regulations such as this one accelerate compliance. (BCLAC2).

44. **Comment:** ARB's DRRP commits to reducing the risk from diesel pollution by 75 percent by 2010 but we are concerned that ARB is not on track to meet this target. Every regulation ARB is considering must be in line with the significant reductions that must happen by this date. (ENVORG2, ENVORG3)

<u>Do Not Accelerate Schedules</u>

45. **Comment:** The proposal to accelerate the proposed schedule is unrealistic due to: 1) the schedule for providing grid-based power; and 2) the viability of alternatives. (POLB1, POLB2)

46. **Comment:** POLB is working with Southern California Edison to accomplish the required capacity enhancements as well as ensure that service to each terminal is enhanced to accommodate additional loads. Construction of the necessary improvements could extend well beyond the CARB's cold ironing implementation date in 2014, and given the phased nature of the work, we have limited ability to move up completion of the initial work. Concerned about the impact the retrofitting of existing terminals will have on tenants and cargo moving activities. For example, large segments of an operating terminal must be disrupted to install underground conduits, ship berths must be taken off-line for days or weeks to install outlets and system-wide outages will be required to upgrade the terminal electrical system. All these elements can combine to delay cargo operations and can have unintended consequences to the economy—backing up ships, delaying cargo handling, as well as train and truck traffic congestion. We must carefully plan how multiple concurrent retrofit projects can take place while minimizing the

delay in cargo movement. We do not believe acceleration of the implementation schedule could be achieved. (POLB1, POLB2)

Make the Schedules More Similar or Technology-Neutral

47. **Comment:** Harmonize compliance time for all energy sources. (EHC)

48. **Comment:** Establish equal timelines based on emission reductions regardless of the technology. (AZA)

49. **Comment:** Grid-based shore power must comply with the same timeline as alternative technologies. (ENVORG1)

50. **Comment:** Modify the rule to "level the playing field" in terms of compliance timelines for grid-based and alternative shore power technologies. (WOEIP)

51. **Comment:** The regulation should have a single, technology-neutral compliance path. (BAAQMD2)

52 **Comment:** Support uniform timeline for compliance, but ask regulation's pace be set by the most aggressive technology that's available now. (CCP)

53. **Comment:** It is unfortunate that the current regulation contains differing compliance schedules depending on which method is selected. Port authorities, terminal operators, and vessel owners will be hindered in their planning and decision-making by the lack of a single compliance schedule for all potential solutions. This proposal may have the effect of delaying any implementation at all until the latest possible date which would postpone the emission reductions benefits that can be implemented in the near term if a common compliance date was available. (POAKLAND1)

54. **Comment:** Create a level playing field by requiring all ships reduce auxiliary engine emissions 20 percent by 2010. (PGE1)

55. **Comment:** The regulation should include a single compliance schedule of 20 percent of ship visits to California ports use shore power by January 1, 2010, 40 percent by January 1, 2012, 60 percent by January 1, 2014, and 80 percent by January 1, 2016. (BCLAC1, BCLAC2, BAAQMD1, ENVORG2, ENVORG3, CCP, FOE1)

56. **Comment:** Shipping fleets should be allowed to comply with the mix of technologies that best suits their operational needs. (BAAQMD1)

57. **Comment**: The regulation should address only emission reductions and be technology-neutral. Flexibility in the regulation will allow the Port of Oakland and

its partners to continue to develop and refine alternative emissions reduction technologies. (OMCC)

58. **Comment:** Supports technology-neutral standards. (UCS)

59. **Comment:** The regulation should ultimately level the playing field between all emission reductions technologies, whether they are electrification by utility or non-utility generation or a new advancement in alternative control technology. (FOE1)

60. **Comment:** Level the playing field for all technologies to be implemented. (AZA, MAERSK)

61. **Comment:** Requesting that ARB set the standards along with timeframes to meet those standards and then basically stand back and allow industry to seek out the technology that will result in the required emissions reductions. (MAERSK)

62. **Comment:** Let the stakeholders decide what to do as long as they achieve the desired emission reductions. (DW)

63. **Comment:** Technical neutrality. The current language contains a single presumptive solution which is grid power, with a glancing nod to the possibility of one or two tentative options. (CAL1)

64. **Comment:** Allow a certain amount of flexibility for businesses to comply with requirements. (CMTA)

65. **Comment:** Regulation should be flexible by not requiring how the emission reductions are achieved. If a requirement is 50 percent in 2014, for example, there should not be a prescription requiring half the ship visits to shut off their engines completely. It should be open to, for example, shutting off 50 percent of the engines all the time or some combination that achieves the desired results. (PGE1)

66. **Comment:** Include a common implementation date for all alternative solutions. Staggering the implementation dates will create a recipe for confusion for carriers/operators as they try to quantify what the cost/benefit ratios are among the alternative options. Carriers/operators will take a “wait and see” approach. Staggering will retard technological growth. Certain solutions will have advantages while others are disadvantaged. Staggering will result in increases in emissions as cargo volume and ship visits increase during the intervening years. (CAL1)

67. **Comment:** Compliance standards within the proposed regulation serve to thwart new technological solutions that are available today. This is because the

regulation is based on a presumptive solution, which is port electrification. (LAPEER)

68. **Comment:** The regulation may create a multi-tiered playing field, favoring one emission reduction technology over another. The regulation dramatically favors a solution only realized years into the future while discouraging presently available new technologies. (FOE1)

69. **Comment:** The standards and timelines issued under this rule will negatively impact existing and ongoing innovation and impair investment in alternative technologies. This rule also has the potential to penalize and discourage those who would otherwise work to develop and adopt alternative technologies sooner than 2014. The rule should not punish those who lead the industry as early adopters of new and innovative technologies, but should seek ways to compliment their efforts. (PMSA1)

70. **Comment:** The proposal has a different schedule and a different emission standard depending on which technology is used to deliver power to vessels. This approach would favor the use of grid power over that from alternative technologies at the expense of earlier emission reductions and irrespective of which source of power is the cleanest. The regulation provides no quantifiable incentive for ports or marine terminal operator to take aggressive steps to achieve emission reductions sooner than 2014. Consequently, the approach could impede the more rapid deployment of alternative technologies capable of producing quantifiable emission reductions as soon as 2010. (PERATA)

71. **Comment:** Concerned that alternative technology which would secure early and critical emission reductions from shore power are in effect being penalized. As written, the timelines and percentages for compliance are set differently for grid-based shore power; non-grid-based shore power and alternative control technologies; and hybrid combinations of electricity from grid, non-grid and alternative control technologies. The slowest and most relaxed schedule for compliance is placed on grid-based shore power which will create conditions for industry to choose the slowest and most relaxed compliance. There is a possibility for industry to, as the grid-based deadline approaches, argue for delaying compliance on the grounds that it is not reachable. (ENVORG1)

72. **Comment:** The regulation has different requirements including different compliance dates for those choosing grid power and those choosing an alternative such as the Wittmar system. The regulation disadvantages ports like Oakland that are in position to reduce emissions sooner. For example, under the current draft, if a port wants to use grid power, it is required to reduce emissions 50 percent by 2014. If a port chooses an alternative it is required to reduce emissions by 20 percent in 2010 and by 2014 it would be required to reduce emissions by 60 percent. This arrangement discourages and penalizes early action. (PGE1)

73. **Comment:** The rule penalizes alternative compliance technologies by requiring adherence to a more stringent implementation schedule compared with grid-based power. Requirements should favor near-term, low-cost solutions that provide immediate emission reductions with bridge technologies until the grid or zero-emissions distributed generation technologies are available at cost-effective prices. (WOEIP)

Make the Schedules More Aggressive

74. **Comment:** The Ports of Los Angeles and Long Beach are well underway in implementing the San Pedro Ports Clean Air Action Plan shore power measure. The Ports envision that grid-based electric power to be their primary technology. Alternative technologies such as distributed generation would provide significant emission reductions as the grid-based infrastructure is constructed and the proposed changes would ensure the emission reductions are realized as early as possible. (SCAQMD1)

75. **Comment:** We recognize that there may be additional costs associated with the more aggressive compliance schedule that we recommended which had a 2010 compliance date for both options. However, we believe that vessel operators can take a longer lead time technology path such as grid-based shore power for the longer term compliance targets and in the interim deploy more near-term solutions without incurring substantial economic impacts. (SCAQMD1)

76. **Comment:** We evaluated the capital and operating costs of several alternative solutions for a typical terminal with specified number of calls and vessels and assuming 20 percent compliance in 2010:

- Grid-power = $2.30 per TEU
- Fuel cell = $3.40 per TEU
- Purchase of LNG-power dockside generator with SCR = $0.80 per TEU
- Rental of generator assuming $1000/hr usage fee = $3.50 per TEU

Based on the analysis, the additional cost of compliance can be easily borne by the vessel operators (and the Ports of Los Angeles and Long Beach covering the cost of shore-side grid power) who would be able to recoup the cost to implement one or a combination of the technologies through a modest increase in per TEU charge. (SCAQMD1, SCAQMD2)

77. **Comment**: The regulation should require, regardless of technology, that 30 percent of all ship visits to CA ports use shore power by 2010, 60 percent by 2012, 80 percent by 2014, and 100 percent by 2016. (ENVORG1)

78. **Comment**: Raise the 50 percent compliance requirement for 2020 to 90 percent. (WOEIP)

79. Comment: Recommend the following revised compliance schedule:

Date	Reduced Onboard Power Option (Grid)	Equivalent Emission Reduction Option [1]
January 1, 2010	20% visits and power demand[1,2]	20% reduction
January 1, 2012	40% visits and power demand[1,2]	40% reduction
January 1, 2014	60% visits and power demand [1]	60% reduction
January 1, 2017	70% visits and power demand [1]	70% reduction
January 1, 2020	80% visits and power demand [1]	80% reduction

1. In addition, all ships must use shore power if available.
2. Equivalency may be demonstrated on a port-wide basis based upon a submittal by the Port Authority.

An equivalency demonstration on a port-wide basis should be allowed for the 2010 and 2012 requirements under the Reduced Onboard Power Option in recognition of the lead time needed to construct the infrastructure at individual terminals. The Port Authority would submit the equivalency demonstration. The proposed regulation is on a vessel operator basis at this time so on average, it should come out to be the same port-wide. (SCAQMD1, SQAMD2)

80. Comment: We believe our recommended schedules are feasible given the current state of existing and developing technologies. San Pedro Ports Clean Air Action Plan calls for significant use of grid-supplied shore power to reduce hotelling emissions which will result in about a 20 percent reduction in NOx emissions by the 2010/2011 timeframe. Other control technologies, such as DG and after treatment systems, offer alternative means of compliance for fleets. Use of shore-side after-treatment systems is also being demonstrated at the Port of Long Beach this year which is potentially capable of achieving over 90 percent reductions in NOx and PM emissions. SCR has also been successfully installed and tested on an auxiliary engine onboard a container vessel achieving 90 percent reduction in NOx. (SCAQMD1)

81. Comment: Add an exemption in section (e) for vessel operators complying with sections (d)(2)(A)(1) and (d)(2)(A)(2), if the operator can demonstrate, prior to 2014, that meeting the emission reduction targets is not feasible due to physical limitations, safety, or other reasons. The operator must demonstrate that the only choice is grid-based power and show progress to developing the necessary infrastructure to meet the emission reduction targets of sections (d)(2)(A)(3) and (d)(2)(A)(4). (SCAQMD1, SCAQMD2)

82. **Comment:** We recommend the following changes to the regulatory language (SCAQMD1):

1. Change Table under section (g)(1) to have subsequent terminal plan updates beginning in 2011 under the Grid-Based Shore Power option.
2. Change subparagraphs (h)(1)(A) and (h)(2)(A) so that all vessel fleet plans be submitted no later than July 1, 2009, regardless of compliance approach.
3. Specifically, revise Table 3 under section (h)(2)(A) to reflect submittal of initial vessel plans by July 1, 2009, with subsequent submittals every two years to 2019.

Supports the Revised Compliance Options

83. **Comment:** We support the staff-proposed changes that will create level playing field for alternative measures, such as DG systems, so they can continue to emerge and mature and serve as long-term options for ports like Oakland that might not be able to deliver a cost-effective grid power option. (POAKLAND2)

Do Not Support the Revised Compliance Options

84. **Comment:** The NOx emission reductions for the current proposal compared to the emission reductions under Section (d)(2)(B) of the October 2007 release are 1.6 tons per day (TPD) less in 2010, 2.6 TPD less in 2012, and 1.9 TPD less in 2014. South Coast needs those reductions. (SCAQMD1, SCAQMD2).

Response to All Compliance Schedule Comments: ARB received more comments about the originally proposed compliance schedules than any other component of the proposed regulation. Taking into account all of these comments, ARB revised the proposed regulation significantly before taking it to the Board for consideration of approval in December 2007. Below is a thorough discussion of the compliance schedules, both those originally proposed in Appendix A to the Staff Report and those ultimately adopted by the Board. ARB agrees that emission reduction benefits must be realized as early as possible and that no particular technology should be given preference over another to achieve these emission reductions.

Original Proposal

The original proposal included four compliance schedules—one for the grid power option and three for the emission reduction option. The table below depicts these originally recommended options:

Date	Limited Engine Operation (Grid)	Reduced Emission Operation (Grid)	Reduced Emission Operation (Non-Grid)	Reduced Emission Operation (Both)
January 1, 2010	-	-	20% of emissions	
January 1, 2012	-	-	40% of emissions	20% of emissions
January 1, 2014	50% of visits	50% of emissions	60% of emissions	50% of emissions
January 1, 2016	-	-	80% of emissions	-
January 1, 2020	80% of visits	80% of emissions	-	80% of emissions

The overall intent of these original schedules was to recognize that grid-based shore power would take time to implement because of the significant infrastructure requirements associated with it, while alternative technologies could be deployed within a shorter timeframe.

Although one of the goals in the Goods Movement Emission Reduction Plan (GMERP) was to require 20 percent of the ship visits to California's ports to use shore power by 2010, ARB did not propose a 2010 compliance requirement for grid-based shore power. Grid-based shore power implementation will require extensive modification to port and terminal electrical infrastructures. In some cases, a significant upgrade to the utility grid is needed to bring the additional electrical power to the port. Such modifications are likely to require environmental review, permits, and complex construction—construction activity that needs to be coordinated with an operating terminal—which is likely to take up to five years to complete. The proposed regulation's initial milestone of 2014 for shore power allows for five years for initial implementation.

Nevertheless, earlier reductions will occur from shore power projects already planned at some California ports. Emissions reductions from vessels using shore power at Long Beach and Los Angeles will occur well before 2014 because of commitments made in the Clean Air Action Plan. If the plan is fully implemented, ARB anticipates reductions of 1,300 tons of NOx emissions and 37 tons of PM emissions by 2011, which represents a reduction in emissions of 15 percent for NOx and 20 percent for PM of emissions in 2011 at the ports. The ports are continuing to update the Clean Air Action Plan, and it is likely both ports will identify additional reductions for shore power prior to 2014. In addition, to satisfy the 2014 milestone, ARB anticipates that emission reductions as a result of the regulation will begin in 2011 and significant reductions will occur in 2012 and 2013.

The regulation requires that 50 percent of the vessel visits connect to shore power in 2014 as opposed to the GMERP's strategy for a shore power that requires 60 percent of the vessel visits use shore power by 2015. ARB proposed a compliance date one year earlier to allow the NOx emission reductions from the proposed regulation to be used to

satisfy the South Coast air basin SIP for attaining the $PM_{2.5}$ ambient air quality standard. By moving the date up one year, ARB proportionally reduced the percentage of vessel visits from 60 percent to 50 percent. In 2020, the regulation satisfies the GMERP goal of 80 percent shore power (or equivalent).

The originally proposed "non-grid" schedule assumed that alternative technologies could be deployed more rapidly. These technologies include distributed generation; emission controls installed on the ships (e.g., particulate control traps, selective catalytic reduction units, alternative fuels); or emission controls installed at the wharf (e.g., a "bonnet" capture-and-treat technology). ARB had proposed an aggressive schedule of 20, 40, 60, 80 percent emission reductions by 2010, 2012, 2014, and 2016, respectively.

Revised Compliance Schedules

As mentioned above, ARB considered the comments received about the original compliance schedules and revised the schedules before taking the proposed regulation to the Board in December 2007. The compliance schedules in the regulation, as adopted by the Board in December 2007 are as follows:

Date	Reduced Onboard Power Option (Grid)	Equivalent Emissions Reduction Option
January 1, 2010	Ships must use shore power if available	10% reduction
January 1, 2012	Ships must use shore power if available	25% reduction
January 1, 2014	50% visits and power demand	50% reduction
January 1, 2017	70% visits and power demand	70% reduction
January 1, 2020	80% visits and power demand	80% reduction

For the grid-based shore power compliance path, now called the "Reduced Onboard Power Option," ARB proposed to keep the targets of 50 percent and 80 percent of visits using shore power for 2014 and 2020, respectively, but also to require a similar percentage of onboard electricity generation to be reduced. Onboard electricity generation is directly related to emissions; therefore, it is a better measure of emissions reduction than visits alone. To assure a reasonable rate of progress between 2014 and 2020, ARB proposed an interim 2017 milestone of 70 percent of fleet visits using shore power while reducing onboard electricity generation by 70 percent. ARB also emphasized that ships with the capability of using shore power must use shore power

when visiting a berth that was capable of providing the power in a technically compatible manner, although that requirement was in the original proposal.

In adopting the regulation, the Board concurred with staff that 2014 was a reasonable initial requirement for grid-based shore power because of the extensive capital improvements required at the 31 affected terminals at six California ports, as well as the hundreds of vessels that must be retrofitted to accept shore power.

ARB reduced the other three originally proposed compliance options to a single option called the "Equivalent Emissions Reduction Option." Furthermore, ARB aligned the requirements of this option more closely with the Reduced Onboard Power Option, thereby reducing any unintentional weighting of one option over the other, as some commenters had asserted with the original proposal. As with the Reduced Onboard Power Option, the regulation now has an interim 2017 target. Finally, to further balance the two options, the regulation provides an incentive with the Equivalent Emissions Reduction option for early or additional emissions reductions. Please see the response to Comments 86-98 for a description of this incentive program.

The Equivalent Emissions Reduction Option allows any technology to be used to reach the emission reduction targets, including shore power. This option is entirely technology neutral.

In response to Comments 28-44 regarding accelerating the compliance schedule for grid-based shore power, ARB maintains that 2014 is a reasonable initial target to allow all 31 affected terminals to design the shore power infrastructure, receive CEQA approval, build the infrastructure while the terminals are still fully active, and work with the local electrical utilities to provide sufficient power to the terminals.

More specific to Comments 39-42, ARB disagrees that the ARB's March 2006 draft report, *Evaluation of Cold Ironing Ocean Going Vessels at California Ports* (Evaluation Report), found that 20 percent of ship calls utilizing cold-ironing by 2010 is both technologically feasible and cost effective. The purpose of the draft Evaluation Report was to determine if cold-ironing was feasible at California ports and to determine which ocean-going ship categories were the most attractive candidates for using shore power as a means of reducing at-berth or hotelling emissions. The draft Evaluation Report concluded that cold-ironing is feasible at California ports (at the time the report was released, shore power was already being installed at the Ports of Los Angeles and Long Beach). It also concluded that the most attractive vessel candidates for shore power, based on cost-effectiveness analyses that were performed on each ship category, are passenger ships, container ships, and refrigerated cargo ships—ships that make frequent visits to a California port, spend a sufficient number of hours at berth, and have an ample power demand while hotelling. The draft report was intended as a prelude to ARB's development of this regulation and did not include recommended dates for cold-ironing ships in California. These dates were to be determined later as ARB developed this regulation.

The draft Evaluation Report did illustrate the potential emission benefits from cold-ironing ocean-going ships for 2010, 2015, and 2020, which are the target dates included in ARB's Goods Movement Emission Reduction Plan (GMERP, 2006). The GMERP identifies numerous strategies for reducing emissions from all significant emission sources involved in goods movement in California, including ocean-going vessels. For controlling hotelling emissions, the GMERP established a goal of utilizing shore power for 20 percent of the ship visits to California ports by 2010, 60 percent of visits by 2015, and 80 percent of visits by 2020. However, as mentioned earlier, ARB determined that it would be unrealistic to require all terminals to have grid-based shore power available by 2010 because of the lead time required to install the equipment. Consequently, ARB did not include a shore-power visit requirement for 2010 or 2012.

Regarding Comments 43 and 44, the Board approved the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (Diesel RRP) in 2000. The Diesel RRP presented information on the available options for reducing diesel PM and recommended regulations to achieve these reductions. The Diesel RRP's scope was broad, addressing all categories of mobile and stationary engines. It included control measures for all off-road diesel sources, such as those covered by this regulation. The goals of the Diesel RRP are to reduce California's diesel PM emissions and associated cancer risks by 75 percent by 2015, and 85 percent by 2020 from the 2000 levels. ARB maintains that the regulation adopted by the Board in December 2007 will help meet the goals of the Diesel RRP.

ARB agrees with Comments 45 and 46 that an accelerated shore-power schedule is infeasible.

In response to Comments 47-66, ARB believes that by reducing the compliance options from four to two and more closely aligning those options to each other, any perceived or unintentional preference within the regulation for one technology over any other has been eliminated, especially with additional incentives for early emission reductions in the Equivalent Emission Reduction option.

Although the two compliance options are now similar and balanced, ARB believes it is unrealistic to merge the two options into one, technology-neutral schedule, as requested by several of the commenters. ARB maintains that alternative technologies can be deployed earlier than 2014 since the considerable infrastructure requirements of grid-based shore power are not applicable (although shore power can be used for this compliance option); therefore, some earlier compliance targets are appropriate for the Equivalent Emissions Reduction option. Regarding the Equivalent Emissions Reduction option itself, it *is* technology neutral: any technology capable of meeting the emission reduction targets is allowable.

Comments 67-72 state that the regulation discourages alternative technologies because of the inequity of the originally proposed compliance schedules. ARB believes that it has addressed these concerns by modifying the compliance options into two, more similar paths, providing additional early-emission credits for the technology-neutral

Equivalent Emissions Reduction option. Furthermore, the 2010 and 2012 emission-reduction targets of 10 percent and 25 percent, respectively, are more modest than the originally proposed 20 percent and 40 percent. ARB recognizes that there are only a couple of shore-side alternative technologies that may be available by 2010 to reduce at-berth emissions: non grid-based shore power systems such as the Wittmar liquid natural gas engine system, and after-treatment systems such as the Advanced Maritime Emissions Control System being developed by Advanced Cleanup Technologies, Inc. Both of these technologies are at the "proof of concept" stage and will take some time to be fully demonstrated, commercialized, and deployed at the ports. Ship-side alternative controls such as Selective Catalytic Reduction (SCR) may also be available by 2010, but these too are at the demonstration stage. Therefore, ARB believes that the 2010 and 2012 emission-reduction targets in the regulation, although less stringent than those originally proposed, are more realistic and appropriate.

Comments 73-76 and 80 mention using available technologies as "bridge" technologies, achieving emission reductions early while grid-based shore power can be installed. When developing the regulation, ARB concluded that by requiring alternative technologies for shorter-term emission reductions while waiting for shore-power infrastructure to be installed for the long term essentially doubled the cost of the regulation.

For example, ARB estimated it would cost $125 million to install shore power infrastructure at the Ports of Long Beach and Los Angeles in order for terminals to satisfy their fleet's 2014 shore-power visits requirements. If these fleets were also required to comply with a 20 percent emission reduction by 2010 and 40 percent reduction by 2014, ARB estimates that the cost to comply with these reductions using distributed generation would be another $150 million, assuming $1,000 per operating hour.

Specific to Comment 76, the commenter did not provide the basis for the cost-per-TEU figures presented, so ARB cannot replicate those estimates. Nevertheless, ARB disagrees that the technologies recommended for deployment by 2010 are fully developed or commercially available. For example, grid power at all of the 31 affected terminals will not be in place by 2010; fuel cells capable of supplying adequate power to a vessel (for example, one megawatt to five megawatts for container ships) require many hours to start-up and shut down, and they have a large footprint, thereby making them poor candidates for shore power; and the portable generator mentioned is only in the "proof of concept" stage—this equipment could not be deployed by 2010 on the scale that the commenter has suggested.

For the reasons enumerated above, ARB believes that a more aggressive emissions reduction schedule, as suggested in Comments 77-79 is unrealistic. In response to Comment 78, ARB is requiring an 80 percent reduction by 2020, not 50 percent reduction.

Comments 80 and 81 suggest that alternative technologies are available for immediate deployment. ARB believes that these technologies are promising; however, the technologies to which the commenter referred are still in a "proof of concept" stage. These technologies have not been deployed to date, nor are they commercially available yet. A wide deployment by 2010 is unrealistic.

Comment 82 requests specific text changes to the regulation. The first two proposed revisions are based on the commenter's request to have grid-based shore power requirements beginning in 2010. Since there are no such requirements in the regulation, these revisions are unnecessary. ARB revised the regulation to address the third proposed revision: Whereas the commenter wanted biennial submissions of vessel plans starting on July 1, 2009, the regulation now requires submittal of these plans, including updates, by July 1 of 2009, 2011, 2013, 2016, and 2019.

H. Early Reductions and Extra Time

85. Comment: Shipping lines that achieve early emission reductions by any acceptable method should receive additional time in reaching the end goal of the regulation. (BAAQMD1)

Response: ARB disagrees. We feel that the most important goal of this regulation is to meet the 50 percent emission reductions by 2014 and ultimately the 80 percent emission reductions by 2020. The regulation to reduce emissions from hotelling vessels in California's ports will help meet several health-related goals of the Board, including reducing diesel PM, reducing emissions from goods-movement activities, achieving and maintaining ambient air quality standards, and reducing GHG emissions to help mitigate the effects of global warming.

Over the last several years alone, federal and State agencies have adopted plans to reduce emissions and associated health risks as quickly as possible in the Federal Clean Air Act, the Diesel Risk Reduction Plan, and the Emission Reduction Plan for the Ports and Goods Movement in California.

The federal Clean Air Act (CAA) requires the United States Environmental Protection Agency (U.S. EPA) to establish National Ambient Air Quality Standards (national standards) for pollutants considered harmful to public health, including fine particulate matter ($PM_{2.5}$) and ozone. Set to protect public health, the national standards are adopted based on a review of health studies by experts and a public process. The South Coast Air Basin (Air Basin), which is home to the two largest ports in California, the Ports of Los Angeles and Long Beach, exceeds the national standards for both ozone and $PM_{2.5}$. Consequently, a State Implementation Plan (SIP) is required for the Air Basin that outlines how and when the region will attain the national standards.

Although ARB originally considered a draft proposal with an early credit mechanism, it was ultimately decided that such an approach was not appropriate. The U.S. EPA requires the Air Basin to meet the $PM_{2.5}$ standards by 2015, but the emission reductions

must be in place by 2014. The emission reductions achieved by the regulation will play an essential role in assisting the South Coast Air Basin with meeting its 2014 $PM_{2.5}$ deadline as well as its future ozone deadlines.

SIP requirements are not the only timely commitments for reducing emissions as quickly as possible. In 2000, the Diesel Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel RRP) was developed by the ARB which presented information on the available options for reducing diesel PM and recommended regulations to achieve these reductions. The Diesel RRP's scope was broad, addressing all categories of mobile and stationary engines. It included control measures for all off-road diesel sources, such as those covered by the regulation. The ultimate goal of the Diesel RR is an 85 percent reduction from 2000 levels, in California's diesel PM emissions and associated cancer risks by 2020. The regulation will reduce diesel PM emissions and the local health impacts from ships docked in California's ports and will assist the Board with meeting the 2020 Diesel RRP goal.

In April 2006, the Board approved the *Emission Reduction Plan for the Ports and Goods Movement in California* (GMERP). The GMERP identifies strategies for reducing emissions created from the movement of goods through California ports and into other regions of the State. The GMERP is part of the broader Goods Movement Action Plan (GMAP) being jointly carried out by the California Environmental Protection Agency and the Business, Transportation, and Housing Agency.

The GMERP identifies numerous strategies for reducing emissions from all significant emission sources involved in goods movement, including ocean-going vessels, harbor craft, cargo handling equipment, locomotives, and trucks. Specific to hotelling emissions, the GMERP established a goal of utilizing shore power for 20 percent of the ship visits to California ports by 2010, 60 percent of visits by 2015, and 80 percent of visits by 2020. While the regulation would represent a significant move toward satisfying the GMERP goals by requiring specific vessel types to shut down their engines while docked, the final requirements of the regulation are consistent with the emission reduction goals in the GMERP.

ARB recognizes that incentives for early emission reductions are necessary and have included criteria for accumulating and using fleet emission credits in the final regulation under the equivalent emissions reduction option. Additionally, there are other government programs that can provide financial assistance as incentives for early reductions. See the response to Comments 86-98 for a discussion of early action credits and government funding. There are several incentive program options available to help California reach its goals for cleaner air.

I. Emission Credits and Incentives for Early Compliance

86. Comment: Incentives in the form of additional emissions credits for early adoption would provide a strong incentive for ocean carriers and marine

terminals to address the issue of at-berth vessel emissions, resulting in emissions reductions much sooner than the 2014 deadline currently included in the regulation for the first phase of implementation. Absent incentives, the regulated community will take a "wait and see" attitude because technology is evolving rapidly and the infrastructure for utility-based shore power does not exist in many places at the moment. An incentive for early adoption would drive the development of new technology and harness the power of the marketplace, which will ultimately result in more cost-effective technologies that would achieve the emission reductions goals now rather than later. (OMCC)

87. **Comment:** Early adoption incentives relieve much of the uncertainty that carriers now face with regard to election of emissions elimination/control technologies. With early adoption incentives, carriers and terminal operators can be certain that their investments will not become stranded. Early adoption incentives will result in cleaner air sooner, may have the positive effect of creating competition among carriers to gain recognition as environmental leaders, can assuage skeptical investors, corporate boards, and other financial institutions to support related investments, and will inspire new technological solutions beyond the current crop. (CAL1)

88. **Comment:** This regulation as written will not reduce a single ounce of harmful emissions until January 1st, 2014, at the earliest when mandated reductions go into effect. As written, the proposed regulation offers no incentives for early adopters to achieve compliance before being forced to. Incentives for early adoption of alternative control solutions are essential to encourage ocean carriers, vessel owners and terminal operators to use proven emissions preventative technologies that are available now. (LAPEER)

89. **Comment:** Early emission reductions are the most important emission reductions. Supports the inclusion of firm financial incentives in the regulatory language to encourage shipping lines into action now, rather than waiting for a state mandate to go into effect in six years. ARB should work with the ports to determine any additional incentives that can be provided to shipping lines that adopt early compliance of the regulation before the first 2010 compliance deadline. (BCLAC1, ENVORG1)

90. **Comment:** Incentives for early action have the real potential to spur innovative control strategies to cut hotelling emissions which are the largest single source of emissions at the Port of Oakland. While Wittmar Technologies has pioneered an innovative control strategy, incentives for early action can both advance this technology and spur the development of other new approaches. (BAAQMD2)

91. **Comment:** The draft regulation lacks the incentives for early adoption that were included in earlier drafts of the regulation. (POAKLAND1)

92. **Comment:** Incentives for early adoption, once considered, now redacted from the latest version need to be replaced. (CAL1)

93. **Comment:** An earlier draft of the regulation recognized the benefits of a regulatory incentive to achieve early reductions and we strongly request that the concept be added back into the final version presented to the ARB Board. Without incentives for early compliance, we believe very little actual reductions will occur before 2014, at least in our region. (BAAQMD1)

94. **Comment:** The current version of the regulation should be rewritten to include such incentives, as the July 12th version did. (ENVORG1)

95. **Comment:** The regulation should include a financial incentive to lure shipping lines into action now, rather than waiting for a state mandate to go into effect in six years. (BCLAC1, ENVORG1)

96. **Comment:** Early action incentives should be provided for all compliance options. (WOEIP)

97. **Comment:** Establish emission credit bank for early compliance. (AZA)

98. **Comment:** We support staff's proposed modifications for creating incentives for early reductions. (POAKLAND2)

Response: ARB concurs that incentives will help bring earlier emission reductions and will encourage the development of new alternative control technology. To that end, ARB recommended at the Board hearing that the regulation be modified to provide early compliance incentives for the Equivalent Emissions Reduction option. This incentive provides a third method of encouraging early emission reductions—Proposition 1B funds and the Carl Moyer program being the other two. Funds from these sources are available for either compliance option.

The Equivalent Emissions Reduction option requires vessel fleets to reduce their emissions by 10 percent in 2010, 25 percent in 2012, 50 percent in 2014, 70 percent in 2017, and 80 percent in 2020. This compliance option is entirely technology-neutral—emissions reductions can be achieved using a variety of techniques. The regulation encourages early reductions for this compliance option in the following manner: NOx and PM emission reductions achieved prior to 2010 or in excess of the 2010 and 2012 requirements may be credited to the vessel fleet for later use if a shortfall of emission reductions is experienced. In other words, if a fleet fails to meet its emission reduction target for a specified period, it can withdraw any credits it may have earned for early or excess emission reductions to make up for the shortfall. A fleet can use its emission credits toward compliance with its 2010, 2012, and 2017 emission reduction requirements. (The 2014 and 2020 requirements must be met; no credits may be used.) ARB believes the fleet emission credits will allow the advancement of new

control technologies by encouraging shipping companies to invest in them in the early stages of implementation.

The Carl Moyer Program and Proposition 1B funding are two sources of financial incentives for achieving early emission reductions under the grid-based shore power option. Under the Goods Movement Emission Reduction Program, Proposition 1B authorizes the Legislature to appropriate $1 billion in bond funding to the Board to incent the early reduction of air pollutants and associated health risk from freight movement along California's priority trade corridors. In February 2008, the Board established a funding target of $100 million for shore-power and cargo-handling projects. Berths that accommodate cargo shipping and will be retrofitted for grid-based shore power are eligible for Prop 1B funding. In order to be eligible for funding, grid-based shore power must be installed and in operation at least two years prior to a regulatory requirement for that technology or level of emissions control. Passenger-ship terminals are not eligible to receive funding under this program, since they are not involved in goods movement; however, Carl Moyer Program funds are available.

The Carl Moyer Program is implemented through the cooperative efforts of ARB and the local air districts. Shore power projects at terminals or on vessels subject to the regulation must be complete and operational no later than January 1, 2011, in order to achieve three years of surplus emission reductions and be eligible for Carl Moyer funding.

The three sources of incentives (Carl Moyer funding, Proposition IB funding, and the fleet emission credits) are mutually exclusive—that is, applicants may choose only one of the options.

99. **Comment:** Whatever the ultimate regulatory compliance deadline, there ought to be incentives for early action for proven technologies that can reduce hotelling emissions by 90 percent or more. (WOEIP)

Response: ARB has added provisions for establishing and using fleet emission credits for early or excess reductions, as discussed above. Although ARB does not believe that there are alternative control technologies available now that can reduce hotelling emissions by 90 percent, the deployment of such technologies would be eligible if early or excess emission reductions are realized.

100. **Comment:** Here is an alternative (to staff's July 12, 2007 draft) that we think is preferable. Within a given fleet, all visits where auxiliary engines are not used in 2008 receive a credit of 1.5 visits against regulatory requirements in a future year (for example, 2016). Visits in 2009 that are cleaned up (regardless of whether the grid or other options are used) are worth 1.25 visits against the future year requirements. If the regulation has no mandatory requirements for 2010, then visits in 2010 that are cleaned up receive a credit of one visit against the future year. If there is no mandatory requirement for 2011, then visits in 2011 that are cleaned up receive a credit of 0.9 visits against the future year. Credits end whenever the regulatory requirements start.

Because of the complimentary auxiliary engine fuel rule, and the drop in hotelling emissions starting in 2010, the above approach gets more total reductions than a no-incentive approach. We do not believe the record keeping for incentives will be too administratively difficult. While we believe that the example provides significant incentive for shipping lines to act early, we urge you to get the perspective of the shipping lines, and all parties with an interest in the regulation. (BAAQMD2)

Response: As discussed in the response to Comment 85, ARB initially proposed a similar incentive approach early in the rule development stage, but ultimately decided that such an approach was not appropriate. The emission reductions achieved by the regulation will play an essential role in assisting the South Coast Air Basin with meeting its 2014 $PM_{2.5}$ deadline as well as its future ozone deadlines. Instead of deferring emission reductions beyond 2014 or 2020, ARB developed an incentive program based on fleet emission credits, as described in the previous comments.

101. Comment: It is particularly disappointing that no early action incentives are included considering that development of compliance strategies for AB 32 has embraced shore side power as an early action measure. One viable option is to commit an allocation of carbon credits such as a fixed price discount relative to auction prices to those who install shore power early. (WOEIP)

Response: The Board identified this regulation as a discrete early action measure for reducing greenhouse gas (GHG) emissions, as required under AB32. Although the regulation is primarily aimed at reducing NOx and PM emissions, using grid-based shore power instead of operating diesel-fueled auxiliary engines while at berth will result in a co-benefit of CO_2 emission reductions. The incentives discussed earlier will help accelerate the reductions in all hotelling emissions, including GHGs. Regarding carbon credits, ARB staff is currently proposing for Board adoption a Scoping Plan that includes a cap-and-trade-program. If the Board adopts a Plan that includes a market-based system, ARB staff will begin developing the details of that program through a separate rulemaking process.

J. Shore-Power-Equipped Ships

102. Comment: Some of the terminals have gone ahead and provided for shore power. Because of their proactive stance, will all vessels now calling at those terminals be required to plug in? I don't think you want to penalize early compliance behavior. I believe that the intent was actually to provide a mechanism to develop credits. (PMSA2)

Response: ARB recognizes that some terminals are already providing shore power or will be installing it in the near future in response to a number of efforts already underway at the ports. One of these efforts is the San Pedro Ports Clean Air Action Plan, which includes a shore power measure for the Ports of Long Beach and Los Angeles. The

measure's goal is to have, by fiscal year 2010/2011, at least one berth with shore power capability at each of the container- and passenger-ship terminals at the two ports. With this infrastructure in place, the plan estimates that about 1,000 ship visits will use shore power in fiscal year 2010/2011. Terminals are also installing shore power as a condition for expanding operations or renewing leases. ARB expects these conditions to include requirements for shore-power visits, such as shore power being used for at least some minimum number of ship visits to a terminal per year.

Regarding the perception that the regulation would penalize these early applications of shore power, the commenter is referring to provisions in subsection (d)(1)(I). This subsection requires an individual ship that is equipped with shore power capability to use shore power whenever it visits a berth equipped to provide compatible shore power, regardless of the fleet's compliance requirements in (d)(1), the Reduced Onboard Power compliance option. This requirement would apply only if both the berth can provide and the ship can receive the shore power. ARB included this provision because of the immediate emission reduction benefits that can be realized from ships connecting to grid-based shore power.

While it is true that no early incentives are available for fleets choosing the Reduced Onboard Power option—where the "if you have it, you must use it" shore-power requirement is—early shore-power visits can be a mechanism to develop credits under the regulation's Equivalent Emissions Reduction option. Under this option, fleets can generate credits in the early stages of implementation that will allow them more flexibility with meeting the later emission reduction requirements. Specifically, fleet emission credits can be accumulated for emission reductions achieved before or in excess of those required by the 2010 requirements and in excess of those required by the 2012 requirements. A fleet can use its emission credits toward compliance with its 2010, 2012, and 2017 emission reduction requirements. Fleets choosing this option may decide to use shore-power visits as an early-reduction mechanism to generate credits, if one or more of their ships are capable of receiving shore power and visit a berth with compatible power.

K. Early Action Credits and Public Funds

103. Comment: Early reductions paid for with public funds should not get a double benefit of early action credits plus public funds. (WOEIP)

Response: ARB agrees that recipients of public funds, such as those available through Proposition 1B or the Carl Moyer Program, should not also receive the early action credits provided in the Equivalent Emissions Reduction option. ARB modified the regulation to prohibit such a possibility. Specifically, the modified language states that emission reductions that are a result of a project that has received incentive funds through a contract or other binding agreement from the ARB or a local air district are not eligible emission reductions for fleet emission credits.

L. Standardization of Shore Power

104. Comment: The assumption of the regulation seems to be that a commonly accepted international standard already exists and provides uniform specification for vessels to retrofit that will enable them to access shore power infrastructure at all California ports. No international standard or uniform specification exists for vessels to retrofit that will enable them to access shore power. All installations to date have been done on a case-by-case basis with little to no consideration of the ability to use the vessel retrofits at other ports. (PMSA1)

Response: ARB agrees that there is not yet an international standard for shore power. However, the lack of an international standard for shore power does not affect the use of shore power at California ports. The Ports of Los Angeles and Long Beach have developed standards for the implementation of shore power at their ports, including identifying service voltage, design load, and specifying design requirements for shore power receptacles. To date, one terminal has installed shore power equipment conforming to this standard and an additional three terminals will be so equipped by the end of 2008. By fiscal year 2010/2011, pursuant to the San Pedro Bay Ports Clean Air Action Plan (CAAP), the two ports will have 25 berths that are shore-power ready that will satisfy these design standards. Additionally, as of mid-2008, eight new container ships have been built with shore power capability that is compatible with standards of the Ports of Los Angeles and Long Beach, and 17 existing container and passenger vessels have been retrofitted to use shore power compatible with these standards.

Recognizing the importance of standardizing shore power connection at ports throughout the world, the International Organization of Standardization (ISO) formed a working group under its Technical Committee 8 (Ships and Marine Technology) to develop a standardized shore-to-ship power system. The Port of Los Angeles is a member of this working group. The objective is to establish Publicly Available Specifications (PAS), which will allow ports and carriers world-wide to refer to an official document that provides shore-to-ship power specifications.

105. Comment: Request that ARB work with foreign and domestic ports, terminals, and shippers to help create IMO/ISO standardization for shore power connectors, voltages, and related cable management systems. This will help ensure that terminals and vessels will standardize power systems in the Pacific Rim ports and beyond. (POLA)

Response: ARB agrees and is willing to assist port staff in creating IMO/ISO standards for shore power.

M. Building Grid Infrastructure

106. Comment: It is unclear who is responsible for supplying the dock infrastructure. The terminal operator is required to complete a plan, but the regulation does not

identify who will be financially or physically responsible for installing and maintaining the shore power infrastructure. (CLIA)

Response: The regulation requires the vessel fleets to reduce their auxiliary-engine emissions while docked. Unless the emissions reductions can be achieved solely through onboard technologies, these fleets cannot meet these goals without shore-power infrastructure or shore-based equipment being added to the terminals that these fleets visit. The regulation does not identify which entities are responsible for the installation of this shore-based equipment. ARB considered putting such specific requirements into the regulation, but the affected ports differ from one another in that some are landlord ports—that is, the ports lease the terminals to terminal operators through contractual agreements—while other ports are the terminal operators themselves. Ultimately, ARB decided that the regulation should not mandate the responsibility for installing shore-side equipment and that the goals of this regulation will only be satisfied if the affected entities cooperate with each other. For example, the timely installation of shore-power infrastructure depends upon the cooperation between the local utility, the port, the terminal, and the ship fleet operator. ARB believes that there is a strong, business-related incentive for these partners to accommodate the needs of the vessel fleets that call on California ports. The regulation allows the affected parties to work cooperatively to achieve the goals of the regulation.

107. Comment: Transformers and any frequency converters must be ashore as these are large pieces of equipment that could not reasonable be placed onboard a passenger ship. The need for on-dock shore power equipment for passenger ships should be specifically recognized in the regulations. (CLIA)

Response: ARB disagrees that the regulation should explicitly recognize the need for on-dock shore power equipment for passenger ships. The regulation is not technologically prescriptive. The details for the necessary infrastructure improvements and ship modifications to implement shore power are left to the cruise lines and the terminals at which the vessels call. ARB notes that for the purposes of estimating the cost effectiveness of the regulation on passenger ships, ARB included the cost of a shore-side transformer at the passenger terminals. Finally, Carl Moyer funds are available for the installation of these shore-side transformers at passenger terminals. The Ports of San Francisco and San Diego have been awarded such funds.

N. Cost of Grid-based Shore Power

108. Comment: By favoring one particular technological solution over another, this rule will impose a severe financial hardship on the Port without providing a substantial incremental benefit in the air quality situation in our neighboring communities. (POAKLAND1)

Response: ARB disagrees that one particular technical solution is favored over the other. The regulation provides flexibility in achieving its emission reduction goals. Please see the discussion of the options in response to Comments 28-84.

109. Comment: We have been made aware that the Port of Oakland and other container ports in California have consistently raised concerns about the high cost of utility-based shore power for ports that either lack sufficient electrical infrastructure or in some cases power supply to support the additional electrical demand created by shore power loads. The new demand created by utility-based shore power may fall during times of peak electrical load which would stress that system at the Port of Oakland and in the larger service area. We are concerned the cost may cause terminal operators and shipping lines to consolidate their operations elsewhere thereby weakening the Port's competitive position. (OMCC)

Response: ARB is aware that, if the terminal operators at the Port of Oakland—working with the carriers who visit those terminals—choose shore-based grid power to meet the requirements of the regulation, additional electrical infrastructure will be needed in and around the port. This is also true of the Ports of Long Beach and San Diego.

The regulation does not require shore power; other alternative technologies to reduce emissions from vessels that are docked at the berths are allowed. Nevertheless, since many vessels visiting the Port of Oakland will be shore-power capable (because they will be using shore power at the Ports of Long Beach or Los Angeles), ARB determined that shore power is a cost-effective approach to compliance at the Port of Oakland, as elucidated in Chapter X of the TSD.

110. Comment: The electrical infrastructure to support the traditional method of cold ironing at the Port of Oakland simply does not exist with the electrical system already operating at or near capacity during peak demand times. The cost of creating the additional substations and conveyance for the power needed to support cold-ironing in Oakland would exceed $90 million. (POAKLAND1, OMCC)

111. Comment: We have serious concerns over any rule that would mandate a power-grid-only shore power requirement. Grid shore power in Oakland is estimated to cost $90 million and, comparing it to the annual maritime revenues of approximately $120 million, would create severe hardship. Also, the Port is currently in debt $1.5 million due to previous improvements to terminals. It will be difficult to recover these costs through tariffs in lease agreements, as our position as a discretionary port of call requires us to provide the most cost-effective services to continue to deliver economic benefits to local, regional, and state economies. (POAKLAND2)

Response: Please also see response to the previous comment. Although the regulation does not mandate grid-based shore power, ARB is aware that compliance with the regulation will require extensive capital investment. Nevertheless, the health benefits derived from reducing the exposure to the nearby communities from the

emissions from vessels docked at ports are substantial, making the regulation both cost-effective and health-protective. ARB believes that the $90 million estimated cost to support cold-ironing at the Port of Oakland is a reasonable estimate and is consistent with the $80 million estimate in Chapter X of the TSD. PG&E stated that they have sufficient electrical capacity to provide power to the Port for shore power, but the infrastructure to deliver the power must be constructed. ARB illustrated in the TSD that shore power is cost effective at the Port of Oakland when shore-power capable vessels make calls at the Port. In addition, funding is available through the Proposition 1B Program to help reduce the costs for compliance.

112. Comment: The infrastructure contemplated is enormously expensive with most recent estimates exceeding $1.8 billion. There are no funds to build it and no public appetite for public funding of projects of this magnitude. Grid solution will require expensive retrofits on ships that will be incompatible with other technologies worldwide driving businesses away from CA ports. (CAL1)

Response: ARB disagrees that the regulation will cause vessels to discontinue calling on California ports because of the expense of compliance. ARB estimated in Chapter X of the TSD that the $1.8 billion compliance cost would represent $25 - $40 per container for the container-ship carriers (less than five percent of the typical value of the goods in the containers) and would add 15 percent to the cost of a typical cruise. Shore power is already required for many passenger-ship visits in Alaska and Seattle, and the Ports of Los Angeles and Long Beach have committed to using shore power extensively to reduce emissions from docked vessels, as stated in their Clean Air Action Plan.

O. Availability of Grid Power

113. Comment: There is ample power available for shore power, and there are 12 power plants currently being planned that were initially approved by the AQMD this summer and several solar power plants being approved in the Inland Empire. (IBEW)

Response: ARB agrees that there is ample power available to meet the requirements of the regulation, even if grid-based shore power is selected as the compliance path by all of the affected vessel fleets.

ARB determined that the estimated potential peak load of 205 megawatts and the potential annual electrical use of 643 Gigawatt-hours for shore power by 2020 will represent less than one-quarter of one percent of the State's overall annual power consumption, based on the projected power consumption information in the most recent Integrated Energy Policy Report from the California Energy Commission. Furthermore, the four electrical utilities affected by the regulation—Pacific Gas and Electric (PG&E), Los Angeles Department of Water and Power (LADWP), Southern California Edison (SCE), and San Diego Gas & Electric (SDGE)—confirmed with ARB that they all had adequate electricity supplies for shore power.

114. **Comment:** Grid-power is at or near capacity right now and no new generation is planned to offset this new demand. Early implementations will require additional peak power to be brought on-line to supply the demand and this power is dirty power. Infrastructure to provide power to berth will take years to install and will be delayed due to litigation. (CAL1)

115. **Comment:** The presumptive solution of port electrification is flawed. Costs are staggering (estimated to be $1.2 billion statewide) and electrifying a port means years of construction to install infrastructure to receive electrical power that is not available. There are no plans or budgets to build new generation capacity to supply this power. (LAPEER)

Response: ARB disagrees. As mentioned above, the four affected electrical utilities have all indicated that they have sufficient electricity supply to meet the requirements of the regulation, even assuming that all of the vessel fleets choose grid-based shore power as their compliance path.

ARB understands that additional electrical infrastructure, including transmission lines, will have to be constructed to bring the electricity to the terminals at some of the ports. The electrical utilities have been working with the ports to provide the necessary electrical infrastructure in a timely fashion to meet the requirements of the regulation. SCE and LADWP have publicly guaranteed sufficient power to the Ports of Long Beach and Los Angeles, respectively.

116. **Comment:** The grid is not the gold standard and existing technologies are available that are as clean and in many cases cleaner than the grid. It is impossible to know what the grid emissions footprint is as it varies by time of year, day, and load pocket. (CAL1)

Response: ARB concurs that emissions related to electricity generation varies temporally and geographically, and as a practical matter, cannot be estimated in real time. Nevertheless, if the electricity supplied to the ports is considered “marginal electricity,” that is the power is assumed to be added to the grid at the time of the demand, some simplifying assumptions can be made.

According to the four electrical utilities providing power to the ports, the source of marginal electricity is typically combined-cycle gas turbines (CCGTs). Electricity from coal-fired plants, hydroelectric dams, solar and wind sources, and nuclear plants are all part of the baseload electrical demand, as is a significant amount of natural-gas-fired electricity. Additional electrical demand—the “marginal” demand—is typically from more natural-gas-fired equipment: CCGTs. This CCGT assumption is shared by the California Energy Commission (CEC), the California Public Utilities Commission (CPUC), and the AB 32 Climate Action Team Economics Subgroup, as discussed in Chapter IX of the TSD.

Even considering this consensus position on the sources of marginal electricity generation, ARB offered a range of potential GHG emission reductions in the TSD. In any case, the grid-based electricity emits less GHG emissions per unit of power than the auxiliary engines on the vessels. ARB believes that an alternative source of electrical power, such as distributed generation, should be GHG-equivalent to the grid. Finally, ARB recognizes that the grid will be getting cleaner over time as AB 32 requirements take effect on the electricity sector.

P. Provision to Address Shore Power Not Available at Port by 2014

117. **Comment:** Include a provision in the regulation to delay implementation for each port that is not equipped to provide shore power. As written, industry would have to use shore power beginning in 2014, even if it is unavailable at a port of call. (CLIA)

Response: The four electrical utilities serving the four ports at which passenger ships call (San Francisco, Los Angeles, Long Beach, and San Diego) have stated that they will be able to provide sufficient power to the ports for compliance with the regulation. ARB understands that adequate time is necessary to design, approve, and construct the electrical infrastructure required to accommodate the vessels calling on California's ports, which is why ARB chose 2014 as the first performance standard for those choosing to use grid-based shore power. Many commenters wanted an earlier compliance date, but ARB believes that the 2014 date in the regulation is reasonable for all 31 affected terminals to have shore power installed if they chose that compliance path.

Q. Adjustments for Grid-Power Interruption

118. **Comment:** There should be a variance or some exemption if the grid is actually interrupted or not able to provide the power. If there is interruption by something outside of the ship or terminal operators' control, they should be given a pass. (DW)

119. **Comment:** There are parallel efforts going with greenhouse gas, with CARB and the PUC, which deals with the electric market, not only how we can collectively reduce greenhouse gas emissions, but how we can improve reliability of the grid. ARB should consider, on occasion when there is a grid emergency or stage one or two alerts where it was facing rolling blackouts, that suppliers of grid power are allowed to interrupt that supply and allow the ships to power up for a brief few hours; maybe a few hours per year. That would help improve resource adequacy as well as part of the utilities response measure. That's something to consider down the road as something that the California ISO would very much welcome. (DW)

120. Comment: If the utility cannot provide power to the ship through no fault of the ship's operator, it should not be penalized for the failure by the power utility. That should not be counted in the overall compliance. (PMSA2)

Response: ARB agrees that there should be adjustments to a fleet's compliance requirements when there is interruption to grid power during a ship's visit. At the Board hearing, the Board directed staff to modify the regulation to ensure a fleet is not penalized when a ship is unable to shut down auxiliary engines and connect to grid-based shore power when at berth because of an emergency event beyond the vessel's control. Staff addressed the Board's concern by making several changes to the regulation.

The definition of emergency event has been modified to include a more comprehensive list of events where the utility may be unable to provide power to the port. These events now include the period of time when the utility cannot provide power because of a transmission or distribution emergency, must reduce grid-based shore power to the port because of a natural disaster such as an earthquake or fire, or must reduce grid-based power to the port in response to the California Independent System Operator or the Los Angeles Department of Water and Power declaring a Stage 3 emergency or to avoid a Stage 3 emergency if one is anticipated.

In addition, the regulation includes provisions in the Reduced Onboard Power and Equivalent Emissions Reduction compliance options to allow for adjustments to a fleet's compliance requirements for visits meeting the definition of emergency event.

Fleets choosing the Reduced Onboard Power option must shut down the onboard auxiliary engines during a certain percentage of their vessels' visits to a port and supply the power to the vessels by some other means, most likely grid-based shore power. Furthermore, the fleets must also reduce their onboard electrical generation by the same percentage. For example, by 2014, vessel fleets choosing the Reduced Onboard Power option must shut down their auxiliary engines for 50 percent of their visits and reduce their fleet's onboard electrical power generation by 50 percent. The regulation now specifically allows visits experiencing an emergency event to be counted as a shore-power visit. Furthermore, the onboard electrical generation that would have been reduced during the visit is removed from the fleet's baseline generation. In other words, the visit counts as a shore-power visit for the fleet, but the required reduction of onboard electrical generation is forgiven for emergency events.

Fleets choosing the Equivalent Emissions Reduction compliance option must reduce the at-berth auxiliary engine emissions from their vessels' visits to a port by certain percentages. The fleets may choose grid-based shore power, non-grid-based shore power (distributed generation), or other ship-side or shore-side control techniques to reduce at-berth emissions. This option also includes a calculation formula a fleet must use to demonstrate compliance with the emission reduction requirements. The formula requires fleets to determine their vessels' at-berth emissions at the port before and after application of the alternative control technique(s). Comparison of the two cases defines

the percent emissions reduction achieved for the applicable compliance period. ARB modified the regulation to now allow the auxiliary engine emissions from visits experiencing an emergency event to be excluded from both the fleet's baseline and post-baseline emission reduction calculations, similar to the provision in the Reduced Onboard Power option.

R. 3 - 5 Hour Limit on Operating Auxiliary Engines

121. **Comment:** As the regulation is currently written, ships are given three to five hours within docking to power down their auxiliary engines. While some flexibility is needed in allowing the ships to safely connect, ARB can encourage operators to hook up as soon as safely possible in order to protect public health. Require ships to power down auxiliary engines as soon as safely practicable instead of allowing a blanket 3-5 hours that is likely only rarely necessary. (ENVORG3)

122. **Comment:** Allowing for three hours before switching to shore power seems unreasonable and unjustified. Instead, ships should be required to plug in to shore power as quickly as practicable. (WOEIP)

Response: ARB disagrees. ARB believes the three- and five-hour limits to connect and disconnect a ship from shore are reasonable. The Reduced Onboard Generation option of the regulation allows three hours of auxiliary engine operating time for ships that use synchronous power transfer systems and five hours of auxiliary engine operating time for ships that do not use synchronous power transfer systems.

For the typical ship visit, after the ship is tied to the berth, the ship and the ship's crew are subject to inspection by the Department of Homeland Security. Until the ship is cleared by the department, the port's labor cannot board the ship and the ship's crew cannot leave the ship. Any shore power equipment cannot be brought on board the ship or equipment on the ship cannot be accessed until the ship is given clearance by the Department of Homeland Security. The inspection typically takes an hour, and the ship's auxiliary engines are operating during this time. After the ship receives clearance, the necessary connection between the shore and the ship can be completed. Once connected, the ship's power source can then be switched from ship-based power to grid-based power. The auxiliary engines are shut down for the rest of the ship's visit until the ship is nearly ready to leave port. The movement of equipment, connecting of cables, and power transfer is expected to take about an hour. Before the ship leaves the berth, the reverse procedure will take place: auxiliary engines are turned back on, the ship switches back to ship-based power, and the cables are disconnected and, if necessary, returned to the shore. This, too, is expected to take an hour for vessels using synchronous power transfer systems. Therefore, for these ships, the auxiliary engines are likely to operate the first two hours of the ship's visit and the last hour of the ship's visit.

A ship that does not use synchronous power transfer systems will experience a total loss of power. Very few ships will be using non-synchronous power transfer systems;

consequently, nearly all the ships using shore power will be limited to three hours of operating time for a visit to a California port. In the case of power transfers that do not use synchronous power transfer systems, the regulation allows five hours because the resulting loss of power during the power transfer process disables the ship's navigation system. Three hours is needed at the end of the ship's visit to restore the navigation system.

For vessel fleets that choose to use grid-based shore power to comply with the Equivalent Emissions Reduction option, they have a built-in incentive to connect to shore power as quickly as practicable. This option requires auxiliary engine emissions to be reduced by specific amounts (e.g., 10 percent, 25 percent, 50 percent, etc.). To maximize emission reductions while in port, the vessels will want to be plugged in for as long as possible. As long as the auxiliary engines are operating, no emission reductions are taking place.

S. Other Alternative Technologies

123. **Comment:** Other technologies should also be considered as a means to achieve shorter term reductions to complement the use of shore power such as the" Bonnet" technology being tested in Long Beach that captures smokestack exhaust at the dock and cleans it with onshore SCR technology. (ENVORG 2)

124. **Comment:** We are not against cold-ironing, but it is a shore-based technology that does not travel with the vessel. As a global carrier, we want a solution that stays with the vessel. We have put an SCR unit on a vessel. We have waste heat recovery on a ship that captures the heat out of the smoke stack and puts it back into energy to drive the vessel. We are currently working on an electronic scrubbing device but need time to get this technology up and running. There is a timing issue on how fast we can clean up the environment. (MAERSK)

125. **Comment:** We support the use of shore power and other proven technologies as a supplement to shore power. (IBEW)

Response: The Equivalent Emissions Reduction option of the regulation allows the use of alternative technologies, whether shore-side or ship-based. Please see response to Comments 28-84 for a more detailed discussion of this compliance option.

T. Distributed Generation

126. **Comment:** There are conflicting definitions of portable power generation equipment under the Portable Equipment Registration Program (PERP) versus the regulation. The regulation inappropriately treats equipment that is properly registered under the PERP program as distributed generation (meaning stationary). The CARB staff arbitrarily imposes a new definition by requiring physical movement between air districts as an absolute pre-condition for the designation as "portable." (CAL1)

127. Comment: We do not agree that the Wittmar System generator is distributed generation. The generator is registered in and in full compliance with CARB's PERP program. If classified as distributed generation, the generator is subject to unreasonable emission levels for a mobile application and has a negative effect on its mobility. Classify the system as PERP equipment. (PGE1)

Response: Under the Equivalent Emissions Reduction option, fleets can use non-grid-based shore power equipment, such as a shore-side generator, to meet emission reduction requirements. For purposes of this regulation, it is irrelevant whether this non-grid-based shore power equipment is classified as portable equipment or distributed generation (the regulation refers to this technology as "distributed generation"). Shore power generated from a source other than the grid must meet emission standards specified in the regulation.

128. Comment: ARB should specifically consider the successful demonstration project at the Port of Oakland where a shore-side generator operating on natural gas was used to supply on-board electricity as a viable alternative. This technology should be built into the regulation as an option if proven to achieve significant verified emissions reductions. We were a strong supporter of the pilot project and the public funding from the Bay Area Air Quality Management District that was invested to complete the proof of concept. (FOE1)

129. Comment: Senator Perata supports the use of mobile, distributed generation technologies to provide shore-side power to ocean-going vessels at the Port of Oakland. The benefit of this strategy is its potential to be deployed quickly, achieving important emission reductions sooner than could be achieved if the Port and its tenants simply wait for grid power to be available to shippers calling at the port. (PERATA)

130. Comment: The Port of Oakland successfully demonstrated a shore-side generator that will be operated on natural gas in a pilot project to demonstrate its feasibility and environmental impacts. This technology should be considered as an option if proven to achieve significant verified emission reductions particularly as an interim solution until electric infrastructure is widely available at ports and terminals. (ENVORG2)

131. Comment: We support proven and viable pathways to immediate emission reductions through the use of alternative technologies such as low-emission dockside generators which have shown to deliver comparable and immediate emissions reductions benefits to grid-based power. (BCLAC1, ENVORG1)

132. Comment: All viable and proven technologies that reduce dockside emissions need to be considered and encouraged in the regulation in order to achieve immediate reductions. (FOE1)

133. Comment: ARB should help monitor the air emissions benefits of alternative shore-side power technologies as means to achieve more immediate emissions reductions and complement the use of shore power. (ENVORG2)

Response: The regulation allows the use of all emission reduction strategies, including the shore-side generator that was demonstrated at the Port of Oakland. At this time, however, the shore-side generator and other potential alternative technologies are still at the "proof of concept" stage of development. For example, the Port of Oakland demonstration proved that a shore-side generator can be used to supply power to a ship through the ship's bow-thruster system. However, to be used on a commercial basis, there are a number of technical issues that need to be resolved, including: limited space availability at the dock, the ability of the shore-side generator to provide all the necessary onboard power requirements (so that the ship's auxiliary engines can be shut down completely), and the need to retrofit ships to use the power provided by the shore-side generator on a more routine basis.

In addition, as discussed in responses to Comments 28-84, the use of shore-side generators as an interim solution adds significant costs to reducing at-berth emissions. These added costs would likely delay the implementation of grid-based shore power by diverting both technical resources and capital.

134. Comment: PG&E has been an important part of the effort to use liquefied natural gas for mobile shore-side power generators developed by Wittmar Cold Ironing and we believe this system offers many benefits to the Port of Oakland and West Oakland community. A demonstration completed on July 18th of this year, on the 800-foot container ship *APL China* reduced NOx emissions by 89 percent, PM10 by 99 percent, SOx by 100 percent, and CO_2 by 50 percent. The Port of Oakland has made it clear that they cannot afford to pay for grid extensions, estimated at $90 million, and prefer the Wittmar system. Under the right conditions, the Port could cold-iron every ship call with the Wittmar system by 2010. (PGE1)

135. Comment: The cold ironing demonstration at the APL terminal showed the following reductions can be achieved tomorrow: NOx - 98 percent, CO - 57 percent, PM10 - 100 percent, SOx - 100 percent, and CO_2 - 42 percent. (WOEIP)

136. Comment: Sound Energy Solutions is a proponent for LNG-fueled on-dock power generation as a technology that is available today and has emission rates that are comparable to grid-based power. (SES)

137. Comment: The demonstration of the distributed power generation system technology in Oakland has shown that this technology delivers comparable emission reductions benefits to those derived from grid power at a substantially lower cost. These types of alternatives would be highly preferable to installing a grid-based power system at the port. (POAKLAND1)

Response: ARB agrees that there are air quality benefits that can result from replacing the power provided by the ship's auxiliary engines with power from a clean shore-side generator. However, the estimates provided by the commenters represent the case where the ship's auxiliary engines are shut down and the power provided by the shore-side generator provides all the necessary power needed by the ship. The overall benefits are significantly reduced when the emissions from the auxiliary engines are taken into account while the shore-side generator is being connected and disconnected from the ship—activities that usually take a total of three hours—and if the auxiliary engines must continue to operate, even at reduced load, because the shore-side generator is unable to provide all the necessary power for the vessel.

The impact of the three-hour connection and disconnection time can reduce the emissions benefit provided by using shore-side generators by six to fifteen percent. Furthermore, the shore-side generator used in the demonstration was rated at 800 kilowatts (kW). Although ARB understands that the commercial unit may be able to provide more power, the power demand for a typical container ship is one megawatt (MW) and can be as high as 5 MW if the ship is carrying refrigerated containers. In this case, the generator would only be able to offset 20 percent of the electrical power needed by the ship, achieving only 20 percent air quality benefit.

ARB believes that it is premature to consider using shore-side generators to provide electricity for all ships visiting a port. As discussed above, the use of a shore-side generator to replace a portion of a ship's electrical power demand has reached the proof of concept stage. There are a number of issues that need to be resolved and additional demonstrations before the technology would be considered commercially ready. Once the technology is considered commercially ready, then it is appropriate to consider more wide-scale deployment of the technology.

Finally, ARB disagrees that the emissions benefits from using shore-side generators are comparable to the emission benefits resulting from grid based shore power. See discussion below.

U. Emission Standards for Distributed Generation

138. Comment: Current language effectively penalizes available alternative technologies by placing onerous exhaust control limits on these technologies in later years. The control mechanisms to achieve these levels do not yet exist. This creates an uneven playing field by placing artificial burden on one category of solutions without corresponding down-year requirements for grid power. This guarantees retarding any advancement in alternative technologies including renewable energy sources. (CAL1)

139. Comment: For the South Coast Air Basin, alternative technologies proposed to achieve the emission reduction target should be best available control technology (BACT). Although the District supports alternatives, they believe that these

sources must meet a maximum allowable NOx limit that is more in line with the grid power NOx limits and consistent with local stationary source regulations for internal combustion engines or boilers. Specifically, revise (d)(2)(E) to require NOx emissions for non-grid-based shore power equipment to be no greater than 0.2 g/kW-hr before Jan. 1, 2014, and no greater than 0.03 g/kW-hr beginning January 1, 2014. The 0.03 g/kW-hr standard is the average utility base level now and will be in the district's local rule that will be going before its Board in January [2008]. The district believes the above standards can be met after 2014. (SCAQMD1, SCAQMD2)

140. Comment: Add a BACT requirement as SCAQMD requested. (CCA, ENVORG3)

Response: ARB disagrees that emission limits for distributed generation (DG) will penalize available alternative technologies by placing onerous exhaust control limits on these technologies in later years.

The regulation requires, prior to January 1, 2014, that non-grid-based power sources satisfy a NOx emission standard of 2.0 grams per kilowatt-hour (g/kW-Hr), which is the emission standard for a newly manufactured spark-ignited off-road engine. This standard is necessary to ensure the use of clean engines for DG. For comparison, the average NOx emission rate from the grid, on a statewide basis, is 0.13 g/kW-Hr. ARB recognizes that the emissions from the grid are variable on a seasonal and daily basis; however, the power supplied from the grid to the ports is likely to be generated by a natural-gas combined-cycle gas turbine (CCGT). NOx emissions from CCGTs are typically 0.02 g/kW-Hr, cleaner still than the statewide grid average. (See Comment 116 for a more detailed discussion on power generation for shore power.)

By January 1, 2014, the regulation requires shore-side generators to satisfy a more stringent NOx emission standard of 0.2 g/kW-Hr, which is equivalent to a spark-ignited engine using Best Available Control Technology (BACT). The application of BACT reduces NOx emissions by an order of magnitude. Even at this level, however, the shore-side generator would be 50 percent higher than the average NOx emissions from the grid when the requirements of the regulation are fully implemented or about 10 times higher than the emissions from a natural gas combined-cycle power plant.

ARB believes that the BACT emission level for NOx is appropriate for distributed generation; however, ARB deferred the BACT standard for four years (from 2010 to 2014) so that the shore-side generators could be deployed early and would result in emission reductions much sooner than a grid-based option. A liquid-natural-gas-fueled engine not using BACT is still much cleaner than the diesel-fueled auxiliary engines on the ships. These engines typically emit 85 percent less NOx emissions than the vessel's auxiliary engines and do not emit any diesel PM. However, since the auxiliary engines on the vessels will be running for some period of time before switching to DG power, the overall efficiency for NOx reduction will be closer 70 to 80 percent, with diesel PM reduction at 85 to 95 percent.

We disagree that the 2010 and 2014 emission standards should be lowered to 0.2 g/kW-hr and 0.03 g/kW-hr, respectively. The 0.03 g/kW-hr NOx limit is equivalent to the emissions from a well-controlled combined cycle power plant. These standards, if implemented, would discourage, if not prohibit, the development and use of non-grid based power generation to reduce at-berth ship emissions. ARB recognizes, however, that local air districts can set more stringent emission limits for this equipment.

141. **Comment:** Relying on alternative technologies while following the path to grid-based shore power would potentially double the cost of emission reduction strategies. It would also strain the resources of the port's engineering staff to meet the near-term and long-term cold-ironing solutions. (POLB1, POLB2)

142. **Comment:** While the Port of Long Beach envisions that alternatives to grid-based power have an important place in reducing emission from ships, this technology is not currently mature, cannot meet the power needs of many vessels, and will be most suitable for vessels not targeted by the proposed regulation such as bulk ships. (POLB1, POLB2)

143. **Comment:** No technology has been demonstrated that meets the requirements of the proposed regulation. Currently available technologies, which are being investigated, have either insufficient capacity for the vessel loads envisioned at our facilities and/or require significant infrastructure improvements similar to the grid-based shore power system. (POLB2)

144. **Comment:** A disadvantage of distributed generation systems is that they require significant amount of space on the wharf adjacent to the vessel. As a result, the proposed technology would not eliminate the need for infrastructure or save time. The Port does not have the space in front of quay cranes for the equipment and would need to locate it in terminal backlands with the necessary trenching and wharf improvements at the berth. (POLB1, POLB2)

Response: ARB agrees that it would be too costly and burdensome to include requirements that would essentially mandate the installation of both shore power equipment and interim alternatives in order for a fleet to comply with the regulation. ARB estimates that installing an alternative technology system in addition to a grid-based shore-power system would double the cost of compliance. For example, ARB estimated it would cost $125 million to install shore power infrastructure at the Ports of Long Beach and Los Angeles in order for terminals to satisfy their fleet's 2014 shore-power visits requirements. If these fleets were also required to comply with a 20 percent emission reduction by 2010 and 40 percent reduction by 2014, ARB estimates the cost to comply with these reductions using distributed generation would be $150 million, assuming the use of distributed generation would cost $1,000 per hour.

V. Quantifying Emission Reduction Claims for Alternative Technologies

145. Comment: Alternative controls through the regulation's Emission Reduction Option provision must be limited to viable strategies, guarantee equivalent emission reductions and be subject to public review. The current regulation does not propose sufficient criteria for determining which alternative strategies would provide quantifiable and enforceable emission reductions and would benefit nearby communities as well as regional air quality. (BCLAC1, ENVORG2)

Responses: ARB shares the commenters' concern that the reductions resulting from the use of alternative control techniques must be quantifiable and enforceable. The ARB has years of experience in the review of various emission reduction strategies to ensure that the strategies are viable. Some of the recent programs where ARB staff has reviewed emission reduction strategies include the Distributed Generation Certification Program, where the emission rate of the equipment must be certified to emission standards, and the Equipment Pre-Certification Program, where the claims of a product manufacturer must be supported by emission measurement data. The requirements in the regulation to ensure that the alternative control techniques are quantifiable and enforceable are based on this collective experience.

Specific to this regulation, there are a number of safeguards to ensure that the emission reductions are quantifiable and enforceable. These safeguards include the following: 1) establishing control factors using approved emission measurement techniques; 2) requiring annual statements of compliance for each fleet, including emission information for each ship; 3) requiring recordkeeping for each ship in the fleet, including identifying technology and control factor used, and records of equipment failure or malfunction; and 4) reserving the right of ARB to request additional source testing or other type of monitoring. Some of this information may be considered confidential; ARB will make information available upon request as allowed under the Public Records Act (Government Code section 6250 et seq.).

W. Alternative Emission Reduction Measurement

146. Comment: Shore power provides a means of measuring emission reductions. With the electric meters, every megawatt-hour or kilowatt-hour actually measures so many pounds or tons of emission reduction. Staff should encourage as part of the implementation, which may be a later phase, the use of metered delivery of power, whether it's from distributed generation or from the grid itself, to measure the tons reduced of NOx, PM, and CO2. (DW)

Response: ARB concurs that electricity use is an acceptable surrogate for estimating emissions, which is why the regulation requires onboard power generation to be reduced as well as requiring vessel visits to use shore power. The regulation requires each affected terminal to keep records of utility billing statements for terminals where shore power utilization is monitored separately from the electrical power usage of the other activities at the terminal. Although this information alone cannot be used to

directly determine if the fleet is complying with the regulation, it is an essential component of compliance determination.

X. Baseline Fleet Emission Calculations

147. Comment: Commenter is interested in how the rule will accurately and reasonable calculate baseline fleet emissions for new/expanding shipping activities that might occur after rule is in effect. How will new fleets to Oakland in the future be able to calculate reasonable emission reduction targets when baseline emissions are essentially zero now? (POAKLAND2)

Response: The baseline in the regulation does not refer to past operational history, but instead refers to a fleet's operation without the use of emission control techniques for the compliance period. The baseline refers to the "before controls" case and the post-baseline refers to the "after controls" case. Comparison of the two cases defines the percent reduction achieved for that compliance period.

For the Reduced Onboard Power Generation option, the baseline refers to the power requirements of the fleet over the compliance period. The reduction of onboard power generation is determined by comparing the actual power produced by the auxiliary engines to the baseline power usage for the entire fleet during the applicable compliance period. For the Equivalent Emission Reduction Option, the baseline refers to the fleet's emissions over the compliance period, with no implementation of emission reduction techniques other than cleaner fuels mandated by the auxiliary engine fuel regulation. The emissions reduction is determined by comparing the emissions of the fleet, after implementation of strategies to reduce emissions, to the fleet's baseline emissions for the applicable compliance period. The applicable compliance period, as defined in the regulation, is a calendar quarter for applicable requirements on January 1, 2014 and later, and a calendar year for all applicable requirements prior to January 1, 2014.

148. Comment: We are concerned that this provision, as written, may create a significant loophole. The suggested use of statewide fleet averages is specifically troubling as an alternative control strategy given the difficulty to enforce them and the likelihood for disproportionate emission impacts on local communities. CARB should remove the proposal for the use of statewide fleet averages under the Emission Reduction Option. CARB should exclude operational controls (e.g. shorter ship visits, lower auxiliary engine loads while at dock, etc.) from meeting the requirements of the Emissions Reduction Option. Only measures that are verifiable, reproducible, and enforceable should be permitted to satisfy this provision. (BCLAC1, ENVORG2)

Response: ARB agrees that fleet averaging, while providing flexibility for compliance, is also more challenging to enforce. To ensure that the fleets are complying with the regulation, the fleet operators will be required to file vessel plans that identify the types of controls used on each ship; file annual compliance statements that include detailed

information on compliance for the entire fleet; and keep records for each ship, including the ship's emissions and technology used to reduce the ship's emissions.

Additionally, the regulation does not allow the use of statewide fleet averages—fleets are port-specific. That is, a company that has ships visiting the Ports of Los Angeles and Oakland would have two fleets: one fleet for those ships visiting Los Angeles and another fleet for those ships visiting the Oakland. By defining fleets in this manner, emission reductions are required at both locations. There should not be any disproportionate emission impacts on local communities.

Finally, the procedures for determining compliance with the regulation does not allow any credit for operational controls, such as shorter ship visits or lower auxiliary engine loads. As discussed in response to Comments 118-120, power reductions or emission reductions are based on comparing the baseline scenario, which represents the case where no emission reduction techniques would have been applied, to the case where the vessels' emissions are reduced with emission reduction techniques. Additionally, the emission reduction techniques must be quantifiable, enforceable, and the reductions repeatable from visit to visit.

Y. Test Methods

149. Comment: The emission measurement method for diesel PM in section (f)(4)(B)3 should allow CARB Test Method 5 or U.S. EPA Reference method 5 and 202. Accepted CARB standard methods should be utilized to provide consistency in PM measurements. The ISO 8178 Test Methods needlessly require a dilution tunnel, 5 stable test modes, and a different temperature (125^{o} F) defining PM. Auxiliary engine exhaust stack diameters and gas velocity are normally within the range to allow standard isokinetic PM sampling. (ERM)

Response: ARB agrees. ARB added a provision in the regulation that allows the flexibility of using alternative test methods upon the written approval from the Executive Officer. This provision is found in section (e)(4)(B)(3) of the regulation.

Z. Terminal Plans and Affected Terminals

150. Comment: The proposed regulations threaten the viability of the established business models in operation at the ports of California, potentially upsetting existing lease agreements, and will throw our ports out of balance with ports throughout the rest of the country and internationally. (PMSA1)

Response: ARB disagrees. Shore power is being implemented at many ports in California. By the end of 2008, five terminals at the Ports of Los Angeles and Long Beach will have at least one berth equipped with shore power equipment. In addition, the Ports of Long Beach and Los Angeles have adopted a Clean Air Action Plan that proposes to have 25 berths shore power ready by fiscal year 2010/2011.

Shore power applications are being considered at the Ports of Oakland, San Francisco, and San Diego. The number of shore power projects underway or in the planning stage undermines the commenter's assertion that this regulation threatens the viability of established business models at California ports.

While California ports will remain in the forefront of shore power implementation for the next few years, there is growing world-wide interest in shore power. Princess Cruise Lines already uses shore power at terminals in Juneau, Alaska, and Seattle, Washington. China's largest port operator plans to introduce shore power this year, and the Port of Busan, South Korea, plans to install eight shore power systems by early next year. Additionally, 14 ports in the United States, Europe, Asia, South America, and Australia have committed to investigate the feasibility of building facilities to accommodate shore power. In a few years, California ports will not be alone in having shore power-ready berths.

151. Comment: The terminal lessee or terminal operator is not the appropriate entity to prepare the electrical infrastructure plan for the following reasons: (PMSA1)

- The terminal lessee or operator does not hold a right of property ownership of the terminal. As such, a terminal operator does not have any effective rights to implement or control the plan.

- Marine terminal operators have from time-to-time found themselves going for multiple years without a renewal and are forced to operate on month-to-month lease terms with their landlord port. This is problematic because the cost of such an infrastructure improvement can only be carried over the existing term of the lease.

- The terminal will have only a short-term interest in the property and will not retain economic benefits of the improvements beyond the terms of the lease, which may adversely affect the ability of the terminal lessee or operator to recover the cost of the improvement over a reasonable time period.

- Requiring the terminals lessee or operator to develop and implement the plan may result in unequal implementation between terminals located at the same port. For example, a terminal lessee with a substantial period remaining on a lease may be able to develop a plan with the Port in which the long term lessee would derive substantially greater benefit than a lessee with a short time remaining on his lease and have no guarantee of a lease renewal.

- Potential tax liability issues resulting from improvements added to the terminals which may be not be equally divided between the various terminals within a port.

152. Comment: For the following reasons, the appropriate entity for planning of infrastructure installation is the port authority: (PMSA1)

- The port authority, as the landlord, is responsible to provide infrastructure to accommodate basic terminal and ship operations needs. Since the Ports will be making the improvements and will be the entity experiencing the long-term benefits of the infrastructure, they should be responsible for planning for the cold-ironing infrastructure.

- Under commercial lease terms, the landlord is responsible for maintaining the property to existing regulatory code. The port authority acting as landlord is responsible for providing necessary improvements to reflect the requirements mandated by this regulation. The port authority is able to pass on additional costs sustained during an existing lease of a terminal when the parties engage in a scheduled financial review which provides for revenue adjustments.

- The port has greater financial assets than terminals that can be used to obtain better financial packages to underwrite the cost of shore power infrastructure. For example, most public ports have a diversified portfolio of assents beyond marine terminal operations that can be the basis of accessing capital markets. Additionally, the bonding capabilities available to public port authorities or their respective governing cities allow them access to large amounts of capital and recover this capital over a much longer period of amortization.

- The ports can act as a lead agency for the purpose of the California Environmental Quality Act (CEQA). Terminal lessees or operators cannot act as lead agency for CEQA.

- Because of the port's overall responsibilities, the port is able to resolve potential conflicts in installation of infrastructure that may occur between terminals located at the same port.

153. Comment: It is inappropriate for the terminal operator to be responsible for the plan. Terminals have no land use authority, no ability to do CEQA or issue permits to ourselves. Would be more appropriate on a port-wide basis to assign that responsibility to the port authorities who would do the planning documents and appropriate approvals, and through their leasing authority, can amortize the cost against the broad number of terminal operators to take out some of the variability that's reflected in the cost effectiveness numbers. (PMSA2)

Response: ARB disagrees. The terminal operators are the most appropriate entity to coordinate the development of the plan because of their working relationship with the vessel fleet operators, who are required by the regulation to reduce the emissions from their fleets. Since the terminal operators provide a service to the vessel operators, the

terminals and vessel operators have a business relationship that the landlord ports—which include the Ports of Los Angeles, Long Beach, and Oakland—do not share with the vessel fleets. The landlord ports lease the terminal property to the terminal operator.

The responsibility of submitting the terminal plan should not be confused with the obligation to provide the infrastructure necessary to execute the plan. ARB considered putting requirements into the regulation that mandated the responsibility for installing shore-side equipment, but determined that it was inappropriate and problematic to dictate terminal/port business relationships and contractual obligations and realized that the goals of this regulation will only be satisfied if the affected entities cooperate with each other. For example, the timely installation of shore-power infrastructure depends upon the cooperation between the local utility, the port, the terminal, and the ship fleet operator. ARB believes that there is a strong, business-related incentive for these partners to accommodate the needs of the vessel fleets that call on California ports. The regulation allows the affected parties to work cooperatively to achieve the goals of the regulation.

Since all four entities have important roles with regard to the installation of shore power infrastructure, ARB believes that the most efficient way to develop a plan for installing the infrastructure is to have one entity act as lead in the development of the plan. The one entity would then work with the other three parties to develop a plan that coordinates the activities of the four entities. As noted, the terminal operators, because of their working relationships with the vessel fleets that call on their terminals, are the logical choice to coordinate the plan.

For example, the electrical power demand for shore power can only be established with information provided by the vessel fleet operators. Only the vessel fleet operators can provide information on the electrical power needs for their ships and the number of visits these ships will make to California ports today and in the future. Typically, several different fleets visit a terminal, and the information must be obtained from all fleets visiting the terminal to establish the necessary power requirements. This is the most important information provided in the terminal plan.

Additionally, only the vessel fleet operator can provide information on the physical details of the ships and the shore power capabilities of the ships for 2014 and beyond. Important information includes: the size of vessels, to help locate where sockets should be placed at the berth; the electrical system of the vessels, to determine how much infrastructure (e.g., cable reels) will be needed at the terminals versus onboard the vessels themselves; and the location of the shore-power connection on the vessel, which may affect the position of the ship at the berth (starboard or port?). All the above will have a bearing on the design of infrastructure on the shore.

ARB disagrees that the terminal operator cannot prepare the terminal plan as a result of the terminal operator not holding a right of property ownership, potential lease issues, or potential tax liabilities resulting from the new electrical power infrastructure for shore

power. These issues do not affect the coordination and development of the terminal plan, but are issues to be considered when developing the milestones in the plan.

ARB also disagrees that ports are the appropriate entity for the terminal plan because as landlords the ports are responsible to provide infrastructure for basic terminal and vessel operations and to maintain the property to existing code, or that the ports have greater financial assets than the terminals, or that the ports have the responsibility to address CEQA concerns and issue permits. While these points are pertinent for the execution of the plans (i.e., constructing the necessary infrastructure), they do not support the argument that the ports are better candidates for coordinating the plan. As discussed above, the terminals are better suited for determining the needs of their customers, the vessel fleet operators that are required by the regulation to reduce their emissions.

154. Comment: Staff should be committed to providing detailed criteria for the terminal plan, such that if the terminals prepare these plans satisfy these criteria, the plan will be approved. (PMSA2)

Response: Staff agreed at the Board hearing that it would work with the terminal operators on the plans. To that end, staff revised the terminal plan portion of the regulation to add additional detailed criteria, which was included in the 15-day modifications to the regulation, and has worked with the commenter and his clients to develop a draft template for the plans. ARB will continue to work with the terminal operators regarding the preparation of the terminal plans.

155. Comment: These inequities will be heightened by the thresholds developed by the proposed rule, for example, in that a general cargo terminal that receives 49 general cargo visits and then one container or reefer vessel would be subject to installing infrastructure for that one vessel, but another terminal that receives 49 passenger vessels calls would be exempt. The regulation also includes all container vessels, reefers, and passenger vessels regardless of the number of visits to a California port, the length of stay or the power demand of those vessels. (PMSA1)

Response: The commenter may be confusing the requirement for submitting a plan, which is based on a threshold of 50 vessel calls to a terminal by affected ships (container ships, passenger ships, and refrigerated-cargo ships) with the requirements imposed on the vessel fleet operators to reduce their hotelling emissions and subsequently their reliance on the terminal operators to accommodate their needs. For example, because the regulation affects passenger-ship fleets that make five or more visits to a California port, a passenger terminal that receives 49 passenger-ship calls—although exempt by the regulation from submitting a plan—would nevertheless be compelled to meet the needs of its customers by installing shore power infrastructure, plan or no plan. Again, the requirement for submitting a terminal plan should not be confused with an obligation to provide the necessary infrastructure. The desire to keep current customers (i.e., vessel fleets) and to attract new customers is more of a

business plan, one that should compel the terminals and the ports to work together to accommodate the vessels' needs to comply with the regulation.

The regulation requires affected fleets of container ships, passenger ships, and refrigerated-cargo ships either to reduce the use of auxiliary engines by some percentage or to reduce the emissions from the fleet by some percentage. Even in 2020, when that percentage reaches 80 percent, 20 percent of the fleet's activities are not subject to the requirements of the regulation. Therefore, one visit by a ship affected by the regulation would not require a terminal to add shore power infrastructure.

156. Comment: Designation by type of vessel without provisions to excuse infrequent calls of low duration and activity cannot be justified on the basis of air quality improvements and is clearly arbitrary and capricious under the stated objectives of reducing emissions from vessels at berth. In addition, designation of only certain public port authorities as ports subject to this rule is also discriminatory. (PMSA1)

Response: The regulation requires affected fleets of container ships, passenger ships, and refrigerated cargo ships to either reduce the use of auxiliary engines by 80 percent or reduce the emissions from the fleet by 80 percent. Ship fleet operators have the ability to exempt from the regulation "20 percent" of their fleet's activity, including visits associated with ships that are infrequent visitors or ships that stay in port a short duration for all visits. ARB notes that for most affected fleets, the 80 percent criteria typically affects all the ships in the fleet that make four or more visits to the port.

Since the regulation affects three ship categories, the affected ports are those to which these ship categories call—the six ports identified in the regulation. When ARB addresses the other ship categories—tankers, bulk and general cargo ships, and vehicle carriers—other ports may be affected by a separate rulemaking.

AA. Cost Effectiveness of the Regulation

157. Comment: The cost to implement shore power is tremendously variable. To help minimize the cost impact of the regulation, the regulation should be revised to add cost-effectiveness thresholds above which terminal operators and ocean carriers would be allowed to pursue less costly means of reducing at-berth emissions. The current regulation does not provide for any such consideration. (PMSA1)

158. Comment: We want to ensure that the costs of compliance are fairly allocated. We would like to work to ensure that the emission reduction goals are met and the costs to achieve these goals are lowered as much as possible. (CMTA)

Response: ARB agrees the cost to implement shore power is variable and stated such in the TSD. On the other hand, the regulation does not prescribe any particular technology to be used for compliance, so a "less costly" means of reducing at-berth

emissions is certainly allowed. In fact, ARB expects the affected businesses to comply with the regulation through the most cost-effective means possible, which is why the regulation provides flexibility. Industry (i.e., the "marketplace") is best suited to determining how to comply with the regulation. ARB believes that the affected vessel categories and the ports on which they call have been fairly treated by the regulation. Who ultimately bears what costs of the regulation will be determined by the market (i.e., through typical business practices).

159. Comment: In the assignment of cost, staff failed to identify the ports as direct contributors. Staff assumed that the landlord ports will eventually recover their costs through modifications to terminal leases, while the non-landlord ports will recover their capital costs through fees collected from the carriers. Port costs are real and should be accounted for. (PMSA1)

Response: ARB concurs that the ports will incur costs due to the regulation. Nevertheless, in Chapter X of the TSD, ARB allocated the costs for the regulation among the vessel fleet operators, the terminals, and the utilities. The vessel fleet operators are responsible for costs associated with retrofitting their vessels with emission-reduction equipment or shore-power capability. For the shoreside infrastructure, ARB divided the costs between the utilities, for electrical improvements beyond the port's property, and the terminals, for cost improvements within port property.

The improvements beyond the port's property are related to the utility service that brings electrical power to the port, which varies widely between ports. Some ports, such as the Port of Los Angeles, have existing electrical infrastructure to serve their shore power requirements better than others, such as the Port of Long Beach. The improvements within port property are either: 1) improvements to the port-wide electrical system; or 2) improvements to the terminal electrical system. ARB assigned the cost for the improvements within port property to the terminals, assuming that ports would install the improvements and recover the costs from the terminals.

160. Comment: The cost analysis does not evaluate the benefits of the voluntary efforts moving forward without the proposed regulation. In addition, while not yet implemented, the San Pedro Bay ports have already adopted their Clean Air Action Plan to equip terminals with the necessary infrastructure over the next few years. There is no analysis of the benefits resulting from implementing the plan without the proposed regulation. (PMSA1)

Response: ARB applauds the Ports of Los Angeles and Long Beach for adopting and implementing the Clean Air Action Plan (CAAP). The CAAP is a five-year plan that focuses on reducing emissions from all sources visiting and operating at the two ports, including ships, trains, trucks, and cargo-handling equipment. One of the measures in the CAAP proposes the use of shore power to reduce at-berth ocean-going vessel emissions. The measure indicates, by fiscal year 2010/2011, that at least one berth will have shore power capability for each of the container and passenger ship terminals at

the two ports or 25 berths in total. With this infrastructure in place, the plan estimates that about 1,000 ship visits will use shore power in fiscal year 2010/2011.

ARB believes the shore power measure in the CAAP represents an aggressive initial implementation of shore power within the two ports. At full implementation, the CAAP proposal will reduce NOx emissions by 15 percent and PM emissions by 20 percent. This regulation builds on the CAAP in requiring greater utilization of shore power, requiring the use of shore power for 80 percent or more of all visits made by container and passenger ships to the two ports by 2020, or an equivalent emission reduction.

Because the reductions in the CAAP are not mandated by a regulation, the reductions resulting from implementing the plan are included in the overall reductions of the regulation. In the TSD, ARB estimated that, prior to 2011, reductions achieved by the regulation were essentially due to the implementation of the CAAP measures. Since the Board adopted the regulation in 2007, however, there have been other early shore-power projects being proposed to take advantage of early incentives, such as Proposition 1B and Carl Moyer funds.

161. **Comment:** It is not clear what benefit the auxiliary fuel regulation and voluntary efforts already underway contribute to the cost effectiveness of the regulation. There is confusion of the claimed benefits of the regulation in light of the pending low-sulfur fuel regulation for ships. There is no analysis of the costs and benefits of these regulations after full implementation of local measures and compliance, whether regulatory or voluntary, with the standards envisioned under the current existing laws and voluntary measures taken as a whole. (PMSA1)

Response: When estimating the air quality benefits of the regulation, ARB excluded any reductions that have been or will be achieved by other regulations pertaining to auxiliary engines on ocean-going vessels. For example, when the Board adopted the regulation, the auxiliary fuel regulation was already in effect. That regulation required the use of 0.5 percent sulfur marine distillate fuel by January 1, 2007. The use of this fuel reduced emissions from auxiliary engines on ocean-going vessels by 75 percent for diesel PM and six percent for NOx. These benefits were to increase in 2010, when the auxiliary engine fuel regulation was to require 0.1 percent sulfur fuel to be used.

ARB did not double-count the emission reductions achieved by the fuel regulation, but built on the success of that regulation. Despite litigation and uncertainty regarding the auxiliary engine fuel regulation, ARB believes that regulation will be in place when this regulation becomes effective.

On the other hand, ARB included the emissions reductions and costs claimed by plans, such as the San Pedro Ports Clean Air Action Plan because, as a plan, it was not a binding regulation. This regulation overlays the plan and becomes binding.

BB. Health Benefits Analysis of the Regulation

162. Comment: Sulfur oxides are a significant precursor to $PM_{2.5}$ emissions. ARB's GMERP finalized in April of 2006 did not fully quantify the health impacts associated with the secondary particulate formation of sulfates. The plan did note however that as new information emerges about the contribution of sulfates to the health impacts from ambient levels of fine particles, it may be necessary to accelerate implementation of the strategies in the plan (GMERP, p. 119). It is our understanding that ARB anticipated folding in these health impacts over the course of ensuing months. Based on the most recent scientific data, ARB should incorporate these impacts into the analysis of the regulatory costs and health benefits to fully capture the morbidity and mortality associated with ship pollution. ARB's staff report should fully reflect the health benefits of this regulation and incorporate the most recent scientific research including impacts from particulate sulfate. (ENVORG2)

Response: ARB agrees with the commenter that the Staff Report should fully reflect the health benefits of the regulation. At the time the potential health benefits were assessed, analytical tools were not available for assessing the contribution of sulfur oxides (SOx) to the health impacts from $PM_{2.5}$ emissions; consequently, these impacts were not considered as part of the health benefits for this regulation. Furthermore, ARB assumed that the auxiliary engine fuel regulation would have already reduced SOx emissions by 80 percent, perhaps climbing to 96 percent if lower-sulfur fuel were available by 2010. Therefore the vast majority of any health benefits associated with sulfates are captured under the auxiliary engine fuel rule.

The Pacific Merchant Shipping Association (PMSA) filed suit in federal district court challenging the auxiliary engine fuel regulation as preempted emission standards under Clean Air Act section 209(e). In May 2008, the 9th Circuit Court of Appeals upheld the lower court's granting of summary judgment against ARB's enforcement of that regulation. The Board subsequently adopted another fuel regulation, Fuel Sulfur and Other Operational Requirements for Ocean-Going Vessels within California Waters and 24 Nautical Miles of the California Baseline (2008), to reduce emissions from all engines and boilers onboard ocean-going vessels. This regulation will recapture the emissions reductions achieved by the regulation contested by PMSA and broaden those reductions to other engines and boilers. The fuel regulation, in conjunction with our regulation to reduce hotelling emissions, will significantly reduce at-berth SOx emissions.

163. Comment: We expect greenhouse gas (GHG) reductions from this regulation to be significant. We are pleased that this rule is now proposed to be a part of the implementation of AB 32 early action measures. ARB must ensure that all GHG reductions are quantified and that ARB's analysis of regulatory costs, health benefits and cost-effectiveness incorporated these reductions by apportioning part of the costs to GHG reductions. ARB must quantify the GHG reductions

associated with rule. ARB's analysis of regulatory costs, health benefits, and cost-effectiveness must adequately account for these reductions. (ENVORG2)

Response: ARB agrees that the reductions of GHG should be quantified, but disagrees that part of the cost of the regulation should be apportioned to GHG reductions. The regulation was intended to reduce the emissions of PM and NOx from ships that are docked at California ports. The PM emission reductions support the ARB's effort to reduce exposure to toxic diesel PM and help meet air quality standards for $PM_{2.5}$. In addition, the NOx emission reductions resulting from the regulation will also assist districts that do not yet satisfy the ozone ambient air quality standards. ARB expects that most affected shipping companies will use shore power to comply with the regulation. The use of shore power, as compared to operating the ship's auxiliary engines, will result in significant reductions of GHG. Consequently, the GHG reductions are a by-product of the effort to reduce the at-berth ship emissions of PM and NOx. Being a by-product, the GHG reductions have no regulatory cost associated with them, but ARB did quantify the potential GHG emission reductions in Chapter IX of the TSD.

164. Comment: The impacts and benefits of this regulation are overstated due to the uncertainties inherent in the emission factors for ship auxiliary engines using the fuels assumed for this regulation. (PMSA1)

Response: ARB disagrees. The impacts and benefits of this regulation were based upon emission factors that have been publicly reviewed through the development of the ARB regulation entitled Auxiliary Diesel Engines And Diesel-Electric Engines Operated On Ocean-Going Vessels Within California Waters And 24 Nautical Miles Of The California Baseline (2005), and the Goods Movement Emission Reduction Plan (GMERP, 2006). As part of these proceedings, ARB staff performed a critical review of the available information on ship engine PM emissions (See white paper: A Critical Review of Ocean-Going Vessel Particulate Matter Emission Factors, 2007).

Regarding the perceived uncertainty of fuel types to be used, see response to Comment 161 for a discussion on fuel assumptions, litigation, and recent Board actions. ARB believes that low-sulfur fuels will be used in auxiliary engines when the requirements of this regulation take effect—the base case for the analysis as indicated on page five of Chapter V of the TSD. If heavy, high-sulfur bunker fuel is being used instead of cleaner-burning distillate fuels, the impacts and benefits of this regulation will be significantly greater and the cost-effectiveness would be even more favorable.

165. Comment: The health risk assessment done for this regulation is too limited geographically to determine the actual emission reduction benefits. The modeling domain used was for the San Pedro Bay ports only and did not include the entire regulated area with regard to the multiple ports affected in this rulemaking. In order to understand the full benefits and costs of implementing this proposed regulation, CARB needs to do the appropriate modeling to determine the impacts and benefits based on the population densities, proximity, and exposure time to the vessels throughout the state. (PMSA1)

Response: It was appropriate to conduct the health risk assessment for the San Pedro Bay area because this is where the majority of vessels subject to the regulations are traveling, and likely encompasses the communities subject to the highest health risks. We recognize that other areas will experience different health impacts and are preparing health risk assessments for other areas. For example, ARB has been developing a health risk assessment for the Port of Oakland and the West Oakland community since early 2006. A draft health risk assessment was released spring 2008 and is expected to be finalized by the end of the year. Together, these two risk assessments represent nearly 90 percent of the total visits affected by this regulation.

Health risk assessments require complex computer modeling that is labor intensive. It would not be appropriate to delay the regulations by months or even years to evaluate all areas of the State. In addition, the health risk assessment for the Ports of Los Angeles and Long Beach focused on diesel PM. The regulations also reduce NOx and SOx emissions. These pollutants have additional health impacts to citizens living near ports.

CC. Greenhouse Gases

166. Comment: We expect greenhouse gas (GHG) reductions from this regulation to be significant. We are pleased that this rule is the first Early Action Measure for AB 32, the Global Warming Solutions Bill. Any method of compliance that would cause increased greenhouse gases should not be allowed, especially where compliance options exist that reduce GHGs. All compliance pathways should be held to the GHG standards set for Distributed Generation – for example the Wittmar LNG shore power equipment. We support the South Coast Air Quality Management District's (SCAQMD) recommendation that alternative technologies should be BACT. Ensure that compliance pathways meet GHG standards to guarantee the maximum potential GHG reductions possible through this rule. (ENVORG3)

167. Comment: We ask the ARB to continue to reduce GHG. The GHG reductions from the proposed regulation can be significant in achieving early reductions keeping with the spirit of AB 32. Compliance should be held to the GHG standards set for distributed generation or a higher standard to ensure maximum potential reductions through this rule. (BCLAC2)

168. Comment: Concerned that there isn't a broader policy to prevent any greenhouse gas backsliding with this rule, meaning some alternatives compliance strategies may cause increases in greenhouse gases. Where there are no other feasible means to comply, maybe that can be considered. But in this case, we feel there are feasible alternatives that would be positive on greenhouse gasses meaning we would see reductions. Request that a clause be put in to prevent backsliding of GHGs. (NRDC)

169. Comment: The staff proposal does include standards for NOx and PM emissions. However, does not believe that greenhouse gas emissions have been treated equally in this regulation. Would like to see some protections in the regulation against backsliding at a minimum to ensure that we move forward and get the emission reductions we all desire. (UCS)

Response: As stated in Chapter IX of the TSD, the regulation will reduce CO_2 emissions by 122,000 to 242,000 metric tons in 2020. The regulation achieves these reductions automatically as a co-benefit of the diesel PM and NOx emission reductions. ARB estimated these potential greenhouse gas (GHG) emissions reductions by assuming shore power will be used as the compliance path of choice, so the auxiliary engines on the vessels would be shut down and power would come from the grid. The marginal electricity from the grid that would be needed to supply the vessels would come from combined-cycle gas turbines, which produce less CO_2 per kilowatt-hour than the auxiliary engines, hence the CO_2 emission reductions.

The regulation requires that distributed generation (DG) equipment, such as that provided by the "Wittmar" unit, provide electricity that is GHG-equivalent to the grid: 500 grams/ kilowatt-hour. This requirement essentially prohibits fuels other than natural gas (e.g. diesel) from being used in DG equipment, maximizing the emission-reduction benefits of the regulation.

ARB did not recommend such a CO_2 limit for other alternative technologies that do not generate and provide electricity as a method for achieving the reductions. These technologies, such as a capture-and-treat system (i.e., the "bonnet" technology), particulate filters, or selective catalytic reduction (SCR) units, can significantly reduce criteria pollutants and/or toxic air pollutants but may slightly increase GHG emissions. However, it is unlikely that these technologies would be used widely; therefore, ARB expects overall reductions in GHGs. ARB believes that the flexible approach to reducing NOx and PM emissions from hotelling ships that is provided by a full range of possible alternative technologies is paramount for the effectiveness of the regulation. Since CO_2 emission reductions are a natural co-benefit of the regulation, ARB asserts that any slight reduction in GHG benefits from the application of alternative technologies is minimal and acceptable.

170. Comment: AB 32 clearly places responsibility on the ARB in regards to implementing climate policies. It would be better for our climate policies and our state in general if we have ARB overseeing AB 32 efforts instead of having this piecemeal approach we are now seeing with the CEQA debate. (CMTA)

Response: ARB agrees that AB 32 clearly gives ARB the authority to reduce greenhouse gases in California. Nevertheless, ARB must count on other State agencies, local governmental agencies, and industry to work as partners to achieve the challenging goal of significantly reducing GHG emissions in the State.

171. Comment: In the utility industry there is a lot of debate on the generation, when a utility procures that power, who owns the GHG attributes that may be a tradable asset down the road. I would propose that GHG attributes be owned by entity implementing shore power. (DW)

Response: ARB understands and notes the comment. It is premature to determine the ownership of "tradable assets" related to GHG emission reductions. AB 32 requires the Board, by January 1, 2009, to design and adopt an overall plan (the Scoping Plan, or Plan) to reduce GHG emissions to 1990 levels by 2020. ARB staff is currently working on the Plan, which will be presented to the Board for consideration of adoption in November 2008.

A cap-and trade system for reducing GHG emissions is expected to be part of the proposed Plan taken to the Board. Should the Board adopt a cap-and-trade system as part of an overall strategy to reduce GHG emissions, the technical and administrative details of that system would still have to be developed. The Board has until January 1, 2011, to adopt the necessary regulations to implement the Plan, which, as mentioned, may include the cap-and-trade system. The "credits" for reducing GHG emissions, and the market in which these credits would be traded, has yet to be determined.

DD. Enforcement/Jurisdiction

172. Comment: We urge you to watch closely over enforcement. We think that you may need some additional resources to enforce this regulation. We would like to work with ARB to help with enforcement to make sure we are getting the public health benefits and emission reductions expected. (ALA)

173. Comment: We strongly urge the ARB to include strong enforcement provisions into this regulation. Vessels should be required to provide supporting documentation to the ARB enforcement officials upon request and quarterly progress reports should be made public. The appropriate authority should conduct frequent terminal checks, both to monitor progress of shore power infrastructure development and the actual usage of shore power by docked vessels. The ARB should work with other state and federal agencies to gain efficiencies in enforcing this regulation. Specific language must be included to clarify that upon adoption of this regulation, the use of shore power will no longer exempt an operator from the requirements of other current or future marine rules. California needs a full suite of control measures which build on one another to address pollution from ships—not one measure that can rely on any number of alternative options—many of which may be the subject of future regulation. (ENVORG2)

Response: ARB agrees with the comments. ARB's FY 08-09 budget includes two staff positions to perform compliance outreach and other enforcement efforts for this and

several other newly adopted regulations that target emissions from port and other goods-movement related activities.

A significant portion of this regulation is dedicated to ensure compliance with the emission standards of this regulation. First, terminal plan operators are required to submit terminal plans to the Executive Officer detailing the changes to their facility to accommodate the vessels that will need to satisfy the emission reduction goals of the regulation. Second, the responsible official of each affected fleet must submit an annual compliance statement certifying compliance with the requirements from the previous year. Finally, each affected fleet is subject to reporting and recordkeeping requirements. These records will be subject to inspection by ARB and local air district enforcement staff.

Some of information the regulation requires fleets to maintain may be considered confidential; ARB will make information available upon request as allowed under the Public Records Act (Government Code Section 6250 et seq.).

Finally, ARB will continue to work with shipping companies, terminal operators and ports to ensure compliance with this regulation. ARB intends to work with the affected organizations to develop the necessary forms, provide for electronic submittal, and provide any necessary assistance, such as training workshops. ARB believes effective outreach will enhance compliance with the regulation.

With regard to other regulations containing shore power exemptions, ARB will review and revise the shore power elements in these regulations as necessary.

174. Comment: ARB should maintain jurisdictional control. Don't place the jurisdictional responsibility on the local agencies. (CMTA)

Response: ARB will continue to work as partners with the local air districts to enforce rules and regulations, including this one. The local air districts may have permitting authority for some of the equipment deployed for compliance with this regulation. For example, some shoreside equipment, such as a shore-side generator or a "capture-and-treat" unit (i.e., the "bonnet" technology unit), is considered stationary equipment, subject to local air district permits and enforcement.

175. Comment: Ships should not be subject to fees and penalties until adequate power is available for all ships calling at California ports. (PMSA1)

Response: ARB believes that adequate power will be available to meet the requirements of the regulation. See the response to Comments 28-84 regarding the discussion of compliance schedules. ARB determined the performance standards in the Reduced Onboard Generation option schedule based on discussions with the utility companies, ports, terminal operators, and vessel fleet operators. The requirements are phased-in, and ARB believes that these requirements are reasonable. To wait until all

ships calling at California ports have adequate power before enforcing the regulation is unreasonable and will unnecessarily delay emission reductions and health benefits.

EE. Circumvention of Public Disclosure Process

176. Comment: We are concerned that ARB is circumventing the public disclosure process by not making public the latest draft of shore power regulations released in early October. We understand that the only parties that have officially been notified are the Ports of Los Angeles, Long Beach, and Oakland. A matter of such critical importance to California's environmental and public health should not only be decided by the ports. We ask that you amend this current draft to reflect our recommendations as stated above, and distribute a revised draft widely and publicly with the required time necessary for public comment before the regulation comes before the ARB Board of Directors. (ENVORG1)

Response: ARB disagrees strongly with the comment that ARB circumvented the public disclosure process during the development of the regulation.

As in all regulatory development processes, ARB held both public meetings and individual meetings with stakeholders in the development of this regulation. During the informal regulatory process, ARB held five workgroup meetings and three community outreach meetings. ARB also participated in numerous meetings with various individual stakeholders—typically meetings with one or more stakeholders to either gather information, obtain feedback on proposed regulatory concepts, or address concerns. These meetings were held with representatives of the ports, environmental groups, emission reduction technology developers, terminal operators, and vessel fleet operators. The regulation was developed in an open forum with full disclosure during the regulatory development process.

Regarding the allegation that ARB staff shared with the ports a draft proposed regulation to which other stakeholders had no access, ARB assumes the commenter is referring to a time period just prior to the publication of the Staff Report. During the week of September 24, 2007, ARB released the most current draft regulation and held three workshops and two community meetings at various locations in the State. At these meetings, ARB discussed additional revisions it intended to make to the draft regulation.

ARB revised the draft proposed regulation several times leading up to its submittal to the Office of Administrative Law (OAL). ARB communicated with several stakeholders—ports, utilities, local air districts, and consultants—as it continued to make revisions. ARB submitted the draft proposed regulation to OAL on October 9, 2007.

Because there had been some late revisions to the draft proposed regulation discussed at the prior workshops and public meetings, ARB held a final workshop during the 45-comment period—on November 9, 2007—to obtain additional public input on these

proposed revisions. ARB had issued the notice of this workshop on October 25, 2007, less than a week after the commencement of the 45-day comment period.

ARB continued to work with stakeholders during the 45-day comment period, and ultimately revised the proposed draft regulation substantially before presenting it to the Board on December 7, 2007, at a public hearing. The development of this regulation, with all of the revisions to the draft proposed regulation that continued through the Board hearing, was conducted in an open, transparent, and publicly accessible manner.

FF. Supports Port Drayage Truck Regulation

177. Comment: We support the proposed port drayage truck rule and urge the Board to adopt the measure. The Port of Long Beach and Los Angeles Boards have approved a progressive ban that eliminates dirty drayage trucks serving the two ports. The ports' and CARB's programs together provide a comprehensive approach to addressing port drayage emissions. (POLB2)

Response: This comment was included in a letter that addressed comments on this regulation as well as on ARB's proposed Port Drayage Truck Regulation. Both regulations were presented to the Board on December 6, 2007. Because this comment does not address this regulation, ARB does not providing any response to the comment.

GG. Comments by Reference

The following comments and documents were requested to be incorporated by reference into the rulemaking file (PMSA1):

PMSA correspondence with Dr. Pingkuan Di, CARB, November 21, 2005, regarding comments on the "Draft Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach."

Response: The letter provided comments on a draft ARB report: Diesel Particulate Matter Exposure Assessment Study for the Ports of Los Angeles and Long Beach, October 2005. The report was subsequently finalized April 2006, after considering all comments, including the above. Because these comments were addressed in the final version of the report, ARB does not respond to the letter's comments in this FSOR.

PMSA correspondence with Mr. Mike Waugh, CARB, April 5, 2006 regarding comments on the "Preliminary Draft Evaluation of Cold-Ironing of Ocean-Going Vessels at California Ports."

Response: The letter provided comments for ARB's draft report: Preliminary Draft Evaluation of Cold-Ironing of Ocean Going Vessels at California's Ports (Evaluation Report). This report evaluated the technical and cost-effectiveness of using shore power (cold-ironing) to reduce at-berth emissions for ocean going vessels based upon ship category. The report estimated the cost-effectiveness of using shore power three

different ways: for all ships that visit a port, for all ships that made three or more visits to a port, and for all ships that made six or more visits to a port. Estimates of cost-effectiveness were made for each ship category and for each port the ship category visited in 2005. While the final regulation is very different than the proposal reviewed in the Evaluation Report, ARB did consider all of the comments raised in this letter in the development of this regulation, particularly in the cost-effectiveness calculations. Because this letter did not address the regulation as it was published at the beginning of this rulemaking process, ARB does not respond to the letter in this FSOR.

PMSA correspondence with Clerk of the Board, CARB. April 19, 2006, regarding comments on the "Proposed Emission Reduction Plan for Ports and Goods Movement in California."

Response: This letter provided comments on the Proposed Emission Reduction Plan for Ports and Goods Movement in California. This report provided a plan to reduce emissions from the movement of goods, including activities at California ports. Because these comments do not apply to the regulation, the FSOR does not respond to the comments in this letter.

IV. SUMMARY OF COMMENTS AND AGENCY RESPONSES TO THE MODIFIED TEXT

Four written comments were received on the changes made to the regulation during the public comment period for the 15-day Notice (August 22, 2008 to September 8, 2008). A list of commenters is set forth in Table II below, identifying the date and form of all comments that were timely submitted. Following the list is a summary of each objection or recommendation made regarding the proposed action, together with an explanation of how the proposed action has been changed to accommodate the objection or recommendation, or the reasons for making no change. The comments have been grouped by topic.

Table II: Comments Received During the 15-day Comment Period

Abbreviation	Commenter
ACTI	John Powell ACTI Engineering Written Testimony: August 27, 2008
TBI	William G. Gotimer, Jr. Trailer Bridge, Inc. Written Testimony: September 3, 2008
MAERSK	B. Lee Kindberg, Ph.D. Maersk Inc. Written Testimony: September 8, 2008
PMSA	John McLaurin Pacific Merchant Shipping Association Written Testimony: September 8, 2008

A. Legal Authority

1. **Comment:** The ARB is preempted by federal law from implementing the regulation. The Board's authority in this rulemaking, derived from Health & Safety Code §§ 43013 and 43018, explicitly authorizes ARB to regulate marine sources only to the extent it is not preempted by federal law. The Board's authority derived from Health & Safety Code §39666 is also subject to federal preemption. In addition, the State's statutory authority to regulate emissions from mobile non-road sources is, to any extent, derived directly from the explicit grant of such authority under federal law. These regulations, similar to the previous regulations on auxiliary and diesel electric engines, have exposed several fundamental problems concerning the State's authority to impose such a regulation on vessels, both U.S.-flagged and foreign-flagged. Specifically, PMSA believes that the proposed regulations' paragraph (d) should not be adopted. This section places requirements on vessels that are inconsistent with, and contradictory to, existing statutes, court decisions and other provisions of law, and they exceed the rulemaking authority of the Board. (PMSA)

2. **Comment:** In 1990, Congress amended the Clean Air Act ("CAA") to authorize the U.S. Environmental Protection Agency (US EPA) to adopt emission standards and other requirements related to the control of emissions from non-road sources. Congress amended Section 209, which pertains to motor vehicle emission adding Paragraph (e) (1):

> No state or any political subdivision thereof shall adopt or attempt to enforce any standard or other requirement relating to the control of emission from either of the following new non-road engines or non-road vehicles subject to regulation under this chapter… (PMSA)

3. **Comment:** The CAA further defines a "non-road engine" as "an internal combustion engine (including the fuel system) that is not used in a motor vehicle." (42 U.S.C. section 7550(10)). The requirements of the regulation require the modification of the vessel that is preempted under the CAA. The evidence of the requirement to retrofit can be found in the first definition of in the regulation, "Alternative Control Technologies" (§ (c) (1)) that allows for anything "other than shutting down the engine." Because of the required modification of the vessel to comply, regardless of resulting emission reductions, the regulation is clearly in conflict with federal law and should not be implemented. (PMSA)

4. **Comment:** PMSA and CARB have both previously commented extensively on case law that make it clear that this proposed regulation is preempted by the CAA, the Port and Waterways Safety Act (PWSA) and OPA 90 (including Engine Manufacturers Association v. US EPA, 88 F.3d 1075 (D.C. Cir.1996) and United States v. Locke, 529 U.S. 89 (2000)). For this regulation the same arguments apply, as the state of California is preempted under federal law from imposing regulations that result in modifications to the vessels or their operation. (PMSA)

5. **Comment:** In summary, the proposed regulation should be invalidated because it violates the Congressional intent of the Clean Air Act, PWSA, OPA90, in addition to the commerce clause and other federal statutes, and violates the general preemption principles that "give force to the long standing rule that the enactment of a uniform federal scheme displaces state law."

Response: These comments are outside the scope of the 15-day changes; however, see response to Comments 2-4 in 45-day comment responses.

B. Do Not Adopt Regulation

6. **Comment:** The planning and acknowledgment of this rule will result in substantial costs to the industry that could affect the long term use of California ports as a gateway for imported and exported goods. Therefore it is imperative that the industry and CARB work to avoid otherwise unnecessary disruption of goods to and from California. The clearest and most direct way to work towards a mutually acceptable outcome that will yield significant results similar in scope and affect to those that are expected to accrue from the proposed rulemaking would be to work out a Memorandum of Understanding between industry and the Board.

To make the MOU fully actionable and comprehensive and consistent with Port plans, adopted pursuant to our proposed changes, it would need to be developed under a scenario that doesn't punish early adopters, recognizes that some vessels and marine terminals will be more suited for shore side power in the short-term than others, and acknowledge the lack of an international standard. We believe that the costs would be substantially reduced, the benefits accrued would be similar in significance to those presented to the Board at present, and that in such a scenario the proposed rules that are currently before you, with the exception of paragraphs (d), (e) and (f), could move forward without major industry opposition or the threat of litigation hanging over the Board.

A final consideration in favor of a voluntary MOU approach is the existence of the 1B bond funds, and the potential of other funding sources, that could be used to provide shore side infrastructure and/or ship retrofits in the absence of a regulation but would be restricted, if not precluded, after the regulations are approved. (PMSA)

Response: These comments are outside the scope of the 15-day changes; however, see response to Comments 5-6 in 45-day comment responses.

C. Regulated California Waters

7. **Comment:** the inclusion of the definition of "regulated California waters" is unnecessary and is in conflict with other definitions in the regulation.

PMSA has previously documented our concerns about the creation of the artificial concept of “Regulated California Waters” that is contrary to the authority granted to California by the federal government and has no basis in statute. In addition to those concerns, we strongly object to the inclusion of this definition in this regulation since it is entirely out of context. While we strongly believe that California is preempted by federal law from implementing this regulation, no one is contesting that California has control over the waters and Ports within three nautical miles of the California baseline. We readily concede that all California Ports are well within California’s jurisdiction of three miles from the baseline.

Therefore, not only is this definition unnecessary, the inclusion of this definition is also inconsistent and in conflict with the already included definition of California Ports in the regulation. The definition of “California Ports” for this regulation is restricted to six ports: Hueneme, Long Beach, Los Angeles, Oakland, San Diego, and San Francisco. The definition within the “Regulated California Waters” includes “all California ports,” not just the six that are subject to the regulation creating conflicting and confusing definitions of California Ports that could lead the reader to believe that all California Ports are covered.

The staff justification that the definition of “Regulated California Waters” is needed because it is included in section (b) (3) (A) is more easily and clearly resolved by modifying that section as follows:

“Ocean-going vessel voyages that consist of continuous and expeditious navigation through any of the Regulated California Waters for the purpose of traversing such bodies of water without entering California internal or estuarine waters or calling at a port, roadstead, or terminal facility, “continuous and expeditious navigation” included;”

Since the State of California has no claim or reason to affect the innocent passage of vessels there is any reason for the artificial concept of “Regulated California Waters” to further confuse and conflict with the stated purpose of the regulation to be imposed only on limited types of vessels at six selected ports in California. In order to avoid the conflicting definition of California Ports, and clarify that the application of the regulation only applies to the six ports listed above the obvious solution is to remove the definition of “Regulated California Waters” from the regulation. (PMSA)

8. **Comment:** The proposed definition of "Regulated Waters" is too broad and exceeds the scope of California's authority. There is no adequate legal authority cited for this broad definition, as mandated under California Government Code Section 11346.2(a) (2), and confirmed by recent court decisions. The stated intent of this definition for this section could be accomplished with much more general language, removing the question of jurisdiction. (MAERSK)

Response: ARB disagrees that the definition of "Regulated California Waters," as used in this regulation, is too broad. The definition of Regulated California Waters is tied to the exemption in subsection (b)(3)(A). Subsection (b)(3)(A) exempts from the requirements of the regulation "ocean-going vessels voyages that consist of continuous and expeditious navigation through any of the Regulated California Waters for the purpose of traversing such bodies of water without entering California internal or estuarine waters or calling at a port, roadstead, or terminal facility…." This regulation uses the same definition of "Regulated California Waters" as is used in other ARB regulations that affect ocean-going ships. Read together, the definition of Regulated California Waters has been modified to exclude voyages that do not result in visiting a port, roadstead, or terminal facility; therefore, such voyages are exempted from the requirements of the regulation.

ARB also disagrees that the use of Regulated California Waters within this regulation is confusing. The term is only used in conjunction with subsection (b)(3)(A). As discussed above, the exemption clearly exempts ships traveling through Regulated California Waters from the regulation for those trips that do not involve a stop at a port, roadstead, or terminal facility. Otherwise, the regulation clearly affects container vessels, passenger vessels, and refrigerated cargo vessels when these vessels are docked at berth at a California port, a California port being defined as one of six ports: Hueneme, Los Angeles, Long Beach, Oakland, San Diego, and San Francisco.

D. Include Boiler Emissions

9. **Comment:** The sentence from Requirements and Compliance Schedule (d) (2) (A) "…Specifically, at-berth auxiliary engine emissions must be reduced by 10 percent by January 1, 2010, 25 percent by January, 2012, …" should be modified to read "Specifically, at-berth emissions must be reduced by…" where the words 'auxiliary engines' have been deleted. (ACTI)

10. **Comment:** At-berth emissions include boiler emissions, and the ACTI system will reduce boiler emissions as well as auxiliary engine emissions, resulting in lower total emissions than if only the auxiliary engines were considered. Total emissions reductions should be the criterion. (ACTI)

Response: ARB disagrees. The intent of the regulation is to reduce emissions from auxiliary engines on ocean-going ships. The emissions from boilers are outside the scope of this regulation. Boiler emissions from ocean-going vessels were addressed in ARB's ocean-going vessels engines and auxiliary boilers regulation that was adopted by the Board in July 2008.

E. Other Ship Categories

11. **Comment:** Even if limited to California's Territorial Waters, this proposed regulation is a violation of the Commerce Clause of the Constitution. The regulation at hand affirmatively and facially discriminates in fact and in practical

effect against only selected vessels types, calling at selected ports. In so doing, the State is actively discriminating against vessels by choosing to regulate only those vessels that are engaged in interstate and foreign commerce. In fact, PMSA is not aware of any single vessel, much less any container, "reefer," or cruise vessels, plying intercoastal waterways in a purely intrastate capacity that meets the proposed definition of "Oceangoing Vessel." Simply put, this rule imposes requirements, fees, and penalties that only impact international trade and interstate commerce without any commensurate impacts on, or regulatory parity for, any other vessels involved in intrastate trade. (PMSA)

Response: ARB disagrees. To the extend that a fleet is only involved in intercoastal waterways trade and commerce, that fleet would be subject to the regulation if the fleet visits an affected port 25 or more times. The regulation affects all fleets that visit one of the affected ports 25 or more times, whether the fleet is involved in international, interstate, or intrastate trade. For related discussion, see response to Comments 15-26 in 45-day comment responses.

12. Comment: The Regulation is inherently discriminatory in nature. (PMSA)

PMSA has previously commented on the fact that the regulation is discriminatory, arbitrary and capricious, (PMSA comment letter of December 3, 2007) and will not repeat those comments here but do include them by reference. However, we expand on those previous comments with another example of staff's own assessment of alternatives that highlights that the selected regulatory process was not only discriminatory, but that its principle motivation for the proposed regulation was staff convenience rather than emission reductions.

Staff states, as part of the "Analysis of Alternative Regulatory Approaches" on page X-24 and X-26, " 1) targeting the highest-emitting ships to obtain the necessary reductions . . . Staff estimated that this regulatory approach would be as effective as the proposed regulation. An advantage to this approach is that it would identify the most cost-effective ships from which to reduce emissions; however, staff abandoned this approach because of the complexity and difficulty of tracking the ships that were required to reduce emissions."

In other words, staff decided that the most cost-effective and appropriate regulation should be discarded because it would be too difficult for staff to administer. Instead staff decided to that the regulation should only apply to three pre-selected types of vessels and they did not need to address either the frequency of visits, engine loads, or consider actual emissions from specific vessels at berth. The regulations simply require that terminals that receive more than 50 vessel calls in 2008 must complete terminal plans under the regulation. But only fleets of container, reefer vessels that make more than 25 visits to any of the six selected California ports, or passenger vessels that receive more than 5 annual visits will be subject to the regulation. In contrast, any other type of vessel, regardless of how many visits it makes to the same ports, or the amount

of emissions from that vessel are exempt from the requirements of the regulation. Designation by type of vessel without provisions to excuse infrequent calls of low duration and activity cannot be justified on the basis of air quality improvements and is clearly arbitrary and capricious under the stated objectives of reducing emissions from vessels at berth. As such, with these provisions the regulation is discriminatory in nature and arbitrary and capricious in application. In order for this regulation to avoid being clearly discriminatory it should be applied to vessels based on the stated criteria that can be directly related to emissions from those vessels.

Response: These comments are outside the scope of the 15-day changes; however, ARB disagrees that the regulations ARB developed to reduce at-berth emissions are affirmatively and facially discriminatory. ARB intends to develop regulations to reduce at-berth emissions from all ship types in a cost-effective manner. See response to Comments 8-14 in 45-day comment responses.

ARB disagrees that the regulation is discriminatory, arbitrary and capricious. As discussed in response to Comments 8-14 in 45-day comment responses, the ARB intends to develop regulations to reduce at-berth emissions from all ship categories. This regulation, the first regulation to require at-berth emission reductions, affects three ship categories—container ships, passenger ships, and refrigerated cargo ships. A second regulation will be developed to reduce the at-berth emissions from the other ship categories.

ARB disagrees that one of the alternative regulatory approaches was abandoned because it would be too difficult for ARB to administer. This approach would target the highest-emitting ships, typically the ships that make the most visits to a port, to obtain the necessary reductions. As stated in Chapter X of the TSD, "…staff abandoned this approach because of the complexity and difficulty of tracking the ships that were required to reduce emissions." The issues related to the tracking of ships with this approach are: 1) concern that ship operators could operate fleets to avoid thresholds identified in the regulation; 2) greater opportunity for inadvertent noncompliance by fleets—operators may not know which ships in their fleets should be in compliance due to constant re-deployment of ships; 3) significant tracking and recordkeeping requirements (greater than what is required by this regulation); and 4) enforcement issues. It was for all of the above reasons that the ARB decided to develop the regulation based on fleet emission reductions approach—not because the alternative imposes an unacceptable administrative burden to ARB.

F. Clarification of Vessel Type and Requirements

13. **Comment**: Please confirm that the definition of "type of vessel" when referring to "fleet" means the broad type (container, tanker, etc.), and not the individual class or size ship. The latter approach would greatly segment the fleets, resulting in significantly increased resource demands to ensure compliance without commensurate environmental benefit. (MAERSK)

Response: "Type of vessel" refers to the broad type of vessel, e.g., container ship fleet. The type of vessels does not refer to individual classes of ships.

14. **Comment:** The modified regulation requires additional clarification of the requirements of vessel fleets. PMSA has received comments that additional clarification of the intended application of § (d) (1) and § (d) (2) to vessel fleets is needed to avoid future confusion and inappropriate application of § (d) (2). We suggest some specific language in the Applicability and General Exemption Sections (§ (b) (b)), to the effect that "vessels fleets must communicate their decision to pursue vessel connection to a grid based shore power pathway under § (d) (1), that must be implemented on or before January 1, 2014, or a equivalent emission pathway under section § (d) (2), that may include multiple strategies to reduce emissions from a vessel at berth that may include grid based shore power, distributed generation, or other methods to reduce emission from a vessel at berth beginning on or before January 1, 2010. The pathway selection must be made by the vessel fleet and communicated to the executive officer by to July 1, 2009." (PMSA)

Response: ARB believes the regulation is clear with regard to choosing a compliance option. The two compliance paths are called "options," and there is language in the regulation that further clarifies choice—the introductory language in (d)(1)(A) and (d)(2)(A). Nevertheless, instead of imposing additional requirements, staff will continue to conduct substantial public outreach, including holding workshops, and providing informational material on ARB's webpage, to ensure affected companies are aware of the regulation's requirements.

G. Complexity of Compliance Options

15. **Comment:** We appreciate the inclusion of alternative compliance options and definition of requirements for credit for early action. However, we are concerned about the growing complexity and intrusiveness of these and other sections of the proposal. (MAERSK)

Response: ARB understands that the regulation can be considered complex. ARB believes that some of the complexity of the regulation was removed by consolidating the four previous compliance options into two, more-similar options.

The flexibility of the regulation provided by the technology-neutral Equivalent Emissions Reduction option necessarily requires considerable testing, record-keeping, and reporting to assure compliance. A variety of technologies could be used for compliance, each of them subject to verification of performance and proof of deployment.

Significant revisions, released as part of the 15-day revisions, included the early and excess emission reduction program, and revisions to the emergency event definition and the impact of these revisions on compliance. These two revisions were requested by several commenters, and the inclusion of these revisions required additional text, as

indicated by this commenter. ARB anticipates additional outreach efforts to assist the affected terminals, ports, utilities, and ship operators in complying with this regulation through additional workshops and the availability of fact sheets and compliance material through ARB's webpage.

16. Comment: For alternative compliance, the required reductions are calculated vs. a baseline defined as operating the auxiliary engines on MGO. (MAERSK)

a. It is unclear whether a cost justification was done using this basis.

b. It is unclear without more lengthy analysis how this might impact selection of alternative reduction technologies. However this provision appears to raise the bar significantly for alternatives to shore power. Alternative technologies must also be "verified," which has been demonstrated to be a slow and potentially costly process, which has been seen in other applications (e.g., diesel trucks) to result in periods without adequate verified commercially-available technologies.

Response: The 45-day version of the regulation included the requirement that the baseline emissions be determined based on the use of marine diesel fuel. The auxiliary engine regulation, which was expected to be effective when this regulation is in place, allows the use of both marine gas oil and marine diesel fuel. To be consistent with the requirements of this regulation, the 15-day revisions subsequently clarified that the baseline can be based on either marine gas oil or marine diesel fuel. The intent of this requirement was to allow only reductions to be used for compliance with the regulation that have not been encumbered by regulations that are in place—in this case, the auxiliary engine regulation. As discussed in the response to Comment 161 in the 45-day comment responses, the auxiliary engine regulation will reduce the emissions from uncontrolled levels of NOx emissions by six percent and PM emissions by 75 percent. Because this provision was intended to reflect the emission impact of existing regulations, no cost justification was done or was necessary for this provision.

Finally, this provision which reflects the expected emissions when the regulation becomes effective, should have no impact on the development of alternative control technologies to satisfy this regulation.

The regulation does not require that alternative control technologies be accredited through the verification program. Instead, the regulation has a procedure that ensures the reductions from the use of alternative control techniques are quantifiable and enforceable. In most cases, an initial emission measurement will be necessary. If the same technology is used on several ships, then only a representative sample would needed to be tested. After the initial source test, the regulation requires follow-up emission measurements or appropriate monitoring to ensure that the technology is operating properly.

The verification procedures for in-use strategies to control emissions from diesel engines require a significant amount of testing for a technology to be verified. This regulation does not require any additional testing for technologies that are verified for marine engines.

H. Emission Credit Use

17. **Comment:** Early reductions and excess reductions cannot be applied to 2014, but can be applied to other compliance dates. No rationale is given for this. All compliance dates should be eligible for early reduction and excess reduction credits—early reductions are beneficial to the community and should be encouraged. (MAERSK)

Response: ARB agrees that early reductions are beneficial to the community and should be encouraged. The intent of adding the availability of early and excess fleet emission credits is to provide the necessary incentives such that the fleets will reduce emissions earlier and maximize the reductions. Conversely, the use of these fleet emission credits will result in fewer reductions at later dates. For example, a fleet that can produce 100 tons of early credit prior to 2010 can use these fleet emission credits for compliance with 2010. The fleet complies for the purposes of the regulation, but in actuality, the fleet has a 100 ton shortfall for 2010. ARB believes the early and excess fleet emission credits are worthwhile as an incentive, but should not compromise important milestones in the regulation for 2014 and 2020. As discussed previously, the regulation's reductions are necessary for the South Coast Air Basin's compliance with the $PM_{2.5}$ ambient air quality standard in 2015. These reductions must be in place January 1, 2014, to be accredited toward complying with the ambient air quality standard. Consequently, the regulation does not allow the use of these credits for the 2014 milestone. To ensure that the regulation obtains all the reductions at full implementation, the regulation does not allow the use of these credits for the 2020 milestone. For both milestones, the diesel PM reduction is also significant and warranted for public health protection.

I. Calculations of PM Emissions

18. **Comment:** Calculation of PM emissions: It is not clear what standards apply to the methods used to calculate early action reductions, which is new to this rule. Page II-25 of the Revisions to Title 13 states that:

(C) In lieu of test data measured pursuant to paragraph (A) or (B) above, the following emission rates may be used as default values:

- 13.9 g/kW-hr for NOx.
- 0.38 g/kW-hr for PM if 0.11 to 0.5 percent sulfur marine gas oil or marine diesel oil is used as a fuel.
- 0.25 g/kW-hr for PM if 0.10 or less sulfur content marine gas oil or marine diesel oil is used as a fuel.

This language states effectively, that the difference between the current ARB requirement and actual fuel sulfur cannot be used without testing. Such an application would not provide credit to an operator who voluntarily used lower sulfur fuel than required under the [now-suspended] auxiliary engine fuel rule.

We believe that a calculation that takes into account specific fuel sulfur content, rather than just allowing two levels would more appropriately drive operators towards lower-sulfur fuel. Since such calculation methods exist, we believe that this should be substituted for the calculation above. Our calculations show that the difference between the actual and required fuel sulfur can be very important in estimating emissions reductions for early action credits. (MAERSK)

Response: The calculation procedures outlined in subsection (e) of the regulation are intended to determine compliance with the requirements of the regulation: determining the percentage of onboard power reduction or the percent reduction in emissions from the ship's auxiliary engines. Consequently, these calculation procedures do not apply directly to the determination of fleet emission credits.

The regulation does not specify specific calculation procedures for determining fleet emission credit. Fleet emission credits will be granted by the Executive Officer of the Air Resources Board, pursuant to the regulation, if the reductions can be quantified, and the reductions can be characterized as either early reductions—reductions occurring prior to the regulation requiring the reduction—or reductions exceeding the requirements of the regulation at the time the reductions are generated. The specific procedure that is appropriate to use to calculate fleet emission credit will depend upon the type of reduction. There is no single method to quantify all potential emission reduction options. Consequently, the regulation allows flexibility in the method that is used to quantify fleet emission credits, including the method proposed by the commenter.

Finally, in the calculation procedure outlined in subsection (e) of the regulation, a number of default values were provided. These default values were intended to simplify the calculations for the affected fleet operators by allowing the use of values that are consistent with "average values." These values may not be representative of all cases, but the regulation allows the ship fleet operator to provide their own values, if the values are supported with emission testing or other type of support information.

J. Shore Power and Other Technologies

19. **Comment:** We reiterate our positions that shore power ("cold ironing") is only one of a portfolio of reduction approaches, and should not be treated separately. (MAERSK)

a. Shore power is an expensive and inflexible technique, which benefits only those ports with significant installed infrastructure, and then only when

sufficient power is available and vessel engines are fully transitioned and off line.

b. More holistic approaches to vessel emissions reductions can yield greater reductions more quickly and at lower cost. These include fuel switching, on-board and shore-based after-treatment techniques, engine and vessel design improvements, exhaust heat recovery, and higher efficiency on-board operating/control equipment for high energy use applications like refrigerated containers.

c. Over-segmentation and prescriptive technology requirements will reduce investment in other technology innovations.

Response: ARB agrees that shore power will require the ports, terminals, and ship operators to invest significantly in technology to allow shore power usage. However, such investment will result in significant emission reductions. Given that the use of grid-based shore power will be the technique of choice to reduce emissions when ships are at-berth, the regulation was developed considering two compliance options: grid-based shore power and the use of emission reduction techniques that obtain an equivalent emission reduction. These techniques could include shore power, distributed generation, on-board emission reduction devices, or shore-based emission reduction devices. In summary, the regulation provides an option—the Equivalent Emissions Reduction Option—that allows different emission reduction techniques to be used to provide the necessary emission reductions, as long as these reductions can be quantified and are enforceable.

ARB agrees that prescriptive technology requirements will reduce the development of innovative techniques. ARB believes the suggested modifications affecting the compliance methods and schedules addresses this concern. These revisions, part of the staff's suggested modifications approved by the Board and issued as a 15-day revision, both simplify the compliance options and also provides for a technology neutral path to comply with the regulation.

K. 3 - 5 Hour Auxiliary Engine Use Provision

20. **Comment:** There will be a period of time during shore power connect and also prior to shore power disconnect when the auxiliary engines will be operating. This time is not accounted for. (ACTI)

Response: For fleets that are complying with the Reduced Onboard Generation option of the regulation [(d)(1)], the regulation limits the operation of auxiliary engines to three hours per visit for each visit that is intended to comply with the requirements of (d)(1). See response to Comments 121and122 in 45-day comment responses, for more detail regarding the establishment of this limit.

L. Violation Calculations

21. **Comment:** The section on calculating violations defines an entirely new approach to such calculations. (Pages 43-45 of Attachment II and also Attachment IV). The staff reports recognize that this is a change and state that the constants selected were "mathematically determined to achieve the effective economic disincentive." No detail on this mathematical determination was provided, and the 15-day comment period is insufficient for careful analysis of the potential legal and economic ramifications. We are not aware of other rules where the number of violations is calculated based on emissions or energy use divide by an arbitrary constant. As written this is not a "mere clarification" of the previous rule but an entire new penalty scheme, the function of which is untested and unclear. This hardly putting the regulated community on notice as to what their damages may be, even for inadvertent compliance. This leads to a final point: the formulae do not take into account intent and good faith efforts at compliance or force majeure, and thus may be too rigid and inequitable. (MAERSK)

Response: The ARB disagrees that subsection (h) of the regulation defines an entirely new approach to calculating violations. Furthermore, this revision is not a clarification: staff recommended, and the Board approved, that revisions to the violations subsection of the regulation needed to be made to clearly delineate what is a violation when the vessel fleets do not comply with the fleet-averaging provisions of the regulation. (See Attachment B of Resolution 07-57.)

ARB held a workshop on February 22, 2008, to discuss with stakeholders proposed revisions to the regulation, including revisions to violations section. The proposed revisions to the violations section were well-received because they better defined when violations of a fleet-averaging requirement occurred during a compliance period.

Without the revisions, some interpreted that if a vessel fleet did not meet the requirements of the regulation—say, did not meet the minimum percentage of visits using shore power in a calendar quarter—then the fleet was in violation for the entire quarter, regardless of the amount of the shortfall. Fleets that barely missed the performance standard during a compliance period would have as many violations as those that did not come close to the performance standard.

ARB proposed mathematical formulae in the revised regulation to determine the number of violations occurring when a fleet-averaging requirement was not met during a compliance period, thereby alleviating this inequity. The concept of determining the number of violations based on mathematical formulae has been used in other ARB regulations. For example, this concept is used in the ARB regulation: alternative control plan regulation for consumer products and aerosol coating products—Title 17, CCR, section 94546.

Regarding the specifics of the formulae, ARB developed the formulae to provide sufficient disincentive for noncompliance. ARB calculated several scenarios of noncompliance—not using shore power or control equipment, etc.—determined the cost of that noncompliance, and developed formulae that, at a minimum, would result in a potential penalty three to four times as high as the cost of noncompliance. ARB did not provide a penalty schedule for noncompliance, as those penalties are determined on a case-by-case basis using criteria in the Health and Safety Code. The formulae only determine the number of violations.

Please note that subsection (e) of the regulation addresses regulatory relief from requirements due to emergency events. In these cases, the fleet calculations are adjusted and therefore not subject to enforcement action. The emergency event definition includes many cases where the ship operator intends to use shore power, but shore power is unavailable due to equipment breakdown or utility power issues—the "good faith effort" of the ship operator is recognized by the regulation in that this visit is not counted against the fleet.

M. Terminal Plan

22. **Comment:** The Terminals' Plan Responsibility should be on the Port Authorities. While PMSA is appreciative of the efforts by CARB staff to take some reasonable steps in accommodating the complexities of the international maritime industry, the proposed regulations still threaten the viability of the established business models in operation at the ports of California, potentially upset existing lease agreements, and will throw our ports out of balance with ports throughout the rest of the country and internationally. (PMSA)

23. **Comment:** As we have repeatedly asserted, PMSA continues to believe a more reasonable approach would be to place this planning burden upon the port authorities which are the only entities with land-use authority, retain ownership of capital improvements, and have the same access to cargo and vessel forecasts as terminal operators. We believe that the elevation of the terminal plans to Port plans will not only result in more robust and accurate predictions of future fleet operations but will also result in a more uniform approach to implementation of the requirements of the regulation and infrastructure investment. (PMSA)

Response: These comments are outside the scope of the 15-days changes; however, see response to Comments 150-156 in 45-day comment responses.

24. **Comment:** The fleet and vessel plans due beginning July 2009 now require individual vessel detail out through 2020. This is an extraordinary timeframe and level of detail for an industry where redeployments of vessels and whole routes is common. Our operations experts report the following challenges with the proposed requirements:

a. Marine terminals do not have the vessel information required to develop a plan that is valid for any extended period. The terminal is not responsible for planning and deciding which ships call at their terminal.

b. Carriers change their plans frequently—every three months is a typical frequency. Any projection of vessels calls into the distant future is thus highly unreliable. (MAERSK)

25. **Comment:** While PMSA appreciates the extensive efforts of staff to develop instructions and forms for the terminal operators to assist in the preparation of terminal plans, our primary concerns remain that, without the full cooperation of the Port authorities, public utilities, and the ocean-carriers, the information requested of the terminal operators is unlikely to be more than a "best guess." This is especially true when the terminal plans provided in July 2009, will have to predict the deployment and characteristics of use of vessels beginning as late as 2014. Given the highly dynamic nature of international trade the accuracy and value of these predictions are likely to be inaccurate requiring extensive modifications at a future date. (PMSA)

Response: ARB agrees that long-range forecasts of ship movements to and from California ports are difficult to prepare with a high level of confidence, especially beyond 2014. However, such estimates are necessary to ensure that the development of the shore-side infrastructure is adequate and that the ships are modified so that they will be able to use the infrastructure to satisfy the requirements of the regulation. For example, a vessel fleet operator may have plans to bring more or larger vessels to the terminal in the next several years. Larger vessels require higher levels of power; more vessels may require additional berths to be electrified.

For the terminal plans, which are due by July 1, 2009, the regulation requires the terminal operator to provide information on the shipping activity and the schedule for providing the shore-side infrastructure necessary for the fleets to satisfy the requirements of the regulation. The regulation assumes that the terminal operator will work with the operators of the fleets that frequent their terminal to provide the necessary information on the fleets for the terminal plan. The information identified in the regulation for the fleet is provided on a fleet basis and no information is required for any specific ship. ARB only expects that the ship operators will provide the best estimate and, if necessary, these estimates can be updated as part of plan updates, as required by the regulation.

For the vessel plans, the regulation requires detailed ship information for the applicable milestone. However, since the vessel plans are due six months prior to the applicable milestone, ARB believes that the fleet ship operators are able to provide specific information on the affected ships for the milestone that is applicable six months after the plan is submitted to the Executive Officer of the ARB. In recognition that the ship operators have historically changed their ship activity plans frequently, the regulation requires only fleet level information for other milestones that will become applicable

after six months. Finally, we note that the information provided is a plan, not a commitment.

N. Annual Statement of Compliance

26. Comment: An annual statement of compliance is required starting March 2011. This report requires vessel specific emissions calculations, TEU capacities and calculated energy use.

a. We would like to confirm that the required reports are annual and not expected to be updated with each vessel redeployment.

b. There is no legal definition of vessel TEU capacity. Nominal capacity is declared by each vessel owner.

c. We also question whether the paperwork burden has been considered for both the industry and the staff. (MAERSK)

Response: The annual statement of compliance is filed once a year, representing compliance with the regulation for the previous year. The fleet information provided for the annual statement of compliance should address vessels that visited one of the six California ports affected by the regulation for the previous year. Redeployment of individual vessels does not affect compliance. The compliance report will simply indicate which vessels in the fleet visited that port, how many total visits were made by the fleet, what mitigation measures were employed for those visits, and whether or not the applicable performance standards were met by the fleet for the compliance period.

ARB understands that there is no legal definition of twenty-foot-equivalent unit (TEU) capacity for container ships and, consequently, there is some variation in the reported TEU capacity in the industry. However, since TEU capacity is related to the overall size of the vessel, and therefore is one of the indicators of the potential power usage by the ship, it provides ARB staff with a cross reference to check the power usage listed for the fleet in the annual statement of compliance. A nominal TEU capacity for a vessel can be used for reporting, as long as that figure is used consistently.

ARB understands that the recordkeeping requirements of the regulation can appear burdensome. The degree of recordkeeping is related to the flexibility of the regulation—numerous technologies can be used for compliance, and each of these technologies and their employment must be well-documented—and the fact that the vessels sail away. When the regulated source—the vessels—depart, an enforcement officer must rely on records to determine what occurred during the visits. For example, if the vessel were to use shore power during a visit, a log of connection, electrical use, and disconnection could confirm that. Recordkeeping costs were included in staff's cost analysis for this regulation.

Moreover, while fleet averaging provides the affected fleets flexibility for satisfying the requirements of the regulation, it is also more difficult to enforce. Compliance cannot be verified by testing one ship. Instead, the enforcement is based on recordkeeping for the

entire fleet. The proof that the fleet is complying with the regulation is based on records kept for each ship in the fleet and the subsequent reports—the annual statement of compliance—submitted to the Executive Officer. The records to be retained by the fleets are the minimum necessary to demonstrate compliance with the rule.

ARB intends to work with the affected fleets to minimize the recordkeeping efforts by developing the necessary forms, providing for electronic submittal, and providing assistance, such as training workshops. Additionally, the development of these forms will clearly define what is necessary to demonstrate compliance with the regulation.

O. Cost Effectiveness

27. **Comment:** We stand by the comments on this program which we submitted in 2006 (Attachment A), and feel they have not been fully addressed**.** Therefore, we ask that these be incorporated again into the record. In particular, our comments on cost effectiveness and economic impacts were not addressed; as documented, we believe the cost effectiveness analysis is inaccurate, and therefore the underlying justification for the rule is unsupported. In addition, no new cost-impact data is provided in these revisions, and we believe the impacts could be significant. (MAERSK)

28. **Comment:** The ultimate cost and benefit of the modified regulation are significantly different from those of the regulation approved by the Board. PMSA and others have previously commented that there is substantial uncertainty of the impacts and benefits of this regulation primarily due to the uncertainties in the cost of the shore-side infrastructure, the cost to modify the vessels, and the variability in vessel visit duration and auxiliary engine load while at berth. Now, because of the additional requirements that vessel fleets' compliance will now be enforced on percent emissions reductions in addition to percent vessel calls, our members are faced with a radically different regulation. The economic impacts of meeting both requirements has not been assessed anywhere in the record supplied by staff. The cost-effectiveness of adding this requirement is non-existent and, we believe significant. Because of this radical change to the nature of the regulation, the consequences of which were not provided to the Board when making there decision, PMSA insists that the economic impacts of the revised regulation be completed and the results of that analysis be provided for full public review and comment. Following the public review, the regulation, with the completed staff analysis, should be submitted to the Board for re-consideration. (PMSA)

Response: ARB disagrees that the cost-effectiveness analysis for the regulation is inaccurate. Additionally, the first commenter indicated that comments provided on the ARB draft report: Evaluation of Cold-ironing Ocean-Going Vessels at California Ports (2006), particularly the comment on cost effectiveness and economic impacts were not addressed.

As discussed in the section “Comments by Reference” of the 45-day Comments, the comments on this report are not directly applicable to the regulation. However, ARB considered all of the comments received on the 2006 Draft Evaluation report, and discussed these comments extensively with stakeholders at a workshop on January 11, 2007.

For example, ARB revised the hotelling times for ships used in the analysis in response to the comment that hotelling times for 2004 were not representative due to labor issues. In response to the comment that ships are regularly re-deployed to different parts of the world by ship operators, ARB assumed, for the cost-effectiveness analysis, that each ship would be re-deployed during the regulatory period which resulted in twice the number of ships being equipped with shore power equipment. Consequently, the cost to modify ships represents about 80 percent of the total cost for the regulation. In response to the comment that sample terminals do not correctly represent the container industry as a whole, cost-effectiveness estimates were provided in Chapter X of the TSD that indicated the range of cost-effectiveness on a terminal basis for all terminals affected by the regulation. These terminal-based cost-effectiveness analyses used the specific data applicable to that terminal, including hotelling times unique to the ships that visit the terminal and the ship specific characteristics for that terminal during 2006 (power needs, number of visits, etc). Finally, in response to the comments on the cost of electrical power, ARB consulted with the utilities and used the appropriate electricity utility tariff schedules for shore power.

ARB agrees that there are uncertainties in determining the impacts and benefits of the regulation. Because of this uncertainty, ARB took a conservative approach in developing the cost-effectiveness analysis by using conservative estimates of cost of shore-side infrastructure and ship retrofit costs—values that were not the highest in the range of information collected by ARB, but were well above the average of the range of information collected by ARB. In addition, as discussed above, the variation of hotelling times was accounted for in the terminal specific analysis. In summary, the regulation is cost-effective using ARB’s conservative approach. ARB anticipates that the actual costs will likely be lower and the regulation will prove to be more cost-effective than staff estimated. For example, the auxiliary engine fuel price used in the cost-effectiveness analysis conducted for the TSD was $550 per metric ton. Since that time, fuel prices have reached as high as $1,300 per metric ton and continue to hover around $1,000 per ton. At those prices, turning off the auxiliary engines and using shore power would be even more cost-effective.

While significant changes to the compliance options of the regulation have been made, and issued as part of the 15-day modified regulation order, these revisions do not affect the overall cost of the regulation. As discussed above, the regulation has two paths for compliance. The main compliance option initially was based upon requiring a certain percentage of visits satisfy a limited auxiliary engine operation limit. The regulation’s cost was based upon compliance with this option, since the technique of choice will most likely be grid-based shore power. As part of the 15-day modified regulation order, an additional requirement was added that requires the fleets’ onboard electrical

generation be reduced by 50 percent in 2014, 70 percent in 2017, and 80 percent in 2020. ARB added this provision before the Board hearing to assure sufficient emission reductions would be achieved with grid-based shore power. Power requirements are directly related to emissions.

The impact of this revision on most fleets is that no additional ships will need to be modified to add shore power equipment, but some ships in the fleet may need to be modified sooner. ARB has determined that only one of the 64 affected fleets may need to modify one additional ship. As indicated in Chapter X of the TSD, the regulation is expected to affect 1,450 ships, and the cost to modify ships is 80 percent of the total cost of the regulation: the cost to modify this additional ship is insignificant compared to the total cost to modify all 1,450 ships. Consequently, the revision is not expected to change the cost of the regulation.

29. Comment: We particularly question the cost-effectiveness of shore power when layered on top of other emissions reductions programs such as vessel engine fuel and technology requirements and vessel speed reduction. (MAERSK)

Response: See Comment 161 in the 45-day comments responses on assumptions regarding applicable baseline fuel. ARB assumed that the auxiliary engine fuel regulation would remain in place when this regulation takes effect. The costs and benefits of the regulation were based on this assumption. If heavier, higher-sulfur fuels are used in auxiliary engines when this regulation takes effect, the benefits of this regulation will mushroom, as the emission reductions credited to this regulation will be substantially greater.

In addition, the vessel speed reduction (VSR) program that is being considered by ARB would have no impact on reducing at-berth emissions and therefore would also have no impact to the cost effectiveness of the regulation. The VSR regulation would only affect the emissions of the ship while the ship is traveling in open waters.

P. 15-Day Comment Period

30. Comment: The 15-day comment period is entirely too brief for full analysis of changes so far-reaching and detailed. This is especially true for a notice issued after business hours on a Friday in late August, when many people are on vacation or out of the office. (MAERSK)

a. Under California Government Code Section 11346.4(a), CARB is required to provide notice of its proposed regulations at least 45 days prior to the hearing and close of any public comment period. We note CARB is allowing only 15 days for public comments in response to the regulations published on August 22, 2008. This is not adequate time. The 15-day period must be expanded to 45 days as the 15-day comment period is not authorized by law. Under California Government Code Section 11346.8 CARB is allowed to

adopt or amend an existing proposed regulation allowing 15 days public notice only when changes to a proposed regulation are "nonsubstantial," "solely grammatical in nature," or "sufficiently related to the original text that the public was adequately placed on notice."

b. The changes announced on August 22, 2008, are substantive, complex and require careful evaluation as an entirely new proposal. Entirely new sections and new definitions were added, and the calculations methodologies provided for alternative compliance require additional technical analysis. In addition, the approach to defining number of violations based on energy use or pounds emitted appears to break entirely new ground. The fact that Staff took eight months to write the modifications is evidence enough that these are complex, substantive and merit a new public review period as this is, in reality, a new proposed set of regulations.

c. These changes materially alter the scope of the rules and the timetables for compliance, and are much more than mere clarifications. We reserve the right to submit additional comments within 45 days upon a more thorough review of the proposal.

Response: ARB understands that the 15-day revisions were substantial compared to the proposed draft regulation originally released October 9, 2007, but disagrees that the 15-day comment period was too brief to review these revisions.

After considering stakeholder input during the 45-day comment period, staff recommended to the Board a proposed regulation that contained significant modifications. These modifications were enumerated in Attachment B of Board Resolution 07-57. As staff began making these and Board-directed revisions to the adopted regulation, staff held a workshop on February 22, 2008, to distribute and discuss with stakeholders the revised regulation.

Furthermore, staff met personally with representatives of the commenter on March 6, 2008, to discuss the revised regulation, as released for the February workshop. Staff also held joint workshops with the Port of Los Angeles on May 7, 2008, and the Port of Long Beach on May 1, 2008, to discuss the requirements of the revised regulation. Representatives for the commenter attended all three workshops. Although the last edits to the regulation were not completed until shortly before the 15-day comment period, staff asserts that there was ample opportunity to discuss the revised regulation.

Moreover, staff disagrees that the 15-day revisions should be subject to a 45-day review. California Government Code Section 11346.8(c) states, in part: “No state agency may adopt, amend, or repeal a regulation which has been changed from that which was originally made available to the public pursuant to Section 11346.5, unless the change is… (2) sufficiently related to the original text that the public was adequately placed on notice that the change could result from the originally proposed regulatory

action. If a sufficiently related change is made, the full text of the resulting adoption, amendment, or repeal, with the change clearly indicated, shall be made available to the public for at least 15 days before the agency adopts, amends, or repeals the resulting regulation." ARB released for public review the revised regulation as 15-day revisions on August 22, 2008. The revisions to the regulation were sufficiently related to the original text and well within the scope of original notice.

Q. Proprietary Information

31. **Comment:** Some of the information requested may well constitute confidential or proprietary business information, yet provisions to safeguard against unauthorized and inappropriate public disclosure are not included in the rules. (MAERSK)

32. **Comment:** We are concerned about the potential release of proprietary information included in these forms and in the fleet plans. CARB should provide a process to allow for companies to specify that the information they are providing is proprietary in nature and should not be made public without expressed written permission. (PMSA)

Response: ARB agrees that some of the information that is required by the regulation for the annual statement of compliance may be confidential. The Responsible Official signing the annual statement of compliance should identify which portions of the statement are considered confidential. Any information identified as confidential in the annual statement of compliance will be treated as confidential pursuant to the California Public Records Act.

V. CORRECTIONS TO NON-CANCER HEALTH IMPACTS AND VALUATIONS, AND TO REFERENCES IN THE TECHNICAL SUPPORT DOCUMENT

ARB notes the following corrections to the non-cancer health impacts and valuations and to the references in the Technical Support Document.

1. Non-Cancer Health Effects and Valuations

ARB underestimated the non-cancer health impacts and valuations that were presented in Chapter VIII of the Technical Support Document. ARB did not take into account the emission reductions from 2020 to 2030 from container ships when determining the health impacts that would be avoided from implementing the regulation and the economic value of avoiding those impacts. The majority of ships impacted by the regulation will be container ships. These ships are periodically deployed to other areas of the world requiring other ships to be repositioned to serve California ports. These other ships will need to be retrofit in order to connect to shore power when at a California port. Consequently, ARB assumed a longer lifetime for the regulation (2009-2030) when determining the costs to container ship companies for complying with the regulation and the total emission reductions attributed to implementing the regulation.

Non-Cancer Health Effects

The statewide cumulative impacts of the emissions reduced through this regulation from year 2009 through 2030 are approximately:

- 990 premature deaths (280 to 1700, 95% confidence interval (CI))
- 210 hospital admissions due to respiratory causes (140 to 290, 95% CI)
- 390 hospital admissions due to cardiovascular causes (250 to 600, 95% CI)
- 29,000 cases of asthma-related and other lower respiratory symptoms (11,000 to 46,000, 95% CI)
- 2,400 cases of acute bronchitis (0 to 5,100, 95% CI)
- 170,000 work loss days (140,000 to 200,000, 95% CI)
- 1,000,000 minor restricted activity days (810,000 to 1,200,000, 95% CI)

The following table lists the impacts associated with primary and secondary diesel emissions separately. The methodology for estimating these health impacts can be found in Appendix A of the Emission Reduction Plan for Ports and Goods Movement in California (ARB, 2006) [1].

[1] http://www.arb.ca.gov/planning/gmerp/march21plan/appendix_a.pdf

Table III: Estimated Total Health Benefits Associated with Reductions in Hotelling Emissions from Container Ships, Passenger Ships, and Refrigerated Cargo Ships (2009-2030)*

Endpoint	Pollutant	# of Cases 95% C.I. (Low)	# of Cases (Mean)	# of Cases 95% C.I. (High)
Premature Death	PM	78	280	490
	NOx	200	710	1,200
	Total	*280*	*990*	*1700*
Hospital admissions (Respiratory)	PM	39	61	84
	NOx	96	150	210
	Total	*140*	*210*	*290*
Hospital admissions (Cardiovascular)	PM	71	110	170
	NOx	180	280	430
	Total	*250*	*390*	*600*
Asthma & Lower Respiratory Symptoms	PM	3,200	8,400	13,000
	NOx	8,100	21,000	33,000
	Total	*11,000*	*29,000*	*46,000*
Acute Bronchitis	PM	0	690	1,500
	NOx	0	1,700	3,600
	Total	*0*	*2,400*	*5,100*
Work Loss Days	PM	42,000	50,000	58,000
	NOx	100,000	120,000	140,000
	Total	*140,000*	*170,000*	*200,000*
Minor Restricted Activity Days	PM	230,000	290,000	340,000
	NOx	580,000	710,000	840,000
	Total	*810,000*	*1,000,000*	*1,200,000*

* Health effects from primary and secondary PM are labeled PM and NOx, respectively. The sum of PM and NOx impacts may not equal the total given due to rounding.

Economic Valuation of Non-Cancer Health Effects

The table below lists the valuation of avoiding various health effects, compiled from the ARB and U.S. EPA publications—updated in 2006 dollars. The valuations based on willingness to pay (WTP), as well as those based on wages, are adjusted for anticipated growth in real income.

Table IV: Undiscounted Unit Values for Health Effects (At various income levels in 2006 dollars) [A]

Health Endpoint	2007	2009	2030	References
Mortality				
Premature death ($ million)	8.2	8.3	9.5	U.S. EPA (1999, p. 70-72, 2000, (2004, p. 9-121)
Hospital Admissions				
Cardiovascular ($ thousands)	44	45	57	ARB (2003), p. 63
Respiratory ($ thousands)	36	36	47	ARB (2003), p. 63
Minor Illnesses				
Acute Bronchitis	452	454	474	U.S. EPA (2004), 9-158
Lower Respiratory Symptoms	20	20	21	U.S. EPA (2004), 9-158
Work loss day	192	198	273	2002 California wage data, U.S. Department of Labor
Minor restricted activity day (MRAD)	64	64	67	U.S. EPA (2004), 9-159

[A] The value for premature death is adjusted for projected real income growth, net of 0.4 elasticity. Wage-based values (Work Loss Days) are adjusted for projected real income growth, as are WTP-derived values (Lower Respiratory Symptoms, Acute Bronchitis, and MRADs). Health endpoint values based on cost-of-illness (Cardiovascular and Respiratory Hospitalizations) are adjusted for the amount by which projected CPI for Medical Care (hospitalization) exceeds all-item CPI.

Benefits from the implementing the regulation are substantial. ARB estimates cumulative benefits over the period from 2009 to 2030 to be nearly $5.7 billion using a three percent discount rate or $3.1 billion using a seven percent discount rate[2]. A large proportion of the monetized benefits results from avoiding premature death. The estimated benefits from avoided morbidity are approximately $87 million with a three percent discount rate and nearly $49 million with a seven percent discount rate. Approximately 71percent of the benefits are associated with reduced PM from NOx emissions, and the remaining 29 percent from direct PM emissions.

2. References

There were title names and date errors in the references for various chapters in and appendices to the Technical Support Document (TSD). In addition, one reference was inadvertently included in a chapter and appendix to the TSD. ARB notes the following corrections to the references by chapter and appendix.

[2] ARB follows U.S. EPA practice in reporting results using both three percent and seven percent discount rates.

1) References at the end of Chapter III:

Dates were changed to three references and should appear as follows:

Port of Oakland. *Maritime: Terminal Specifications*; October 12, 2007. http://www.portofoakland.com/maritime/terminal.asp

Port of Long Beach. *Trade/Commerce: Cargo/Tenants – Containerized, Dry Bulk, Liquid Bulk, Break Bulk & Ro Ro*; October 12, 2007. http://www.polb.com/economics/cargotenant/default.asp

Port of Los Angeles. *Facilities: Passenger Terminal, Automobile Terminal, Breakbulk Terminals, Container Terminals, Dry Bulk Terminals, and Liquid Bulk Terminals*; October 12, 2007 http://www.portoflosangeles.org/facilities.htm

2) References at the end of Chapter IV:

Dates were changed to two references and should appear as follows:

Hollman, Michael (MPH). "Cold ironing gathers momentum." *Germanischer Lloyd nonstop*. Edition 2: 26-27. February 2006. http://www.gl-group.com/images/glgroup/nonstop_2006-02_E.pdf

Port of Los Angeles. "Evergreen Group's First 'Green' Mega Ship, Ever Superb, Makes Her Maiden Call at the Port of Los Angeles." Press Release. September 20, 2006. http://www.portoflosangeles.org/Press/REL_Ever_Superb_First_Call.pdf

3) References at the end of Chapter VII:

The date was deleted from one reference and changed for four others and should appear as follows:

Advanced Cleanup Technologies, Inc. *ACTI When Experience Counts*; Informational Brochure

Public Utilities Commission (PUC). Chapter 3, Article 1, Section 451-457; Public Utilities Code. Date accessed: October 17, 2007. http://www.leginfo.ca.gov/cgi-bin/displaycode?section=puc&group=00001-01000&file=451-467

Sea to Sky Pollution Solutions. *WiFE on Demand*; October 2, 2007. http://www.seatoskypollutionsolutions.com/solution-wife.php

U.S. Department of Transportation Maritime Administration Office of Shipbuilding and Marine Technology. *Energy Technologies. Newsletter No. 3*, Spring 2003. http://www.marad.dot.gov/nmrec/energy_technologies/images/ETNo3Spring03.htm Date accessed: October 17, 2007

U.S. Department of Transportation Maritime Administration Office of Shipbuilding and Marine Technology. *Energy Technologies. Newsletter No. 2*, Fall 2002. http://www.marad.dot.gov/nmrec/energy_technologies/images/ETNo2Fall2002.htm Date accessed: October 17, 2007.

In addition, the following reference was deleted as it does not pertain to the chapter:

Joseph Calavita, California Air Resources Board. Personal communication. October 5-6, 2006.

4) References at the end of Chapter VIII:

The date was changed in one reference, and the title was changed in another. The references should appear as follows:

Metallextraktion AB (MEAB). September 2003. http://www.meab-mx.se/en/index.htm

United States Environmental Protection Agency, Assessment and Standards Division, Office of Transportation and Air Quality. *Draft Regulatory Impact Analysis: Control of Emissions from Nonroad Diesel Engines*. EPA420-R-03-008. CD-ROM. April 2003. http://www.epa.gov/otaq/cleaner-nonroad/r03008.pdf

5) References at the end of Chapter X:

Dates were changed to three references and should appear as follows:

Pacific Gas and Electric Company. "Tariff Book." Pacific Gas and Electric Company. March 19, 2005. http://www.pge.com/tariffs/ERS.SHTML#ERS (PG&E, 2005)

San Diego Gas and Electric. "Electric Tariff Book - Commercial/Industrial Rates." San Diego Gas and Electric. May 29, 2005. http://www.sdge.com/regulatory/tariff/elec_commercial.shtml

Southern California Edison. "Regulatory – SCE Tariff Books, General Service – Industrial Rate Schedules." Southern California Edison. April 14, 2005. http://www.sce.com/AboutSCE/Regulatory/tariffbooks/ratespricing/businessrates.htm

6) References at the end of Appendix B:

The date and title was changed in one reference and should appear as follows:

California Air Resources Board. *A Critical Review of Ocean-Going Vessel Particulate Matter Emission Factors*; October 9, 2007. In press.

7) References at the end of Appendix F:

The date was deleted from one reference and changed for another and should appear as follows:

Advanced Cleanup Technologies, Inc. *ACTI When Experience Counts*; Informational Brochure

DieselNet. *Diesel Emission Control*; DieselNet Technology Guide. August 29, 2007. http://www.dieselnet.com/tech/engine_control.html

In addition, the following reference was deleted as it does not pertain to the chapter:

Joseph Calavita, California Air Resources Board. Personal communication. October 5-6, 2006.