California Environmental Protection Agency

Air Resources Board

LOCATION:
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

This facility is accessible by public transit. For transit information, call (916) 321-BUSS, website: http://www.sacrt.com
(This facility is accessible to persons with disabilities.)

PUBLIC MEETING AGENDA

OCTOBER 25 & 26, 2007

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

October 25, 2007
9:00 a.m.

Item #

07-10-1: Health Update: The Association between Exposure to Traffic-Related Air Pollution and Adverse Health Effects in Adults

Health effects from traffic-related air pollution have recently received much media attention and the subject is an important research priority at ARB. Effects have been observed for both short- and long-term exposures. Staff will present findings from several new studies examining associations between traffic-related pollution and outcomes such as: asthma, respiratory symptoms, heart disease, heart attacks, strokes, some cancers, and death. A previous Health Update focused on the impacts of traffic pollution in infants; this Health Update will focus the discussion on health effects found in adults and the elderly.

07-10-2: Public Meeting to Consider Approval of Additions to the List of Early Action Measures to Reduce Greenhouse Gas Emissions under the California Global Warming Solutions Act of 2006 and to Discuss Concepts for Promoting and Recognizing Voluntary Early Actions

Staff will present for the Board's consideration proposed early action measures for climate change mitigation to be added to the list of 37 strategies approved by the Board at its June 21, 2007 Hearing. The additional proposed early actions consist of both regulatory and non-regulatory strategies that were identified following further analysis of stakeholder suggestions. The recommended additions triple the list of discrete early actions previously approved by the Board as well as increase the total number of early action commitments to 44 emission reduction strategies with total reductions in 2020 estimated at approximately 42 million metric tons measured in carbon dioxide equivalents. Following the discussion of the recommended additions to the list of early actions, staff will propose a framework for developing methodologies for the quantification of voluntary greenhouse gas emission reductions, and seek the Board's direction.

07-10-3: Public Meeting to Consider Proposed Adoption of California Climate Action Registry Forestry Greenhouse Gas Protocols for Voluntary Purposes

The Global Warming Solutions Act of 2006 (AB 32) encourages voluntary actions to reduce greenhouse gas emissions. The California Climate Action Registry (CCAR) has developed a cohesive set of forestry protocols for accurate carbon accounting from the forest sector. Staff will recommend the Board adopted the CCAR forestry protocols for purposes of voluntary emission reductions.

07-10-4: Public Meeting to Consider the Approval of the San Joaquin Valley PM10 Maintenance Plan and Redesignation Request

The San Joaquin Valley Air Pollution Control District (Valley) has attained the PM10 National Ambient Air Quality Standards ahead of the projected 2010 attainment date. The Board will consider approval of the Valley's PM10 Maintenance Plan and Redesignation Request.

07-10-7: Public Hearing to Consider Amendments to Regulations Regarding New Aftermarket and Used Catalytic Converters Offered for Sale and Use in California

The staff will present amendments to the Board to strengthen performance requirements and approval procedures for new aftermarket catalytic converters sold for use on California vehicles, and to sunset provisions for the sale of used converters.

October 26, 2007
8:30 a.m.

Item #

07-10-6: Public Hearing to Consider Adoption of Proposed Regulations to Reduce Emissions from Diesel Engines on Commercial Harbor Craft Operated within California Waters and 24 Nautical Miles of the California Baseline

The scope of the proposed regulation includes all harbor craft in the state but limits the in-use emission reductions to ferries, excursion vessels, tugboats, and towboats. Those vessel types would be required to follow an engine compliance schedule. The engine model year and annual hours of operation would be used to determine when engines would need to comply with the emission limits. All newly acquired harbor craft engines, for both new and in-use vessels, would be required to meet the most current U.S. EPA Marine Engine standards. The regulation would require all harbor craft to monitor, keep records, and report certain information to ARB.

07-10-5: Public Meeting to Consider Proposed Amendments to the Suggested Control Measure for Architectural Coatings

The proposed Suggested Control Measure (SCM) for Architectural Coatings would lower the volatile organic compounds (VOC) limits for architectural coatings, which will result in significant emission reductions of VOCs. The proposed SCM also clarifies coating category definitions and revises existing rule language, which will improve the enforceability of district rules and increase consistency among districts.

CLOSED SESSION – LITIGATION

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

Central Valley Chrysler-Jeep, Inc. et al. v. Witherspoon, U.S. District Court (E.D. Cal. – Fresno), No. CIV-F-04-6663 REC LJO.

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

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

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

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

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

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

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

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

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

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

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

THE AGENDA ITEMS LISTED ABOVE MAY BE CONSIDERED IN A DIFFERENT ORDER AT THE BOARD MEETING. THOSE ITEMS ABOVE THAT ARE NOT COMPLETED ON OCTOBER 25 WILL BE HEARD BEGINNING AT 8:30 A.M. ON OCTOBER 26.

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

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

LOCATION:
Air Resources Board
Byron Sher Auditorium, Second Floor
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Sacramento, California 95814

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&
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CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER APPROVAL OF ADDITIONS TO THE LIST OF EARLY ACTION MEASURES TO REDUCE GREENHOUSE GAS EMISSIONS UNDER THE CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006 AND TO DISCUSS CONCEPTS FOR PROMOTING AND RECOGNIZING VOLUNTARY EARLY ACTIONS

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to consider the approval of additions to the list of discrete early action measures to reduce greenhouse gas emissions under the California Global Warming Solutions Act of 2006,and provide final direction to staff to begin the development of regulatory and non-regulatory early actions measures as described in the October 2007 final staff report titled "Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California." The Board will also consider staff concepts for promoting and recognizing voluntary early actions.

DATE: October 25, 2007

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., October 25, 2007. The meeting will then continue at 8:30 a.m., October 26, 2007. Tentatively, this item will be considered on October 25, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before October 25, 2007, to determine the day on which this item will be considered.

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

BACKGROUND

Assembly Bill 32 (Stats. 2006, Chapter 488), the California Global Warming Solutions Act of 2006 (the "Act" or AB 32), creates a comprehensive, multi-year program to reduce greenhouse gas (GHG) emissions in California, with the overall goal of restoring emissions to 1990 levels by the year 2020. The Act recognizes that such an ambitious

effort requires careful planning and a well thought out set of strategies. By January 1, 2009 the Board must design and adopt an overall scoping plan to reduce GHG emissions to 1990 levels. The Board then has until January 1, 2011 to adopt the necessary regulations to implement that plan. Implementation of individual measures begins no later than January 1, 2012 so that the emissions reduction target can be fully achieved by 2020. As part of this comprehensive effort, the Board is empowered to use traditional regulatory methods and to adopt and implement market-based compliance mechanisms provided certain criteria are met.

The Act also recognizes that immediate progress in reducing greenhouse gas emissions can and should be made. Accordingly, the Act requires ARB to identify a list of "discrete early action greenhouse gas reduction measures" by June 30, 2007 (Health and Safety Code section 38560(a)). Discrete Early Actions are GHG emission reduction measures underway or to be initiated by ARB that meet the AB 32 legal definition, are enforceable by January 1, 2010, and are technologically feasible and cost-effective. The ARB staff must make the presumption, based on the best information currently available, that all of the measures that it is proposing will meet the Act's legal requirements. If additional information or analysis reveals that a particular strategy cannot meet one or more of the requirements, it will not be put into effect.

In addition to the statutorily required list of discrete early action measures, additional strategies for reductions in GHGs have been identified. These early actions are GHG emission reduction measures underway or to be initiated by ARB in the 2007–2012 timeframe. These measures may be regulatory or non-regulatory in nature. While staff does not believe that these strategies meet the criteria for "discrete early action measures," the staff is recommending aggressively developing all potentially viable options for mitigating GHG emissions.

CHRONOLOGY OF KEY DECISION POINTS

In April of 2007 ARB staff released a report entitled "Proposed Early Actions to Mitigate Climate Change in California." In that report staff proposed 37 early actions to reduce GHG emissions in California, with a cumulative estimate in the range of 33-46 million metric tons of carbon dioxide equivalent ($MMTCO_2E$) by 2020. Existing ARB regulations contributing an additional 30+ $MMTCO_2E$ (principally the AB 1493 regulations on vehicle GHG emissions) were also discussed. Thus, staff recommended a suite of strategies with the potential to yield over 60 $MMTCO_2E$ by 2020, representing an important down payment towards the estimated 2020 reduction target. In its April 2007 report, staff recommended that three of these strategies be developed on a schedule that met the AB 32 legal requirement for discrete early action measures – the Low Carbon Fuel Standard (LCFS), reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills. The remaining 34 additional GHG reduction measures included both regulations and other measures as well as 10 conventional air pollution control measures that are scheduled for rulemaking by 2009 that are expected to yield GHG emission reduction co-benefits. Voluntary and educational efforts are prominent examples of non-regulatory actions that

can deliver real GHG emission reductions, and staff plans to pursue these efforts aggressively.

In June 2007 the Board approved the staff recommendations. Staff was directed to pursue 37 early actions for reducing GHG emissions under AB 32. The spectrum of strategies to be developed reflects the fact that the serious threat of climate change requires broad action as soon as possible. The Board also directed that three of these 37 strategies were to be developed into regulations meeting the legal definition of discrete early action measures. In addition, the Board directed staff to further evaluate early action recommendations made at the Board meeting by the AB 32 Environmental Justice Advisory Committee (EJAC), the California Air Pollution Control Officers Association (CAPCOA), and the South Coast Air Quality Management District (SCAQMD), and to report back to the Board within six months. The general sentiment of the Board suggested a desire to try to pursue greater GHG emissions reductions in California in the near-term.

Since the June 2007 Board hearing, ARB staff has evaluated all 48 recommendations submitted by the EJAC, CAPCOA, and SCAQMD, as well as several other stakeholder suggestions and several internally-generated staff ideas. A revised report that recommended an expansion of the list of early actions was released on September 7, 2007 and discussed at a public workshop held on September 17, 2007 in Sacramento. In the revised document, staff described the additional analysis conducted for each of the recommendations for early action with respect to potential emissions reductions, technological feasibility, estimated costs, and economic impacts. The document reported staff's findings and made further recommendations for a revised list of early actions, including the addition of six discrete early action measures. The report also provided much greater detail on the evaluation of measures that staff has conducted since the previous April 2007 draft early actions report was released. An updated version of the staff report, which takes into account comments received at and following the workshop, was released on October 5, 2007.

STAFF RECOMMENDATIONS

In summary, based on its additional analysis, ARB staff is recommending the expansion of the early action list to a total of 44 measures. Additions to the list triple ARB's commitments to measures that would be pursued to meet the AB 32 accelerated timeframe for discrete early actions. In total, the 44 recommended early actions have the potential to reduce GHG emissions by at least 42 $MMTCO_2E$ by 2020, representing about 25% of the estimated reductions needed by 2020. ARB staff is working on 1990 and 2020 GHG emission inventories in order to refine the projected reductions needed by 2020 and expects to present its recommendations to the Board by the end of 2007. The 2020 target reductions are currently estimated to be 174 $MMTCO_2E$.

Efforts to develop several of the strategies are already underway, with workshops planned for fall 2007 and early 2008. Further, the Climate Action Team (CAT) member agencies are also moving forward with early actions with a targeted reduction of 68

$MMTCO_2E$ by 2020. Both the ARB and CAT emission reduction projections are best estimates that are subject to revision as additional information on individual measures becomes available. The ARB staff will report on the early actions progress to its Board every six months. The CAT will also periodically update its efforts and progress on a similar schedule. A list of all 44 early actions is presented in the revised and final staff report, with recommended additions as well as the discrete early action measures identified.

Staff has received and continues to receive numerous comments and suggestions from a broad spectrum of stakeholders. Comments were provided during the June 21, 2007 Board hearing and at the January 22, April 23, and September 17 public workshops on early actions. The suggestions ranged from support of the measures as proposed to recommendations for additional action or modification of a proposal. Staff is seeking Board approval of the additions to the list of early actions in order to begin the measure development process for each of the proposed actions.

DISCRETE ARB EARLY ACTIONS PURSUANT TO AB 32

In total, ARB staff is recommending the addition of six discrete early action measures to the original three approved by the Board in June 2007. Collectively, the tripling of the discrete early actions will yield on the order of 16 $MMTCO_2E$ of GHG emission reductions annually by 2020 relative to projected levels. These measures will be brought to the Board in the form of proposed regulations within in the next 12 to 18 months. The discrete early actions are as follows:

Discrete Early Actions approved by the Board in June 2007:

1. Low Carbon Fuel Standard: Will require transportation fuel providers (including producers, importers, refiners, and blenders) to ensure that the mix of fuels they sell in California meets, on average, a declining standard for greenhouse gas emissions that result from the use of transportation fuel.

2. Restrictions on High Global Warming Potential (GWP) Refrigerants: Would restrict the use of high GWP refrigerants for non-professional recharging of leaky automotive air conditioning systems.

3. Landfill Methane Capture: Would set statewide standards for the installation and performance of active gas collection/control systems at municipal solid waste (MSW) landfills.

New Discrete Early Actions recommendations to be considered by the Board:

4. Sulfur Hexafluoride (SF_6) Reduction in the Non-Electric Sector: Involves the potential ban of SF_6 in non-utility, non-semiconductor applications where safe, cost-effective alternatives are available.

5. Reduction of High GWP GHGs in Consumer Products: Reduction of high-GWP GHGs used as propellants in aerosol products, tire inflators, electronics cleaning, dust removal, hand held sirens, hobby guns (compressed gas), party products (foam string), and other formulated consumer products when viable alternatives are available.

6. SmartWay Truck Efficiency: Requires existing trucks/trailers to be retrofitted with the best available "SmartWay Transport" and/or ARB-approved technology to reduce aerodynamic drag and rolling resistance.

7. Tire Inflation Program: Pursue actions to ensure that vehicle tire pressure is maintained to manufacturer specifications.

8. Reduce Perfluorocarbons (PFCs) in the Semiconductor Industry: Establish a PFC emissions reduction goal and determine measures to achieve that goal.

9. Green Ports: Provide an alternative source of power for ships while they are docked. Strategy will also result in reduced emissions of nitric oxides (NOX) and particulate matter (PM).

ARB EARLY ACTIONS TO BE DEVELOPED BY 2012

New Early Actions recommendations to be considered by the Board:

The ARB staff is recommending the addition of early actions as summarized below.

1. Refrigerant Tracking, Reporting, and Recovery Program: The strategy involves the reduction of emissions of high GWP GHGs through establishing requirements for enhanced monitoring, enforcement, reporting, and recovery. It may be determined that more than one strategy is required to effectively address the sources of interest and that the strategy or strategies are likely to include both regulatory and non-regulatory elements.

2. Cement (A): Energy Efficiency of California Cement Facilities: The strategy involves reducing CO_2 emissions from fuel combustion, calcination, and electricity use by converting to a low-carbon fuel-based production, decreasing fuel consumption, and improving energy efficiency practices and technologies in cement production.

3. Cement (B): Blended Cements: The strategy to reduce CO_2 emissions involves the addition of blending materials such as limestone, fly ash, natural pozzolan and/or slag to replace some of the clinker in the production of Portland cement. Currently, ASTM cement specifications allow for replacement of up to 5% clinker with limestone. Most manufacturers could in fact replace up to 4% with limestone. Caltrans allows for 2.5% average limestone replacement until testing of the long term performance of the

concrete is complete. Caltrans currently has over $1 million in task orders and is devoting considerable staff resources to the evaluation of limestone blending in cement. Caltrans also currently has standards for using flyash and slag in concrete. Other blending practices will be explored.

4. Anti-idling Enforcement: The strategy guarantees emission reductions as claimed by increasing compliance with anti-idling rules, thereby reducing the amount of fuel burned through unnecessary idling. Measures may include enhanced field enforcement of anti-idling regulations, increased penalties for violations of anti-idling regulations, and restriction on registrations of heavy-duty diesel vehicles with uncorrected idling violations.

5. Collaborative Research to Understand How to Reduce GHG Emissions from Nitrogen Land Application: The strategy involves the identification of methodologies for better characterizing California's nitrogen cycle. An important first step to better characterizing the relationship between nitrogen land application and nitrous oxide formation in California agriculture, landscaping and other uses as well as opportunities for emission reductions is a collaborative research effort with stakeholders. The research is expected to focus on identifying optimal ways to reduce nitrous oxide emissions while increasing soil retention of nitrogen for plant uptake. As part of the research the ARB will collaborate with the California Department of Food and Agriculture, the Department of Pesticide Regulation, commodity groups, and other stakeholders. The research is expected to ultimately support the development of guidance to improve the characterization of nitrous oxide emissions from nitrogen land applications as well as identify effective strategies for emission reductions.

Early Actions approved by the Board in June 2007:

In addition to the five new measures recommended above, ARB staff is recommending to initiate work on the 34 early actions previously approved by the Board in June. Those measures are discussed in detail in the final staff report and include a diversity of strategies from multiple sectors under the jurisdiction of the Board such as fuels, vehicles, agriculture, as well as new efforts in the area of consumer choice education.

NEW FOCUSED EFFORT ON VOLUNTARY ACTIONS

A common theme during the verbal comment period of the September 17, 2007 public workshop was the need for ARB guidance for voluntary actions. Staff believes that the leadership shown by many businesses and local governments in reducing GHG emissions needs to be acknowledged and supported. A key first step to acknowledge such actions is to quantify and document voluntary emission reductions that rise beyond "business as usual". To that end, the ARB staff plans to propose at the October 25-26, 2007 Board hearing a framework for developing methodologies for the quantification of voluntary greenhouse gas emission reductions, and seek the Board's direction.

DESCRIPTION OF PROPOSED ACTION

Staff is proposing that the Board approve the revised and expanded list of 44 early actions, including the six newly proposed discrete early actions to reduce greenhouse gas emissions. Specifically, staff proposes that the Board:

(i) Approve the revised list of discrete early action measures and direct staff to develop regulations to implement these measures;

(ii) Direct staff to work with stakeholders to develop the additional early action strategies and to bring to the Board for consideration technologically feasible and cost-effective regulations or non-regulatory measures, as appropriate, and in accordance with the timeline published in the staff report,

(iii) Direct staff to work with stakeholders to set in motion concrete plans for addressing voluntary actions and for developing guidance for quantification and verification of these actions in a manner consistent with the intent of the Act; and

(iv) Direct staff to provide status reports to the Board approximately every six months on its progress on the AB 32 Early Action Plan.

PUBLIC REVIEW AND COMMENT

The staff's request for public input on its identification of early actions and subsequent revisions resulted in a broad range of suggestions. Many stakeholder comments and suggestions were coincident with the three public workshops on early actions held in Sacramento on January 22, April 23, and September 17, 2007. Substantive comments were also received by the Board during its deliberations on AB early actions at the June 21, 2007 hearing. Details on the nature and scope of the comments are discussed in the final staff report.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

Staff has prepared a final report titled "Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California" (Staff Report) that was released on October 5, 2007.

Copies of this notice, the Staff Report and all subsequent related documents are available on the ARB Internet site for climate change at: http://www.arb.ca.gov/cc/cc.htm or from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990.

Inquiries concerning the substance of the proposed resolution may be directed to the designated agency contact persons, Richard Corey, Assistant Chief of the Research Division at (916) 322-7077, or by email at rcorey@arb.ca.gov, or Michael Robert, Manager, Greenhouse Gas Reduction Strategy Section, at (916) 327-0604, or by email at mrobert@arb.ca.gov.

Further, the agency representative and designated back-up contact persons to whom non-substantive inquiries concerning the proposed administrative action may be directed are Alexa Malik, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-4011, and Amy Whiting, Regulations Coordinator, (916) 322-6533.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received **no later than 12:00 noon, October 24, 2007**, and addressed to the following:

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

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

Facsimile submittal: (916) 322-3928

The Board requests but does not require that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The board encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed recommendations.

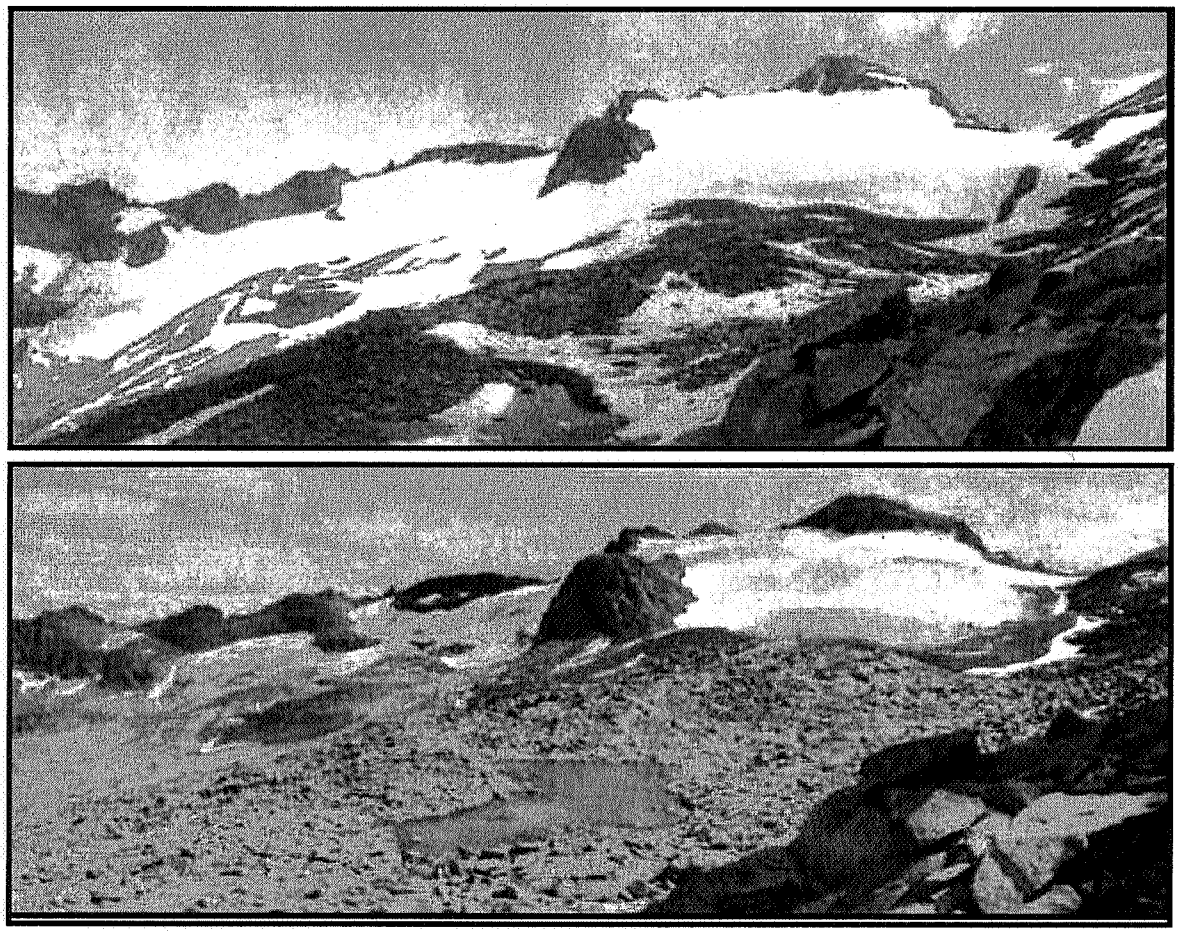
CALIFORNIA AIR RESOURCES BOARD

Tom Cackette
Acting Executive Officer

California Environmental Protection Agency

Air Resources Board

EXPANDED LIST OF EARLY ACTION MEASURES TO REDUCE GREENHOUSE GAS EMISSIONS IN CALIFORNIA RECOMMENDED FOR BOARD CONSIDERATION



Lyell Glacier, Yosemite National Park, California, USA circa 1903 (upper) and 2003 (lower)

OCTOBER 2007

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The ARB staff recommends that the Board expand the list of early action measures being pursued to reduce greenhouse gas emissions from 37 to 44 measures. Of these measures staff believes 9 merit consideration to be placed on the list of discrete early actions as defined by the California Global Warming Solutions Act of 2006 (AB 32), increasing the size of the current list of 3 by 6 items. Cumulatively, these 44 measures have the potential to deliver greenhouse gas emission reductions of at least 42 million metric tons of CO_2-equivalents ($MMTCO_2E$), about a quarter of the 2020 emission reductions needed to meet the AB 32 target. Existing ARB regulations are expected to contribute approximately an additional 30 $MMTCO_2E$ reductions. The Climate Action Team has also identified measures (external to the ARB) that account for a cumulative reduction of approximately 68 $MMTCO_2E$. The remaining reductions to meet the 2020 target will be identified by the Scoping Plan to be considered by the Board in late 2008. These additional early action recommendations incorporate comments received since the September 17, 2007 public workshop. Staff's final recommendations will be brought before the Board at its October 25-26, 2007 hearing.

EXECUTIVE SUMMARY

In June 2007 the Air Resources Board (ARB) directed staff to pursue 37 early actions for reducing greenhouse gas (GHG) emissions under the California Global Warming Solutions Act of 2006 (AB 32). The spectrum of strategies to be developed – including a Low Carbon Fuel Standard, regulations for refrigerants with high global warming potentials, guidance and protocols for local governments to facilitate GHG reductions, and green ports – reflects the fact that the serious threat of climate change requires broad action as soon as possible. Three of these 37 strategies were also identified as discrete early action measures. These are measures that could be fully adopted as regulations and made effective no later than January 1, 2010, the date established by the Health and Safety Code (HSC) Section 38560.5(b) that requires ARB to adopt discrete early actions.

In addition to approving the 37 GHG reduction strategies, the Board directed staff to further evaluate early action recommendations made at the June 2007 meeting by the AB 32 Environmental Justice Advisory Committee (EJAC), the California Air Pollution Control Officers Association (CAPCOA), and the South Coast Air Quality Management District (SCAQMD), and to report back to the Board within six months. The general sentiment of the Board suggested a desire to try to pursue greater GHG emissions reductions in California in the near-term. This revised early actions report provides staff's analyses of additional emission reduction strategies, and provides recommendations to significantly expand the list of early actions as well as discrete early action measures as identified by HSC Section 38560.5(a).

Since the June 2007 Board hearing, ARB staff has evaluated all 48 recommendations submitted by the EJAC, CAPCOA, and SCAQMD, as well as several other stakeholder suggestions and several internally-generated staff ideas. The September 17, 2007 Public Workshop held in Sacramento also generated additional input, which is discussed in this report. Each of these measures has been carefully considered with respect to potential emissions reductions, technological feasibility, estimated costs, and economic impacts. This document reports staff's findings and makes further recommendations for a revised list of early actions and, specifically, discrete early action measures (see insert in next page for definitions). The report also provides much greater detail on the evaluation of measures that staff has conducted since the previous April 2007 early actions report[1] was released.

Based on its additional analysis, ARB staff is recommending the expansion of the early action list to a total of 44 measures. Additions to the list triple ARB's commitments that would be pursued to meet the AB 32 accelerated timeframe for discrete early actions. In total, as shown in Figure ES-1, the 44 recommended early actions have the potential to reduce GHG emissions by at least 42 million metric tons of carbon dioxide (CO_2) equivalent ($MMTCO_2E$) emissions by 2020, representing about 25% of the estimated reductions needed by 2020. ARB staff is working on 1990 and 2020 GHG emission inventories in order to refine the projected reductions needed by 2020 and expects to present its recommendations to the Board by the end of 2007. The 2020 target reductions are currently estimated to be 174 $MMTCO_2E$.

Efforts to develop several of the strategies are already underway with workshops planned for fall 2007 and early 2008. Further, the Climate Action Team (CAT) member agencies[2] are also moving forward with early actions with a targeted reduction of 68 $MMTCO_2E$ by 2020[3]. Both the ARB and CAT emission reduction projections are best estimates that are subject to revision as additional information on individual measures becomes available. The ARB staff will report on the early actions progress to its Board every six months. The CAT will also periodically update its efforts and progress on a similar schedule.

A list of all 44 early actions is presented in Table 1, with recommended additions as well as the discrete early action measures identified. In addition, the year and quarter in which the ARB Board hearing is anticipated is indicated. Inclusion of a strategy, regardless of classification or whether it can be implemented before or after the January 1, 2010 enforceability date for discrete early action measures, represents a commitment by the Board to pursue and – for those strategies that meet all legal and technical requirements – bring the measure to the Board on the timeframe illustrated in the table.

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[1] Available at www.arb.ca.gov/cc/042307workshop/early_action_report.pdf.

[2] Includes the California Environmental Protection Agency, the Business, Transportation and Housing Agency, the Department of Food and Agriculture, the Resources Agency, the Air Resources Board, the Energy Commission, and the Public Utilities Commission.

[3] Those actions are described by the CAT in its companion report on early actions, which can be found at www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.

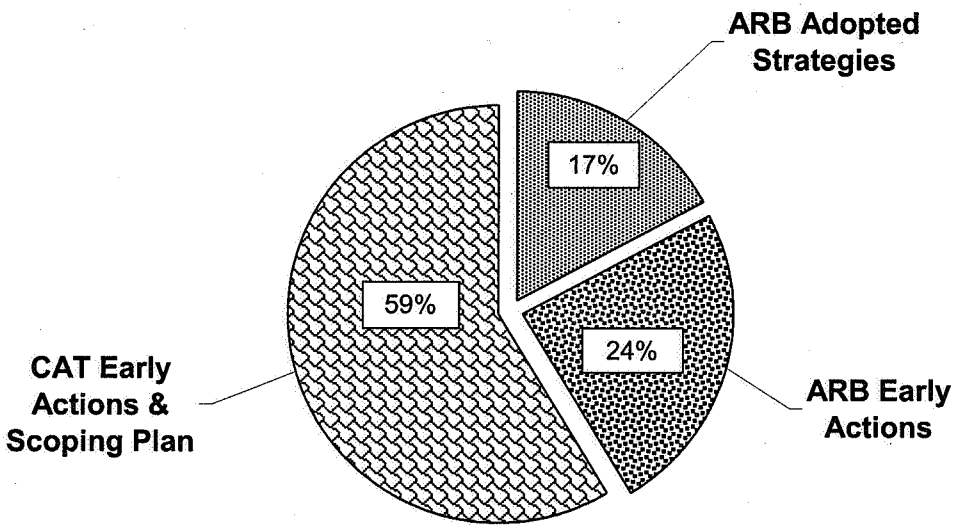

Figure ES-1. 2020 ARB GHG Reduction Estimates by Different Elements of the State's Climate Protection Action Plan.

As part of the early action effort ARB also intends to take steps to encourage and recognize voluntary actions. To that end, the ARB staff plans to propose at the October 25-26, 2007 Board hearing a framework for developing methodologies for the quantification of voluntary greenhouse gas emission reductions, and seek the Board's direction.

BACKGROUND

The California Global Warming Solutions Act of 2006 (AB 32) creates a comprehensive, multi-year program to reduce GHG emissions in California, with the overall goal of restoring emissions to 1990 levels by the year 2020 (Figure 1). AB 32 recognizes that such an ambitious effort requires careful planning and a comprehensive strategy. By January 1, 2009 the Board must design and adopt an overall Scoping Plan to identify how GHG emissions can be reduced back to 1990 levels by 2020. The Board has until January 1, 2011 to adopt the necessary regulations to implement that plan. Implementation begins no later than January 1, 2012 and the emissions reduction target is to be achieved by January 1, 2020. AB 32 also directs the Board to make recommendations on how to best achieve further reductions beyond 2020.

Discrete Early Action – Greenhouse gas reduction measure underway or to be initiated by ARB that meets the AB 32 legal definition as identified by the Health and Safety Code Section 38560.5. Discrete early actions are regulations to reduce greenhouse gas emissions adopted by the Board and enforceable by January 1, 2010.

Early Action – Greenhouse gas reduction measures underway or to be initiated by ARB in the 2007 – 2012 timeframe. These measures may be regulatory or non-regulatory in nature.

In April of 2007 ARB staff released a report entitled 'Proposed Early Actions to Mitigate Climate Change in California.' In that report staff proposed 37 early actions to reduce GHG emissions in California with a cumulative estimate in the range of 33-46 $MMTCO_2E$ by 2020. Existing ARB regulations contributing an additional 30+ $MMTCO_2E$ (principally the AB 1493 regulations on vehicle GHG emissions) were also discussed. Thus, ARB committed to pursue strategies with the potential to yield over 60 $MMTCO_2E$ by 2020, representing an important down payment towards the estimated 2020 reduction target. In its April 2007 report staff recommended that three of these strategies be developed on a schedule that met the AB 32 legal requirement for discrete early action measures – the Low Carbon Fuel Standard (LCFS), reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills.

At its June hearing the Board adopted a resolution which listed three discrete early action measures recommended by the staff and also committed ARB to pursue a total of 37 early actions. The Board also directed the staff to further evaluate recommendations for early actions made by the EJAC, CAPCOA, and the SCAQMD, and to report back to the Board within six months. The general sentiment of the Board suggested a desire to try to accomplish greater GHG emissions reductions in California in the near-term. The staff has completed these additional analyses requested by the Board and staff's conclusions and recommendations form the basis of this report. The updated recommendations documented herein were presented at a September 17, 2007 public workshop at the Cal/EPA headquarters in Sacramento. Responses to comments received are reflected in revisions to this report. The next step is for the staff recommendations to be considered by the Board at its October 25-26, 2007 public hearing.

Figure 1. Comprehensive Multiyear Program Established by AB 32

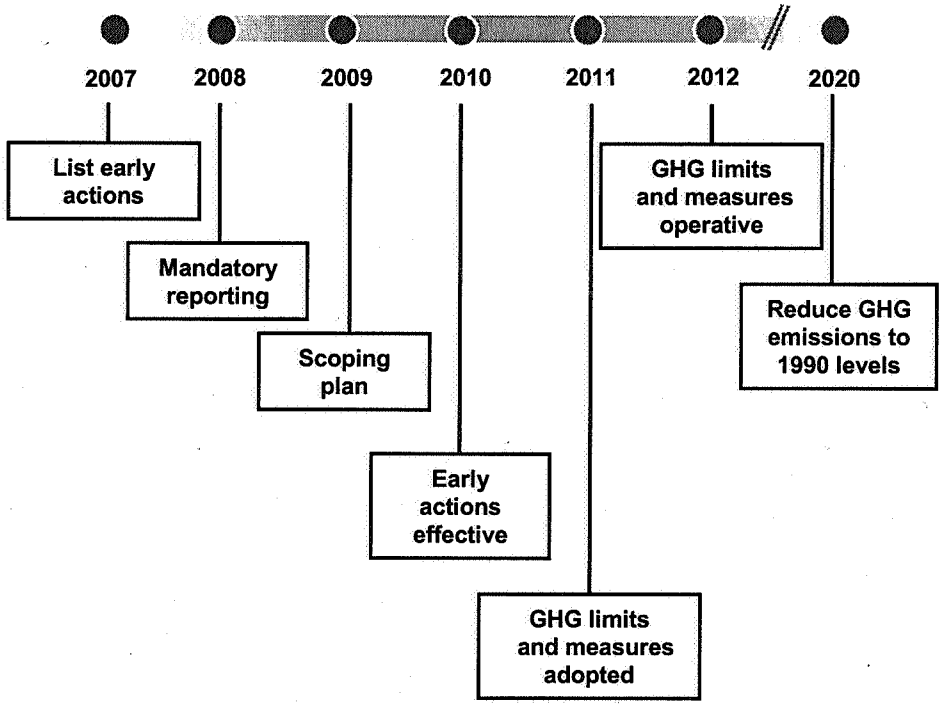

TABLE 1. GHG REDUCTION MEASURES UNDERWAY OR TO BE INITIATED BY ARB IN THE 2007-2012 PERIOD

EA ID	SECTOR	STRATEGY NAME	ARB BOARD HEARING DATE[1]
			2007 Q1	2007 Q2	2007 Q3	2007 Q4	2008 Q1	2008 Q2	2008 Q3	2008 Q4	2009 Q1	2009 Q2	2009 Q3	2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4
1	Fuels	Above ground storage tanks[2]	■																							
2	Transportation	Diesel - Offroad equipment (non-agricultural)[2]		■																						
3	Forestry	Forestry protocol adoption[2]			■																					
4	Transportation	Diesel - Port trucks[2]			■																					
5	Transportation	Diesel - Vessel main engine fuel specifications[2]			■																					
6	Transportation	Diesel - Commerical harbor craft[2]			■																					
7	Transportation	Green ports				■																				
8	Agriculture	Manure management (methane digester protocol)[2]							■																	
9	Education	Local government GHG reduction guidance / protocols[2]							■																	
10	Education	Business GHG reduction guidance / protocols[2]							■																	
11	Energy Efficiency	Cool communities program[2]							■																	
12	Commercial	Reduction of high GWP GHGs used in consumer products[2]								■																
13	Commercial	Reduction of PFCs from semiconductor industry								■																
14	Transportation	SmartWay truck efficiency								■																
15	Transportation	Low Carbon Fuel Standard (LCFS)								■																
16	Transportation	Reduction of HFC-134a from DIY MVAC servicing								■																
17	Waste	Improved landfill gas capture								■																
18	Fuels	Gasoline dispenser hose replacement[2]								■																
19	Fuels	Portable outboard marine tanks[2]								■																
20	Transportation	Standards for off-cycle driving conditions[2]								■																
21	Transportation	Diesel - Privately owned on-road trucks[2]								■																
22	Transportation	Anti-Idling enforcement[2,3]								■																
23	Commercial	SF_6 reductions from the non-electric sector[2]									■															
24	Transportation	Tire inflation program									■															
25	Transportation	Cool automobile paints										■														
26	Cement	Cement (A): Blended cements[3]										■														
27	Cement	Cement (B): Energy efficiency of California cement facilities[3]																■								
28	Transportation	Ban of HFC release from MVAC service / dismantling												■												
29	Transportation	Diesel - offroad equipment (agricultural)[2]												■												
30	Transportation	Add AC leak tightness test and repair to Smog Check													■											
31	Agriculture	Collaborative research on GHG reductions from nitrogen land application[3]																■								
32	Commercial	Specifications for commercial refrigeration																■								
33	Oil and Gas	Reduction of venting / leaks from oil and gas systems																■								
34	Transportation	Requirement of low-GWP GHGs for new MVACs[4]																■								■
35	Transportation	Hybridization of medium and heavy-duty diesel vehicles																	■							
36	Electricity	Reduction of SF_6 in electricity generation																		■						
37	Commercial	High GWP refrigerant tracking, reporting, and recovery program[3]																				■				
38	Commercial	Foam recovery / destruction program																				■				
39	Fire Suppression	Alternative suppressants in fire protection systems																				■				
40	Transportation	Strengthen light-duty vehicle standards																								■
41	Transportation	Truck stop electrification with incentives for truckers																								
42	Transportation	Diesel - Vessel speed reductions[2,5]																								
43	Transportation	Transportation refrigeration - electric standby[2,5]																								
44	Agriculture	Electrification of stationary agricultural engines[5]																								

CUTOFF ADOPTION DATE FOR 01/01/2010 ENFORCEABILITY →

■ = these items are expected to meet the AB 32 definition of discrete early actions in that they directly address GHG emission, are regulatory, and are enforceable by January 1, 2010

[1] Add 9-12 months to Board adoption date to determine the approximate date of Office of Administrative Law (OAL) approval, thereby making a regulation that the Board has adopted legally enforceable.

[2] There is a reasonable expectation that these measures will yield some reductions in emissions impacting climate (e.g., diesel particulate matter, hydrocarbons) . However, they are not listed as discrete early actions because they do not directly address greenhouse gases for which the science is most robust (e.g., CO_2, SF_6, N_2O, CH_4, HFC, PFC), are non-regulatory, or are not enforceable by January 1, 2010. Some are regulations recently adopted by the Board.

[3] These are additional early actions that were not on the list approved by the Board at its June 2007 hearing.

[4] New requirements for HDVs and other classes not included in AB 1493 to be adopted in 2010. Additional requirements for LDVs to be adopted in conjuction with Pavley II (EA ID 40).

[5] Board hearing is not required or indicated - these measures may be ongiong voluntary efforts or under evaluation by staff with insufficient data to justify setting a Board hearing date at this time.

The ARB is one of many state agencies pursuing early actions. The CAT has identified and is refining additional GHG reduction strategies that can be accomplished or initiated in the 2007-2009 period. The CAT process continues to evolve and its early actions will be indispensable for meeting the 2020 target.

The ARB is also in the process of developing a comprehensive Scoping Plan, due in late 2008, which will outline a multifaceted approach to meeting the 2020 emissions reduction target defined in AB 32. The Scoping Plan will evaluate opportunities for sector-specific reductions, integrate synergistically all ARB and CAT early actions and additional GHG reduction measures by both entities, identify additional measures to be pursued as regulations, and define the role of any potential market mechanisms such as a cap-and-trade program. The analyses of many potential GHG emission reduction strategies that are not recommended as early actions are currently underway and will continue as part of the Scoping Plan development. Recommendations regarding the form of these additional GHG reduction measures (e.g., regulatory, non-regulatory, market-based) will be included in the Scoping Plan.

AB 32 requires that all GHG reduction regulations adopted and implemented by the Board be technologically feasible and cost-effective. The law also requires that GHG measures be structured to prevent negative impacts on emissions of criteria pollutants (e.g., hydrocarbons, particulate matter) and to avoid any disproportionate socioeconomic effects (among other criteria). These are critical considerations for each of the recommended early actions. Staff must address these factors fully as detailed proposals are developed. While staff has advanced its understanding with respect to key requirements that must be addressed for most of the proposed strategies, the analyses have not progressed to the point where all impacts (e.g., technical feasibility, cost-effectiveness) can be defined conclusively at this time. Staff plans to develop this information for each of the early actions brought before the Board. If additional information or analysis reveals that a particular measure cannot meet one or more of these requirements, it will not be put into effect. The actual design or features of each measure will be crafted through an open public process that includes interaction with interested stakeholders through various means including workshops.

CONSIDERATION OF STAKEHOLDER INPUT

Sources of Additional Strategies

As directed by the Board, ARB staff further evaluated early action recommendations from the EJAC, CAPCOA, and SCAQMD as presented at the June 2007 Board Meeting. The original submissions from these entities are included in Appendix A to this report. A brief summary of recommendations from these three sources is as follows:

- The EJAC submitted 34 recommendations for early actions. Of these, 21 were approved by the Board at its June 2007 hearing. Thirteen strategies were not on the list approved by the Board at its June hearing.
- The CAPCOA submitted five broad suggestions regarding early actions. These and a sixth suggestion are also addressed in the strategy evaluations presented in the appendices.

- The SCAQMD submitted eight suggestions pertaining to early actions, each of which was further evaluated by ARB staff.

In addition to the items from these three sources, ARB staff has also evaluated additional potential early actions since the June 2007 Board meeting. These measures were either stakeholder suggestions or were items generated internally. There were also several measures approved by the Board at its June 2007 hearing that have direct climate benefits but were not addressed via the EJAC, CAPCOA, SCAQMD, or additional stakeholder suggestions summarized above that are further evaluated in this report. A list of all 63 items considered from these various sources may be found in Table 2 of this document. The results of the staff analysis for each of the strategies evaluated are included in Appendices B through D as indicated in the 'Summary Number' column of Table 2. For those items in Table 2 that are included in the list of previously approved or newly recommended early actions in Table 1, their Early Action ID number from Table 1 is also provided as a cross-reference.

There were several early actions approved by the Board at its June 2007 hearing which were not evaluated further by the ARB. For example, some air pollution control measures that have been approved by the Board with potential GHG reductions or other climate co-benefits (e.g., diesel control measures and hydrocarbon emission standards) have not been further evaluated by staff as their primary rationale was already established.

Staff Analysis of Strategies

Based on the direction from the Board, significant staff effort was expended to increase the depth and breadth of the analysis afforded to the strategies suggested by stakeholders. For each candidate early action measure analyzed, staff's recommendation concerning identification as an early action was based on a consideration of potential emissions reductions, estimated costs and economic impacts, the impacted sectors / entities, technological feasibility, and any additional information available. Completion of a full analysis for each of these factors was the goal for each strategy evaluated. However, as a comprehensive assessment will take at least several months for many strategies, much of the desired information is very preliminary or not currently available for a number of measures.

TABLE 2. GHG REDUCTION STRATEGIES FURTHER EVALUATED BY THE ARB

SUMMARY NUMBER	TBL 1 EA ID	SOURCE	SECTOR	STRATEGY DESCRIPTION	DISPOSITION
Appendix B01	15	--	Fuels	Low Carbon Fuel Standard (LCFS)	No Change in Classification
Appendix B02	16	--	Transportation	Reduction of refrigerant losses from motor vehicle air conditioning maintenance	No Change in Classification
Appendix B03	17	EJAC	Waste	Increased methane capture from landfills	No Change in Classification
Appendix B04	23	ARB	Commercial	SF_6 reductions from the non-electric sector	Add as a Discrete EA Measure
Appendix B05	12	ARB	Commercial	Reduction of high GWP GHGs used in consumer products	Add as a Discrete EA Measure
Appendix B06	14	EJAC STAKEHOLDER	Transportation	SmartWay truck efficiency	Reclassify as a Discrete Early Action
Appendix B07	24	EJAC	Transportation	Tire pressure program	Reclassify as a Discrete Early Action
Appendix B08	13	ARB EA REPORT	Commercial	Reduction of perfluorocarbons (PFCs) from the semiconductor industry	Reclassify as a Discrete Early Action
Appendix B09	7	EJAC/SCAQMD	Commercial	Green ports	Reclassify as a Discrete Early Action
		EJAC	Commercial	Shoreside generators / electrical hookup	
		SCAQMD	Transportation	Auxiliary ship engine cold ironing	
Appendix C01	3	ARB EA REPORT	Forestry	Forestry protocol adoption	No Change in Classification
Appendix C02	8	EJAC	Agriculture	Manure digester protocol for calculating greenhouse gas mitigation	No Change in Classification
Appendix C03	9	ARB EA REPORT	Government	Guidance and protocols for local governments to facilitate GHG emission reductions	No Change in Classification
Appendix C04	10	ARB EA REPORT	Business	Guidance/protocols for businesses to facilitate GHG emission reductions	No Change in Classification
Appendix C05	11	SCAQMD	Energy Efficiency	Cool communities program	No Change in Classification
Appendix C06	22	STAKEHOLDER	Transportation	Anti-Idling enforcement	No Change in Classification
Appendix C07	25	EJAC	Transportation	Cool paints for automobiles	No Change in Classification
Appendix C068	25	STAKEHOLDER	Cement	Cement (A): Energy efficiency of California cement facilities	Add as an EA
		EJAC		Relatively inexpensive energy savings measures with short pay back times for cement industry	Evaluating for Scoping Plan
	--		Cement	Low carbon fuels for cement production	Evaluating for Scoping Plan
Appendix C09	26	EJAC	Cement	Cement (B): Blended cements	Add as an EA
Appendix C10	28	ARB EA REPORT	Transportation	Enforcement of federal ban on HFC release during service/dismantling of MVACs	No Change in Classification
Appendix C11	30	EJAC	Transportation	Addition of AC leak test and repair requirements to Smog Check	No Change in Classification
Appendix C12	31	ARB	Agriculture	Collaborative research to understand how to reduce GHG emissions from nitrogen land application	Add as an EA
Appendix C13	32	CAPCOA	Commercial	Specifications for commercial refrigeration	No Change in Classification
Appendix C14	33	EJAC	Oil and Gas	Reduce methane venting/leaks from oil and gas systems	No Change in Classification
		EJAC	Oil and Gas	Recycling of waste gases at oil production sites	
		EJAC	Oil and Gas	Eliminate methane exemptions granted to oil production sites	Evaluating for Scoping Plan
		EJAC	Oil and Gas	Energy efficiency measures at oil production sites	
Appendix C15	34	EJAC	Transportation	Require low GWP refrigerants for new MACS	No Change in Classification
Appendix C16	35	EJAC	Transportation	Hybridization of medium- and heavy-duty vehicles	No Change in Classification
Appendix C17	36	ARB EA REPORT	Commercial	Reduce sulfur hexafluoride (SF6) from electrical generation	No Change in Classification
Appendix C18	37	EJAC	Transportation	Refrigerant tracking, reporting and recovery program	Add as an EA

TABLE 2. GHG REDUCTION STRATEGIES FURTHER EVALUATED BY THE ARB (continued)

SUMMARY NUMBER	TBL 1 EA ID	SOURCE	SECTOR	STRATEGY DESCRIPTION	DISPOSITION
Appendix C19	38	ARB EA REPORT	Commercial	Foam recovery / destruction program	No Change in Classification
Appendix C20	39	ARB EA REPORT	Commercial	Alternative suppressants in fire protection systems	No Change in Classification
Appendix C21	40	SCAQMD	Transportation	Strengthen light-duty vehicle standards	No Change in Classification
Appendix C22	41	EJAC	Transportation	Truck stop electrification with incentives for truckers	No Change in Classification
Appendix C23	42	ARB	Transportation	Vessel speed reduction	No Change in Classification
Appendix C24	43	EJAC	Transportation	Transport refrigeration units, electric standby	No Change in Classification
Appendix C25	44	ARB EA REPORT	Agriculture	Stationary agricultural engine electrification	No Change in Classification
Appendix D01	--	CAPCOA	Government	CAPCOA recommendations 1. Prioritize SIP reductions to maximize GHG reductions 2. Local rules / potential statewide measures to ID early actions 3. Existing permit programs for significant stationary sources 4. Develop guidance on review and mitigation of GHGs under CEQA 5. Local air district coordinated voluntary programs	Further Evaluation Required
Appendix D02	--	EJAC	Cement	WAFFLEMAT Systems	Evaluating for Scoping Plan
Appendix D03	--	EJAC	Commercial	Green ship incentive program	Evaluating for Scoping Plan
Appendix D04	--	EJAC	Commercial	Anti-idling requirement for cargo handling equipment at ports	Evaluating for Scoping Plan
Appendix D05	--	EJAC	Transportation	Electrification of airport ground support equipment	Evaluating for Scoping Plan
Appendix D06	--	EJAC	Commercial	Electrification of construction equipment at urban sites	Addressed via recently adopted regulation
Appendix D07	--	EJAC	Oil and Gas	Relatively inexpensive energy savings measures with short pay back times for fossil fuel power plants built prior to 1980	Evaluating for Scoping Plan
Appendix D08	--	EJAC	Oil and Gas	Identify and implement energy efficiency measures at refiners that include, but are not limited to, conducting an energy audit	Evaluating for Scoping Plan
		EJAC	Oil and Gas	Recycle waste gases at refineries	
		EJAC	Oil and Gas	Energy efficiency measures at refineries	
Appendix D09	--	EJAC	Commercial	Accelerate the replacement of cargo handling equipment at ports	Evaluating for Scoping Plan
Appendix D10	--	EJAC	Agriculture	Evaluate enclosed dairy barns as an additional strategy for the capture and combustion of methane emissions at dairies	Evaluating for Scoping Plan
Appendix D11	--	EJAC	Commercial	Composting – adopt South Coast and San Joaquin rules statewide	Evaluating for Scoping Plan
Appendix D12	--	EJAC	Electricity	Phase out pre-1980 power plants generating at least 100 MW and provide incentives to replace them with clean energy	Evaluating for Scoping Plan
Appendix D13	--	EJAC	Electricity	Prohibit fuel oil burning in pre-1980 power plants generating at least 100 MW	Evaluating for Scoping Plan
Appendix D14	--	EJAC	Oil and Gas	Refinery methane emissions	Evaluating for Scoping Plan
Appendix D15	--	SCAQMD	Transportation	Accelerate introduction and deployment of light-duty vehicle (passenger) hybrid technology	Evaluating for Scoping Plan
Appendix D16	--	SCAQMD	Oil and Gas	Natural Gas requirement of 1360 Wobbe Index	Further Evaluation Required
Appendix D17	--	SCAQMD	Transportation	Off Highway Recreational Vehicle (OHRV) evaporative emissions control	Further Evaluation Required
Appendix D18	--	SCAQMD	Transportation	Determination of evaporative emissions from Pleasure Craft	Further Evaluation Required

Each staff evaluation sought to address:

- The potential emission reductions in 2010 (if available) and 2020 in terms of million metric tons of CO_2-equivalent per year, including any co-benefits (e.g., reduction in emissions of criteria pollutants) or disbenefits (e.g., fuel penalty).

- The costs per $MTCO_2E$ and the total cost of implementation in 2010 (if applicable) and 2020 and the sectors that will bear the costs including any potential disproportionate impacts on small businesses or environmental justice sectors of the community. This discussion includes businesses or individuals (e.g., environmental justice community) that may be adversely impacted by the proposed strategy.

- The likely technical feasibility of the technology by describing the degree to which it or a similar technology has already been proven. If not applicable, the research/pilot studies that suggest the technological feasibility is likely to be within the next few years are cited.

- Additional considerations that pertain to the measure, such as if any other jurisdiction (state, county) has taken the action, whether the item falls under ARB jurisdiction or is a CAT strategy, whether ARB has legal authority, whether the item would be regulatory, when the item could be taken before the Board, and coordination with affected entities, trade associations, and/or government agencies.

Current State of Understanding

Appendices B through D include a complete listing of staff's analysis for each of the 63 recommendations / potential early actions listed in Table 2. Each summary has a unique identification number that is also listed in Table 2 for each measure; note that multiple measures may be addressed by the same summary.

The summaries in Appendices B through D represent ARB staff's current understanding of the ideas evaluated. It is acknowledged that in many instances, additional time, effort, and information are still needed for a more thorough compilation of all relevant and necessary information to support development as a regulation or other approach such as guidance for voluntary action.

Staff has made one of six recommendations for each measure it evaluated which are described below. One of these six recommendations is indicated for each of the strategies evaluated (see disposition column in Table 2).

- Previously Approved – No Change – applies to measures which were approved by the Board as early actions at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this early action is recommended.

- Previously Approved – Reclassify as a Discrete Early Action – applies to measures which were approved by the Board as early actions at its June 2007 hearing. Based on further evaluation by staff, it is recommended that this early action be reclassified as a discrete early action measure.

- Proposed Measure – Add as a Discrete Early Action – applies to measures which are recommended for addition to the list of discrete early action measures.

- Proposed Measure – Add as an Early Action – applies to measures which are recommended for addition to the list of early actions.

- Proposed Measure – Continue to Evaluate in Scoping Plan – applies to measures proposed at the June 2007 Board meeting which are recommended for further evaluation in the Scoping Plan. A draft Scoping Plan is expected by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering these recommendations.

- Proposed Measure – Further Evaluation Needed – applies to measures proposed that require further information and evaluation prior to recommending that they be pursued an early actions. As additional information becomes available staff will consider whether it supports recommending these strategies as additions to the Board's list of commitments for reducing greenhouse gas emissions.

PREVIOUSLY APPROVED DISCRETE EARLY ACTION ITEMS

Three discrete early action items were approved by the Board at its June 2007 hearing. These included the Low Carbon Fuel Standard (LCFS), Restrictions on High Global Warming Potential Refrigerants, and Landfill Methane Capture. Each of these measures was discussed in the April 2007 staff report and is summarized briefly below as well as further described in Appendix B:

Low Carbon Fuel Standard: Would establish a "carbon content" standard for transportation fuels linked to the fuel's impact on GHG emissions. The goal is to reduce the "carbon intensity" of California's vehicle fuel by at least 10 percent by 2020. Carbon intensity refers to GHG emissions per unit of motive power, in units such as grams of CO_2E per British Thermal Unit. The LCFS will be measured on a lifecycle basis (sometimes called "well-to-wheel" in reference to petroleum products) to capture all emissions from fuel consumption and upstream processes. To reduce greenhouse gas emissions, suppliers will need to bring lower carbon intensity fuels to the market. Lower-carbon fuels include biofuels such as ethanol and biodiesel, as well as hydrogen, electricity, compressed natural gas, liquefied petroleum gas and biogas.

Restrictions on High Global Warming Potential Refrigerants: Would restrict the use of high GWP refrigerants for non-professional recharging of leaky automotive air conditioning systems. The focus of this strategy is to eliminate the unnecessary releases of HFC-134a when cans are used to recharge leaky MVACS. However, realizing that HFC-134a cans for MVACS is not the only burden on the environment, the proper repair of leaky MVACS during professional servicing and the mitigation of HFC-134a impacts from other applications and products are also recommended to be pursued as early actions.

Landfill Methane Capture: Would set statewide standards for the installation and performance of active gas collection/control systems at uncontrolled municipal solid waste (MSW) landfills. In addition, ARB staff is also proposing to expand the scope of this strategy to include efficiency and emissions control resulting in total reductions on the order of 2 to 4 $MMTCO_2E$ by 2020. In developing the control measures, ARB staff will work closely with CIWMB staff. CIWMB is developing a guidance document for landfill operators and regulators that will recommend technologies and best management practices for improving landfill design, construction, operation and closure for the purpose of reducing GHG emissions.

RECOMMENDATIONS FOR ADDITIONAL EARLY ACTIONS

The ARB staff is recommending that a total of 44 early actions be developed and brought to the Board for future consideration. These measures are recommended because staff's evaluation concluded that they are expected to yield significant GHG emission reductions, are likely to be cost-effective and technologically feasible, and can be brought back to the Board as full proposals in the 2007-2012 timeframe. Specifically, staff is recommending that 6 more discrete early actions be added to the list previously approved by the Board, two of which are new recommendations to be added to the list of those actions meeting the narrow definition of discrete early actions in that they are regulatory and will be enforceable by January 1, 2010. Furthermore, staff is recommending that 4 previously adopted early actions be reclassified as discrete early action measures. Cumulatively, these 44 total recommendations are expected to yield at least 42 $MMTCO_2E$ reductions by 2020, representing about 25% of the 2020 target.

Summary of Items Reviewed

Table 2 lists each of the items evaluated as potential early actions. It consists of the recommendations made by the EJAC, CAPCOA and the SCAQMD as well as additional strategies that were identified by stakeholders or ARB staff. Each of the strategies has been evaluated with the results of the evaluation presented in Appendices B through D. The 'Summary ID' column of Table 2 cross-references each of these items to its summary in the appendices; the final disposition of each item is listed in the 'Disposition' column.

Items Addressed by Recently Adopted Regulations

The ARB recently adopted an off-road diesel rule[4] at its July 2007 Board hearing. This regulatory measure was not listed as an early action in the April 2007 ARB staff report. The regulation requires a reduction in off-road diesel engine particulate matter emissions, and is applicable to off-road engines such as those used by urban construction equipment. A possible way to achieve such pollutant reductions is via the electrification of construction equipment at urban sites. This particular example was submitted by the EJAC [refer to summary number B17 in Appendix B]; this recommendation is therefore encapsulated within the intent of a recently adopted regulation and was not further evaluated as part of the early action effort.

Measures Recommended as Additional Discrete Early Actions

The ARB staff's recommendations concerning the addition of discrete early actions are summarized below. In addition to these measures staff closely evaluated many other measures as potential discrete early actions. However, for reasons such as the non-regulatory nature of a measure, its implementation timeline, and others, they are not recommended for addition to the list of discrete early action measures. Additional information, including the specific rationale for the disposition of each strategy evaluated, may be found in Appendices B through D and is summarized in Table 2.

SF_6 Reductions in the Non-Electric Sector: This measure is recommended as an additional discrete early action measure. The strategy involves the potential ban of SF_6 in non-utility, non-semiconductor applications where safe, cost-effective alternatives are available. These applications may include magnesium production and casting operations, air quality tracer gas studies, and face velocity tests for laboratory hoods. The staff will investigate other possible uses of SF_6 during the development of the regulations.

Reduction of High GWP GHGs in Consumer Products: This measure is recommended as an additional discrete early action measure. The strategy involves the reduction of high-GWP GHGs used as propellants in aerosol products, tire inflators, electronics cleaning, dust removal, hand held sirens, hobby guns (compressed gas), party products (foam string), and other formulated consumer products when viable alternatives are available. Some data regarding emissions of GHGs are available from a recent survey of consumer products, which may represent possible reductions within the discrete early action timeframe. Manufacturers are also currently being surveyed to determine the extent of usage of high GWP gases in several more categories of consumer products. These future survey results may lead to additional strategies with emission reduction potential that can be pursued after the deadline for discrete early action items.

[4] Staff report located at http://www.arb.ca.gov/regact/2007/ordiesl07/isor.pdf

Measures Recommended for Reclassification as Discrete Early Actions

The ARB staff's recommendations concerning the reclassification of pre-existing early actions are summarized below. Additional information, including the specific rationale for the disposition of each strategy evaluated, may be found in Appendices B or C and is summarized in Table 2.

SmartWay Truck Efficiency: This measure is recommended to be re-classified as a discrete early action measure. The strategy involves requiring existing trucks/trailers to be retrofitted with the best available "SmartWay Transport"[5] and/or ARB approved technology. Technologies that reduce GHG emissions from trucks may include devices that reduce aerodynamic drag and rolling resistance. Aerodynamic drag may be reduced using devices such as cab roof fairings, cab side gap fairings, cab side skirts, and on the trailer side, trailer side skirts, gap fairings, and trailer tail. Rolling resistance may be reduced using single wide tires or low-rolling resistance tires and automatic tire inflation systems on both the tractor and the trailer.

Tire Inflation Program: This measure is recommended to be re-classified as a discrete early action measure. The strategy involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. Specifically, the strategy seeks to ensure that tire pressure in older vehicles is monitored by requiring that tires be checked and inflated at regular service intervals. One potential approach would be to require all vehicle service facilities, such as dealerships, maintenance garages, and Smog Check stations, to check and properly inflate tires. It is also anticipated that signage at fueling stations clearly indicate the availability of compressed air at no charge. Staff also recommends that the feasibility of conducting an extensive outreach program be investigated.

Reduction of PFCs from the Semiconductor Industry: This measure is recommended to be re-classified as a discrete early action measure. The strategy involves establishing a PFC emissions reduction goal and determining measures to achieve that goal. There are several approaches the industry has either employed or committed to continue evaluating to reduce PFC emissions from semiconductor production, including process optimization (optimizing the use of PFCs, such as in the chamber cleaning process), alternative chemistry development, emissions abatement; and recovery/recycling (separation of fluorinated compounds from other gases for further processing and reuse).

[5] The United States Environmental Protection Agency (U.S. EPA) in collaboration with the freight industry has developed a voluntary program designed to increase energy efficiency while significantly reducing greenhouse gases and criteria pollutants. The program, known as the SmartWay Transport Partnership (SmartWay Transport), encourages trucking companies to use technologies that improve efficiency and reduce emissions. The SmartWay Transport also designates highly efficient and emission reduction technology packages as SmartWay Upgrade Kits which can be purchased at various SmartWay partner centers, dealerships, and service centers.
(http://www.epa.gov/otaq/smartway/documents/420f07027.htm)

Green Ports: This measure is recommended as an additional discrete early action measure. The strategy involves providing an alternative source of power for ships while they are docked. For example, the ships can use cables to receive electricity from the shore, thereby allowing them to shut off their auxiliary engines, reducing emissions of air pollutants. Staff proposes to present the draft regulation to the Board as a measure to reduce nitrogen oxides (NO_x) and diesel particular (PM) emissions and to quantify the associated (carbon dioxide) CO_2 emission reductions. By focusing on NO_x and PM reductions, staff will address the local and regional health impacts of ships docked in California's ports, including any disproportionate impacts those emissions may have on surrounding communities.

Measures Recommended as Additional Early Actions

The ARB staff's recommendations concerning the addition of early actions are summarized below. In addition to these recommendations staff closely evaluated many other measures such as a green ship incentive program and refinery methane emission reductions. However, for reasons such as a substantial lack of available information, technological barriers, implementation timeline, and others, they are not recommended for addition to the list of early actions. Additional information, including the specific rationale for the disposition of each strategy evaluated, may be found in Appendices B through D and is summarized in Table 2.

Refrigerant Tracking, Reporting, and Recovery Program: This measure is recommended as an additional early action. The strategy involves the reduction of emissions of high GWP GHGs through establishing requirements for enhanced monitoring, enforcement, reporting, and recovery. It may be determined that more than one strategy is required to effectively address the sources of interest and that the strategy or strategies are likely to include both regulatory and non-regulatory elements. Such strategies could include:

- Refrigerant Recovery from Decommissioned Refrigerated Shipping Containers: This consists of an assessment of the magnitude of the emissions from refrigerated shipping containers. Depending on results, the strategy may be similar to the one enforcing the federal ban on releasing refrigerants to the atmosphere from the servicing or dismantling of MVACS. After the recovery from a decommissioned container, it may be desirable to disable the refrigeration unit as well, which may require a regulation.

- Residential Refrigeration Program: This involves supporting existing voluntary programs to promote the upgrade of residential refrigeration equipment in need of repair, such as refrigerators and freezers. The program could potentially be expanded to include window unit air conditioners.

- High-GWP Refrigerant Tracking, Reporting, and Deposit Program: This strategy involves 1) expanding and enforcing the national ban on venting high-GWP GHGs (including fully emissive processes) during equipment/process lifetime; 2) requiring high-GWP GHG sales, use and energy use reporting as well as inspection and maintenance (I/M) and leak repair for equipment, cylinders, products, or systems with capacities above some CO_2E threshold; 3) requiring technician certification for sales, purchase, transport, recovery, reclamation, resale, I/M; and 4) establishing a high-GWP GHG deposit program and/or fines for emissive processes or leaky systems.

Cement (A): Energy Efficiency of California Cement Facilities: This measure is recommended as an additional early action. The strategy involves reducing CO_2 emissions from fuel combustion, calcination, and electricity use by converting to a low-carbon fuel-based production, decreasing fuel consumption, and improving energy efficiency practices and technologies in cement production.

Cement (B): Blended Cements: This measure is recommended as an additional early action. The strategy to reduce CO_2 emissions involves the addition of blending materials such as limestone, fly ash, natural pozzolan and/or slag to replace some of the clinker in the production of Portland Cement. Currently, ASTM cement specifications allow for replacement of up to 5% clinker with limestone. Most manufacturers could in fact replace up to 4% with limestone. Caltrans allows for 2.5% average limestone replacement until testing of the long term performance of the concrete is complete. Caltrans currently has over $1 million in task orders and is devoting considerable staff resources to the evaluation of limestone blending in cement. Caltrans also currently has standards for using flyash and slag in concrete. Other blending practices will be explored.

Anti-idling Enforcement: This measure is recommended as an additional early action. The strategy guarantees emission reductions as claimed by increasing compliance with anti-idling rules, thereby reducing the amount of fuel burned through unnecessary idling. Measures may include enhanced field enforcement of anti-idling regulations, increased penalties for violations of anti-idling regulations, and restriction on registrations of heavy-duty diesel vehicles with uncorrected idling violations.

Collaborative Research to Understand How to Reduce GHG Emissions from Nitrogen Land Application: This measure is recommended as an additional early action. The strategy involves the identification of methodologies for better characterizing California's nitrogen cycle. An important first step to better characterizing the relationship between nitrogen land application and nitrous oxide formation in California agriculture, landscaping and other uses as well as opportunities for emission reductions is a collaborative research effort with stakeholders. The research is expected to focus on identifying optimal ways to reduce nitrous oxide emissions while increasing soil retention of nitrogen for plant uptake. As part of the research the ARB will collaborate with the California Department of Food and

Agriculture, Department of Pesticide Regulation, commodity groups, and other stakeholders. The research is expected to ultimately support the development of guidance to improve the characterization of nitrous oxide emissions from nitrogen land applications as well as identify effective strategies for emission reductions.

Process Forward for Early Actions

All discrete early action measures and the majority of the other early actions will enter into the conventional regulatory development process. This process involves public workshops and the consideration of stakeholder input, followed by the formal regulation development, which includes a public hearing where the Board considers the staff recommendation. If the Board adopts the regulation or an amended regulation, then it must be reviewed and approved by the Office of Administrative Law (OAL) before becoming law. Though the non-regulatory strategies such as guidelines will not become binding mandates, they will go through a similar process of public participation. This open process ensures that the development of each strategy that the staff recommends to the Board is informed by the best and most up-to-date information.

STAKEHOLDER INPUT ON REVISED LIST OF EARLY ACTIONS

The ARB received 68 written comments from stakeholders and the general public following the release of its September 7, 2007 draft early action staff report and the third early action workshop held at the Cal/EPA headquarters on September 17, 2007. Each of these comments was reviewed by ARB staff. These comments addressed a wide variety of issues and were very valuable in the advancement in ARB's understanding of the complexity and importance of early action efforts. Several of the evaluations in Appendices B-D were updated in response to stakeholder suggestions. In addition, stakeholder information has been added to the 'Additional Information' subsection of all evaluations for which comments were received.

Many of the comments received were applicable to previously approved and/or recommended early actions identified in the draft September 2007 staff report. There was considerable public comment related to early actions addressing heavy-duty diesel truck measures such as aerodynamic improvements, anti-idling, and transportation refrigeration units. Other comments addressed the forest protocol, the use of SF_6, landfill gas capture, business and government protocols, cool communities, refrigerant measures, tire inflation, nitrogen land use research, HFC/PFC measures, and green ports. The ARB staff appreciates these valuable inputs and is committed to working with those organizations that provided them during the relevant measure development process(es).

Many stakeholder comments addressed issues that will be considered during the development of ARB's Scoping Plan, which is due for consideration by the Board by the end of 2008 with initial workshops planned for late 2007. The comments identified several newly proposed measures addressing the areas of policy (e.g., line item veto for State budget), economics (e.g., carbon permit fees, fuel taxes), transportation (e.g.,

Smog Checks, light-rail extension) and others such as combined heat and power. Several other comments pertained to electricity generation, water resources, renewable energy, carbon capture and sequestration, land use planning, marine vessels, aircraft, and product-packing take-back programs.

VOLUNTARY ACTIONS

A common theme during the verbal comment period of the September 17, 2007 public workshop was the need for ARB guidance for voluntary actions. Staff believes that the leadership shown in GHG emission reductions by many businesses and local governments needs to be acknowledged and supported. A key first step to acknowledge such actions is to quantify and document voluntary emission reductions that extend beyond "business as usual". To that end, the ARB staff plans to propose at the October 25-26, 2007 Board hearing a framework for developing methodologies for the quantification of voluntary greenhouse gas emission reductions and seek the Board's direction.

ADDITIONAL CONSIDERATIONS / CAT STRATEGIES

ARB has or will be adopting several strategies not discussed explicitly in this report that will yield significant GHG reductions by 2020. Most notably, the regulation that the Board adopted in response to AB 1493, which mandated the reduction of greenhouse gas emissions from passenger vehicles, is expected to account for 30 $MMTCO_2E$ by 2020. Other diesel PM, ozone-precursor, and State Implementation Plan (SIP) measures are also expected to have climate co-benefits whose magnitudes are yet to be determined.

In its April 2007 draft report entitled 'Climate Action Team Proposed Early Actions to Mitigate Climate Change in California', the CAT identified early actions external to the ARB that may yield up to 68 $MMTCO_2E$ reductions by 2020. In addition to ARB, members of the CAT have begun work on implementing many of the strategies outlined in the April 2007 draft report. Although not under statutory mandate to do so, the other CAT members expect to have several items implemented through regulations by January 1, 2010; these 13 strategies are expected to result in emission reductions of approximately 7 $MMTCO_2E$ with some reduction estimates still to be calculated. The same CAT members have also identified 41 additional measures for the post-2010 timeframe, which are expected to yield reductions in greenhouse gas emissions on the order of 61 $MMTCO_2E$ by 2020.

The ARB is in the process of developing a comprehensive Scoping Plan, due in late 2008, which will outline the multifaceted approach to meeting the 2020 emissions reduction target required by AB 32. The Scoping Plan will evaluate opportunities for sector-specific reductions, integrate synergistically all ARB and CAT early actions and additional GHG reduction measures, and define the role of any potential market mechanisms. The analyses of many potential GHG emission reduction strategies that

are not recommended as early actions are currently underway and will continue as part of the Scoping Plan development. Recommendations regarding the form of these additional GHG reduction measures (e.g. regulatory, non-regulatory, market-based) will be included in the Scoping Plan.

CONCLUSIONS / RECOMMENDATIONS

At its June 2007 hearing, the Board asked staff to conduct additional analyses of stakeholder suggestions for early actions. Staff has completed this task as well as the further evaluation of additional potential early action measures, and recommends that the list of early action measures be expanded to 44. Nine of these strategies meet the AB 32 definition of discrete early action measures, which is three times the number of original discrete early action measures previously approved by the Board. The ARB recognizes that California must act quickly and decisively now to begin the long road to mitigating the most serious impacts of global warming, and is committed to pursuing the full list of 44 early actions.

The revised list of early actions as recommended by ARB staff is a more ambitious plan than originally proposed and is a complement to the actions of the Climate Action Team members and many other entities in California, the U.S., and the world who are acting now for climate protection. Discrete early action measures that will be in place and enforceable by 2010 include the original list of 3 strategies, plus an additional 6 measures in the transportation and commercial sectors. In addition, 5 new measures as suggested by stakeholders or staff analysis are proposed to be pursued as early actions, but will be implemented post-2010 or are not necessarily regulatory in nature. Cumulatively, all 44 early actions have the potential for reductions of 42 $MMTCO_2E$ by 2020.

The revised early action plan is a comprehensive framework of regulatory and non-regulatory elements that will result in significant and effective GHG emission reductions. The revised early action plan was presented at a public workshop on September 17, 2007 and subsequently revised based on stakeholder comments and suggestions as reflected in this report. Staff will recommend that the Board approve this report at its October 25-26, 2007 public hearing. If approved, each early action will be developed through an open public process.

GLOSSARY OF TERMS AND ACRONYMS

AB 32 – Assembly Bill 32, the Global Warming Solutions Act of 2006

ARB – Air Resources Board

CAPCOA – California Air Pollution Control Officers Association

CAT – Climate Action Team, a committee of multiple state agencies led by the Secretary of Cal/EPA

CO_2 – carbon dioxide; a byproduct of fossil fuel combustion, cement production, and other natural processes

Discrete Early Action – Greenhouse gas reduction measure underway or to be initiated by ARB that meets the AB 32 legal definition as identified by the Health and Safety Code Section 38560.5. Discrete early actions are regulations to reduce greenhouse gas emissions adopted by the Board and enforceable by January 1, 2010.

Early Action – Greenhouse gas reduction measure underway or to be initiated by ARB in the 2007 – 2012 timeframe. These measures may be regulatory or non-regulatory in nature.

EJAC – Environmental Justice Advisory Committee

GHG – greenhouse gas or gases; defined in AB 32 as including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride; also known as "the Kyoto six"

GWP – global warming potential; the relative warming of a greenhouse gas over a specified time period as compared to carbon dioxide which has a GWP defined as 1. The Kyoto Protocol uses a time period of 100 years.

HFCs – hydrofluorocarbons; a class of compounds whose molecules consist of carbon, hydrogen, and fluorine atoms typically used as a refrigerant in air conditioning systems and as aerosol propellants

HSC – (the California) Health and Safety Code

LCFS – Low Carbon Fuel Standard

$MMTCO_2E$ – million metric tons (of) carbon dioxide equivalent (gases)

MVAC – motor vehicle air conditioning (systems)

OAL – California Office of Administrative Law

OHRV – Off Highway Recreational Vehicle

PFCs – perfluorocarbons, a class of compounds derived from hydrocarbons by replacement of hydrogen atoms by fluorine atoms. PFCs are made up of atoms of carbon, fluorine, and/or sulfur, and are mostly used in the semi-conductor industry

SCAQMD – South Coast Air Quality Management District

SF_6 – sulfur hexafluoride; a highly stable non-conducting chemical used for and emitted from various industrial processes and in the manufacturing of electrical circuitry

APPENDIX A – EJAC, CAPCOA, and SCAQMD Recommendations

ARB Discrete Early Action Measures
as proposed by
the Environmental Justice Advisory Committee on the Implementation of the Global Warming Solutions Act of 2006

Number	Description
1	Improved landfill methane capture
2	Require HFC-134a reductions through evaluation of refrigerants in de-commissioned or stored cargo containers, commercial and residential HVAC system leakage, auto dismantling/crushing facilities (i.e., requiring HFCs be removed from cars prior to scrappage)
3	Manure management[1]
4	Reduce venting/leaks from oil and gas systems
5	Heavy-duty vehicle emissions, efficiency improvements[2]
6	Cool automobile paints[3]
7	Port electrification
8	Transportation refrigeration, electric standby
9	Truck stop electrification with incentives for truckers
10	Tire inflation program
11	Require low GWP refrigerants for new MVACs[4]
12	Add AC leak tightness test and repair to Smog Check
13	Wafflemat system for concrete slab foundations
14	Demonstrate use of shoreside generators as bridge to electrical hook-up
15	Green ship incentive program
16	Anti-idling requirement for cargo handling equipment at ports
17	Require the electrification of airport ground support equipment
18	Require the electrification of construction equipment at urban sites
19	Adopt a regulation and or incentive program to take advantage of emerging hybrid technology for medium duty delivery trucks
20	Relatively inexpensive energy savings measures with short pay back times for cement industry
21	Explore a greenhouse gas and mercury emission performance standard for cement facilities equivalent to the level achievable through conversion from coal to natural gas
22	Relatively inexpensive energy savings measures with short pay back times for fossil fuel power plants built prior to 1980[5]
23	Relatively inexpensive energy savings measures with short pay back times for refineries[6]
24	Accelerate the replacement of cargo handling equipment at ports[7]
25	Enclose dairy barns to capture methane[8]
26	Adopt South Coast and San Joaquin rules on enclosed composting facilities statewide[9]
27	Establish necessary rules and or emissions thresholds for transmission to local Air Districts for the phase out, by 2010, of power plants built prior to 1980 that generate over 100 MW of electricity and provide incentives for clean energy production in their place[10]
28	Prohibit fuel oil burning for base load generation of electricity in facilities100 MW or greater and built prior 1980[11]
29	We recommend CARB undertake and adopt regulatory measures that require recycling of waste gases at refineries instead of dumping or incinerating them[12]
30	Adopt regulatory measures to eliminate the methane exemptions granted to refineries and require methane control measures at refineries[13]

31	Identify and implement energy efficiency measures at refineries that include, but are not limited to, conducting an energy audit. This audit shall consider and address, at least: a) Use of clean, renewable energy for refinery electricity consumption b) The impact of heavier crude oil modifications on GHG emission c) Other energy efficiency measures[14]
32	We recommend CARB undertake and adopt regulatory measures that require recycling of waste gases at oil production sites instead of dumping or incinerating them[15]
33	Adopt regulatory measures to eliminate the methane exemptions granted to oil production sites and require methane control measures at oil production sites[16]
34	Identify and implement energy efficiency measures that include, but are not limited to, conducting an energy audit at oil production sites. This audit shall consider and address, at least: a) Use of clean, renewable energy for oil production site electricity consumption b) Other energy efficiency measures.[17]

Early Action Measures to be Forwarded by ARB to the CAT Team

The Committee recommends that all CAT agencies with jurisdiction in the area of energy generation, procurement, siting, permitting, rate-setting and renewable energy deployment in both electricity and transportation sectors, conduct the following:

1) Quantify and publicly provide the air emission and cumulative impacts of new power plant construction in CA and report to CARB the implications for the achievement of the state's climate and air quality goals;
2) Require proponents of new power plant construction to conduct a thorough and robust renewable energy alternatives assessment. If a more carbon-beneficial combination of energy producing or saving sources is available, then the utility should be required to pursue that avenue. This process should begin with all currently approved and expected power plants;
3) Report to CARB on the progress of existing renewable energy deployment programs and identify obstacles to the achievement of the state's renewable energy goals;
4) Perform an audit, to be publicly available, of existing and planned low-income rate assistance, energy efficiency, solar, and green building programs and identify barriers that impede local community participation.

Note: The Committee supports electrification of engines when coupled with efforts to increase use of clean, renewable energy sources such as wind and solar.

[1] During the development of this measure ARB must identify methods that would eliminate the NOx emissions which result from this technology in order to comply with the prohibition in AB 32 against backsliding on criteria pollutants.
[2] Particularly promising avenues include requiring or incentivizing: Use of wide base tires, Use of automatic tire inflation systems, Use of low viscosity lubricants, Improving freight logistics, and Pursuit of hybrid truck technology. ARB should undertake a complete life cycle analysis before suggesting use of fuel additives.
[3] Any regulation developed would have to ensure that the new paint formulations did not cause backsliding on criteria pollutants.
[4] Any chosen replacements must first undergo a complete life cycle analysis and multi-media toxicity analysis.

[5] This measure was not included in the CARB report on Early Action Measures, but was received by CARB and the committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.
[6] This measure was not included in the CARB report on Early Action Measures, but was received by CARB and the committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.
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[10] This measure was not included in the CARB report on Early Action Measures, but was received by CARB and the committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

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[12] This measure was not included in the CARB report on Early Action Measures, but was received by CARB and the committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

[13] This measure was not included in the CARB report on Early Action Measures, but was received by CARB and the committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

[14] This measure was not included in the CARB report on Early Action Measures, but was received by CARB and the committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

[15] This measure had not been previously received by CARB and was added to the Early Action Measures list by the Committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

[16] This measure had not been previously received by CARB and was added to the Early Action Measures list by the Committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

[17] This measure had not been previously received by CARB and was added to the Early Action Measures list by the Committee. The measure was evaluated and recommended as Early Action Measures because it met the criteria established by the committee.

07-7-4

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May 14, 2007

Ms. Catherine Witherspoon
Executive Officer
California Air Resources Board
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Re: Proposed Early Action Measures Under AB 32

Dear Ms. Witherspoon,

The California Air Pollution Control Officers Association is writing to support your efforts to identify discrete early action measures to help secure the earliest possible reductions in greenhouse gas emissions, and to urge you to include additional measures and timeframes in your final proposal. We also would like to offer the support and resources of local air districts in developing and implementing early action measures.

Local air districts recognize the critical importance of early reductions to delay the approach of a climate change "tipping point" and to effect a meaningful slowing of the process of climate change. We also recognize the extraordinary resource demands facing the ARB as you implement the requirements of AB 32. We believe that by relying on local air districts for specific tasks, the ARB will be able to reserve crucial resources for those activities that should be developed and implemented centrally.

CAPCOA supports the inclusion of the measures listed in the ARB's April 20, 2007 draft proposal. We believe additional measures can and should be identified as Group 1 measures. We also believe that more specific time frames should be included for measures in Group 2 and Group 3. Most importantly, we believe there are existing processes and programs that can be effectively leveraged for early reductions of greenhouse gases, and we urge you to include specific tasks and milestones for them in your final list of measures.

The local districts understand the difficulties identifying specific measures that can be adopted and implemented in the short time period called for in AB 32. We recommend actions in five key areas that ARB can take to secure these reductions quickly and without investing significant additional resources.

Recommendation 1: Prioritize SIP rulemaking. CAPCOA recommends that ARB review proposed SIP measures and rank them on the basis of criteria pollutant reductions, public health protection, and greenhouse gas reduction potential. Rules that rank high in all three areas should be given higher priority in the rulemaking calendar. This additional review will not add substantially to workload already planned, but will define GHG reductions that can be achieved in the near term without compromising progress towards clean air or undermining protection of public health.

Recommendation 2: Review Existing Rules. CAPCOA recommends that you perform a review of existing state and local rules, similar to an "All Feasible Measures" review that would identify existing rules that, whether expressly intended or not, result in significant reductions of GHGs. Rules that are so identified could be more quickly adapted for statewide implementation and adopted by the ARB. Some local districts have already adopted and implemented regulations intended to reduce GHG emissions; many others have regulations for criteria pollutants which, by virtue of the way the rules are structured, also secure significant collateral GHG reductions. We believe that with a modest investment of resources, perhaps relying on a contractor who could work with a CAPCOA committee, ARB could identify rules with potential for statewide GHG reductions. Because these rules have already been adopted and implemented, much of the preparatory work has been done and the feasibility and costs are well documented; this should shorten both the time and resources needed for state rulemaking. CAPCOA has already begun this review and we look to share initial results with you in the near future.

CAPCOA also recommends that ARB use a focused workgroup process (which you have already discussed with us) to tap district staff resources and expertise with specific source categories to identify discrete early reductions that could be achieved in each category. We believe this process could identify early reduction potential in the six categories ARB has identified for reporting and rulemaking, and could be used to accomplish some of the necessary steps to speed adoption by the ARB. The workgroup process could also be used to build on the review of local regulations (described above) and identify opportunities for additional reductions of greenhouse gases within the existing air pollution program structure. Some local districts have already begun this review and others plan to begin soon. CAPCOA believes such a coordinated workgroup process could identify potential GHG reductions and secure them in the near term through local rule amendments that implement a consistent statewide standard – similar to a suggested control measure. We recommend that this process be included in your final list, and would be happy to work with you in defining an appropriate schedule and associated emission reduction potential.

Recommendation 3: Minimize Impacts of New Stationary Sources. CAPCOA recommends that ARB work with the districts to develop a coordinated approach to reviewing greenhouse gas emissions from significant stationary sources in categories that also emit significant amounts of GHGs. As you know, the most environmentally effective and cost effective emission reductions are those implemented before a project is built. The challenge of reaching the 1990 baseline will be easier to meet if we ensure that economic growth occurs along the path of least climate impact. Local air districts already require permits and preconstruction review for such sources, which provides an efficient and effective platform to identify and address GHG emissions from new or modified sources in categories of concern. ARB could establish a general framework for including a review of GHG emissions in the local permitting process. The framework should also identify appropriate local, regional, or global mitigation strategies. This process would be analogous to the development of review programs for toxic air contaminants in the late 1980s and early 1990s. In fact, because of district obligations under CEQA, districts may be required to address GHG emissions associated with new permits regardless of any action by ARB. The outcome would be better coordinated with ARB participation at the outset to identify the scope of the review and the mitigations to be considered.

Recommendation 4: Leverage CEQA Mitigations. CAPCOA recommends that ARB work with local districts to coordinate approaches to the review of GHGs under CEQA and capture the reductions that result from mitigation. Local air districts routinely review the impacts of a variety of development projects under CEQA. Local governments are currently contacting air districts with questions about how to incorporate climate change and address GHG emissions of projects, and are seeking specific guidance on GHG significance thresholds for projects. CAPCOA's Climate Protection Committee and Planning Managers Committee are working on this now, and we would like to include ARB staff in this effort. We believe that a focused effort to identify thresholds and mitigation measures could result in practical reductions in the near term through the CEQA process. We recommend that ARB include timelines and commitments to such a process on the early action measures list, and we would be happy to work with you on an appropriate schedule and associated emission reduction potential.

Recommendation 5: Capture Voluntary Reductions. CAPCOA recommends ARB work with local districts to establish mechanisms to promote, track, verify, and capture voluntary reductions in GHGs. As you are well aware, there is tremendous interest in voluntary reductions on the part of business, local government, and the general public. CAPCOA believes this interest should be aggressively pursued. Many local air districts are already working with local stakeholders to identify and organize voluntary reduction efforts. CAPCOA also has a Climate Protection Committee that is tasked, among other things, with compiling voluntary reduction strategies and other materials to support individual districts in this area. We suggest ARB work with us to compile information, and that ARB rely on local districts to help form your reporting, verification, and tracking structure for early reduction efforts. We believe ARB should include milestones for implementing this in your final list of measures, and will work with you to identify associated emission reduction targets.

Summary

In closing, CAPCOA applauds ARB's efforts to identify and secure early reductions of greenhouse gases under AB 32. We urge you to include additional Group 1 early action measures on your final list, and to establish time frames for the measures in Group 2 and Group 3. We specifically recommend that ARB 1) prioritize SIP reductions to maximize collateral GHG reductions, 2) review existing local rules to identify potential statewide measures or local enhancements, and use district resources in workgroup efforts on specific source categories with significant GHG emissions, 3) coordinate with districts on a strategy to use existing permit programs to review and mitigate greenhouse gases from significant stationary sources, 4) coordinate with districts on review and mitigation of GHGs under CEQA, and 5) rely on local air district resources to implement early reductions through coordinated voluntary programs,

Thank your for your consideration of our recommendations.

Sincerely,

Larry R. Allen
President

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

May 7, 2007

Via email

Mr. Bart Croes
Division Chief
California Air Resources Board
1001 I Street
Sacramento CA 95812

Re: Proposed Early Actions to Mitigate Climate Change in California

Dear Mr. Croes:

Thank you for the opportunity to comment on the State's Proposed Early Actions to Mitigate Climate Change in California. This effort will contribute significantly to the overall strategy to reduce greenhouse gases in the state. The following comments are offered for your consideration.

The report includes 3 tables: Table 1, Group 1 – Early Action Measures; Table 2, Group 2 – Additional GHG Reduction Measures Underway or Initiated by ARB in 2007 – 2009 Period; and Table 3, Group 3 – ARB Air Pollution Controls for 2007 – 2009 Adoption with Potential GHG Reductions or Other Climate Co-Benefits. Relative to the measures in Group 1, which will be adopted and implemented by January 1, 2010, SCAQMD staff recommends including a measure to accelerate hybrid penetration, as this technology is already well developed and readily available. At a minimum, this measure should be added to Group 3 if it is not added to Group 1. In addition, the measure on Low Carbon Fuel Standard (1-1) needs to be evaluated in light of the recent Stanford study regarding potential negative implications of E-85.

For Group 2, it would be very helpful for CARB staff to identify years for adoption and implementation for each measure to enable a better sense of priority. Providing preliminary information for potential reductions would also help to understand these measures and their relative benefits. Measure 2-16, Port Electrification should be moved to Group 3 as part of the port measures. There are also several measures that SCAQMD staff would like to see adopted by 2009, not just underway or to be initiated. These are measures 2-9 - Energy Efficiency, 2-13 – Transportation (light-duty vehicle standards), and 2-14 – Transportation (heavy-duty vehicle emission reductions and efficiency improvements.

For Group 3, there are SIP measures in the SCAQMD 2007 Air Quality Management Plan that should be added:

- Evaporative Emission Standards for Recreational Boats and Off-Road Recreational Vehicles; and
- Auxiliary Ship Engine Cold Ironing.

In addition, CARB staff should consider adding one of the SCAQMD measures in the 2007 Air Quality Management Plan – Accelerated Use of Plug-In Hybrids for Light- and Medium-Duty Vehicles, if it is not added to Group 1.

The report also includes tables in Attachment A with the status of assignment to Groups 1, 2, or 3, or deferred to the Scoping Plan. Sixteen of the 24 items in the table are deferred to the Scoping Plan, which is not due for another 18 months. SCAQMD staff recommends that work on these concepts be initiated right away so emission reductions can be realized as soon as possible.

SCAQMD staff also concurs with comments made at the April 30th Environmental Justice Advisory Committee meeting that the report could be improved by adding information on the more than 70 proposals received and the reasons why many ideas were not included in this report.

Thank you again for the opportunity to contribute to this important policy document. If you have any questions or would like to discuss this further, please call me at (909) 396-3104 or Elaine Chang at (909) 396-3186.

Sincerely,

Jill Whynot

Jill Whynot
Planning and Rules Manager

BC:JW
cc: Alberto Ayala, CARB
M. Robert, CARB

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

May 9, 2007

Via email

Mr. Bart Croes
Division Chief
California Air Resources Board
1001 I Street
Sacramento CA 95812

Re: Additional SCAQMD Comment - Proposed Early Actions to Mitigate Climate Change in California

Dear Mr. Croes:

South Coast Air Quality Management (SCAQMD) staff sent comments on May 7, 2007 regarding the Proposed Early Actions to Mitigate Climate Change in California. We have an additional comment that CARB staff should consider for inclusion.

An early action measure should be added to require that natural gas supplies for the state be at a Wobbe index of 1360 or lower. As you know, higher carbon content will result in increased carbon dioxide emissions. It is possible to achieve this level by securing natural gas sources with low Btu content, removing heavier hydrocarbon components by a condensing process, injection of inert gas such nitrogen, and blending high Btu gas with low Btu gas. This would have concurrent nitrogen oxides benefits, as well. Please see control measure #2007CMB-04 in the draft 2007 Air Quality Management Plan for additional information.

Thank you for considering this addition to the early action list. If you have any questions or would like to discuss this further, please call me at (909) 396-3104 or Elaine Chang at (909) 396-3186.

Sincerely,

Jill Whynot

Jill Whynot
Planning and Rules Manager

EC:JW
cc: Alberto Ayala, CARB
M. Robert, CARB

Cleaning the air that we breathe...

Bill Wright
07-7-7

Suggested Changes to Early Action Measures by SCAQMD Staff June 21, 2007

Add New Group 1 (Early Action Measures)

- Accelerate hybrid penetration
- Wobbe index ≤ 1360 for natural gas

Group 2 Measures (underway or to be started in 2007 – 2009)

- Add specific adoption and implementation dates

▪ 2-9	Energy Efficiency	adopt by 2009
▪ 2-13	Transportation (LD)	adopt by 2009
▪ 2-14	Transportation (HD)	adopt by 2009
▪ 2-16	Port Electrification	adopt by 2009

Add to Group 3 Measures (adopt 2007 – 2009)

- Evaporative Emission Standards for Recreational Boats and Off-Road Recreational Vehicles
- Auxiliary Ship Engine Cold Ironing
- Accelerated Use of Plug-In Hybrids (if not added to Group 1)

Consider Other Measures Suggested by CARB Environmental Justice Advisory Group

APPENDIX B – Staff Evaluations of Discrete Early Actions

SUMMARY ID	STRATEGY TITLE	PAGE NUMBER
Appendix B01	Low Carbon Fuel Standard (LCFS)	B- 3
Appendix B02	Reduction of HFC-134a emissions from nonprofessional servicing of Motor Vehicle Air Conditioning Systems (MVACs)	B- 6
Appendix B03	Increased methane capture from landfills	B- 9
Appendix B04	SF6 reductions from the non-electric sector	B- 11
Appendix B05	Reduction of high GWP GHGs used in consumer products	B- 14
Appendix B06	SmartWay truck efficiency	B- 17
Appendix B07	Tire pressure program	B- 21
Appendix B08	Reduction of perfluorocarbons (PFCs) from the semiconductor industry	B- 24
Appendix B09	Green ports	B- 28

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *B01*
ID NUMBER: *N/A*
TITLE: *Low Carbon Fuel Standard (LCFS)*
PROPONENT: *AIR RESOURCES BOARD*

2. Staff Recommendation

The Board approved the Low Carbon Fuel Standard as a discrete early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. It is anticipated that the Board will consider this item in late 2008.

3. Early Action Description

This strategy requires fuel providers (including producers, importers, refiners, and blenders) to ensure that the mix of fuels they sell in California meets, on average, a declining standard for greenhouse gas emissions that result from the use of transportation fuel.

Transportation accounts for over 40 percent of greenhouse gas emissions in California. Reducing GHG emissions from this source category is vital in achieving the goals of the Global Warming Solutions Act of 2006. Understanding this challenge, the Governor signed Executive Order S-01-07 on January 18, 2007, which established the Low Carbon Fuel Standard (LCFS) in California. Amongst other directives, Executive Order S-01-07 requires ARB to consider the LCFS as part of its list of discrete early action items for AB 32.

The LCFS as an early action would establish a "carbon content" standard for transportation fuels linked to the fuel's impact on GHG emissions. The goal is to reduce the "carbon intensity" of California's vehicle fuel by at least 10 percent by 2020. Carbon intensity refers to GHG emissions per unit of energy, in units such as grams of CO_2E per British Thermal Unit, used to power a vehicle.

4. Potential Emission Reductions

The goal of LCFS is to reduce the "carbon intensity" of California's vehicle fuel by at least 10 percent by 2020. To reduce greenhouse gas emissions, suppliers will need to bring lower carbon intensity fuels to the market. Lower-carbon fuels include biofuels such as ethanol and biodiesel, as well as hydrogen, electricity, compressed natural gas, liquefied petroleum gas and biogas. The potential emission reductions resulting from this strategy are estimated to be 10 to 20 $MMTCO_2E$ by 2020.

5. Estimated Costs / Economic Impacts and the Impacted Sectors/ Entities

The University of California report on a Low Carbon Fuel Standard for California (UC Report) Part II dated August 1, 2007 recommended the LCFS regulation be imposed upon entities that produce or import transportation fuel for use in California. For liquid fuels, these are refiners, blenders and importers, and the point of regulation should be the point at which finished gasoline or diesel is first manufactured or imported. For electricity and gaseous fuel providers that choose to participate in the LCFS, the regulated entities should be distributors of the fuel and the point of regulation should be the supply of electricity or fuel to the vehicle. The ability of regulated firms to trade and bank credits is critical to the cost-effectiveness of the LCFS. Additional work will be needed to conduct a cost analysis of the LCFS.

6. Technical Feasibility

The UC Report Part I examined various scenarios to determine the technical feasibility of the proposed LCFS. Six of these scenarios were designed to meet or exceed a 10 percent carbon intensity reduction by 2020, including two that attain a 15 percent reduction. These scenarios all contained plausible combinations of technological innovation and investment in vehicle technologies and low-carbon fuel production and distribution infrastructure. Among the various scenarios that attain the 10 percent carbon intensity reduction target by 2020, most of the reductions were due to fuel technology innovations. With biofuels, even without technological innovations in production, it may possible to lower carbon intensity by up to 10 percent by 2020. A mixture of vehicle and transportation fuel technological innovation can further attain up to 15 percent emissions reduction.

7. Additional Considerations

Currently, California relies on petroleum-based fuels for 96 percent of its transportation fuel needs. Greenhouse gas emissions result from each step of the petroleum refining process, from pumping crude oil out of the ground through vehicle tailpipe emissions. The LCFS will be measured on a lifecycle basis (sometimes called "well-to-wheel" in reference to petroleum products) to capture all emissions from fuel consumption and upstream processes.

Comments Received From: Silicon Valley Leadership Group.

8. Division:	Stationary Source Division
Staff Leads:	Christina Zhang-Tillman
	Anil Prabhu
	Jing Yuan
	Reza Lorestany
Section Manager:	John Courtis
Branch Chief:	Dean Simeroth

9. References:

Air Resources Board, Early Actions to Mitigate Climate Change in California, Staff Report, April 20, 2007

Farrell, A., Sperling, D., et al, A Low Carbon Fuel Standard for California, Parts I and II

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*B02*
ID NUMBER:	*N/A*
TITLE:	*REDUCTION OF HFC-134a EMISSIONS FROM NONPROFESSIONAL SERVICING OF MOTOR VEHICLE AIR CONDITIONING SYSTEMS (MVACs)*
PROPONENT:	*2007 EARLY ACTIONS FINAL REPORT AND 2006 CAT REPORT*

2. Staff Recommendation

Staff recommends that this strategy be retained as a discrete early action as approved by the Board during its June 21, 2007 hearing. The form of the regulation has not been developed and CARB staff is considering an industry proposal as well as a restriction on the sale of small cans of refrigerant. Staff recognizes that the latter strategy will place some economic hardship on the low-income sector of the public. The Environmental Justice Advisory Committee and certain Board members have expressed some concerns about this regulatory proposal. Whichever approach is taken, the reductions in emissions that can be achieved is significant considering the amount of effort.

3. Early Action Description

This regulatory measure would reduce the emissions of high-GWP refrigerants by non-professionals who recharge their leaking automotive air conditioning systems. This strategy would apply predominantly to the individual who recharges their personal vehicles' air conditioner(s). These individuals typically do not have the know-how to either repair their leaking MVACS, or the proper equipment to correctly re-charge the system. HFCs are potent GHGs. Specifically, HFC-134a, used nearly universally in motor vehicle air conditioning systems, has a GWP of 1300 as compared to CO2 (with a GWP of 1). The focus of this strategy is to eliminate the unnecessary releases of HFC-134a when cans are used to recharge leaky MVACS. The source of these emissions include the leaking A/C unit that is never repaired, the breaching of the system in re-charging the MVACS, and the discarding of the refrigerant can containing the unused portion of the refrigerant. As mentioned previously, the exact nature of this proposed measure has not been determined. CARB staff is considering a concept restricting the sales of small cans of refrigerant as well as an industry proposal that would reduce emissions from the unused refrigerant remaining in the used can. CARB staff intends to work with industry in an evaluation process to characterize the emission reductions, technical feasibility, and cost effectiveness of each option. The most viable alternative will be brought to the Board for their consideration.

4. Potential Emission Reductions

Potential emission reductions for the sale restriction option have been estimated to be in the range of from 1 to 2 MMTCO2E in 2012 that would give an emission reduction potential rating of large. The industry proposal would result in estimated reductions ranging from less than 0.1 MMTCO2E to approximately 1 MMTCO2E which would give an emission reduction potential of medium.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The cost of a small can of refrigerant is approximately $10 per can. There are anywhere from 2 million to 4 million small cans sold in California per year. Thus, a complete ban on the sale of small cans would result in the elimination of about $23 million to $40 million dollars per year of small can sales. Dividing this cost by the estimated emission reductions gives a preliminary cost effectiveness range of from about $ 12 to $ 40 per $MTCO_2E$. The true cost and cost effectiveness numbers may be much less if one considers only the actual profit margin per can, rather than the total cost of the can at retail.

The professional auto A/C servicing industry would benefit significantly from the increase in demand of its services and at the expense of the DIY, who would see her A/C service costs climb from a cost per can of HFC-134a of approximately $10 to the cost of professional A/C servicing of more than $100. Industry has recently determined a windfall profit to the professional mechanic, who in 2006 on average charges $147 for recharge service, on the order of more than $166 million. It appears that lower-income individuals may be more affected by this measure than others since they would do their own MVACS servicing rather than paying someone. On the other hand, the use of professionals in servicing automobile A/C systems would probably result in reduced emissions and A/C systems operating in a more efficient manner. Professional technicians have the experience, training and proper equipment to service and repair these complex systems. So there would be a benefit to the sales restriction approach

Industry has proposed the implementation of a refrigerant can return program along with refrigerant recovery of the unused contents. Costs and cost effectiveness of this proposal are yet to be determined. This proposal would target one specific component of the emissions from the DIY practitioners, the can heel. Industry has said that they would support the inclusion of a leak check requirement in the Smog Check Program. This alternative would certainly lessen the cost impacts on the low-income population although the price of the refrigerant would probably increase due to the use of self-sealing valves and the set-up and operation of a can return and refrigerant recovery program.

6. Technical Feasibility

The form of this discrete early action has not been determined. One proposal calls for a restriction on the sales of small cans of refrigerant. This regulatory proposal would not be considered a technology-based regulation, because it would basically prohibit the sale of small cans of refrigerant. The alternate proposal from industry would reduce emissions from the unused refrigerant remaining in the used can by the installation of

self-sealing valves on the refrigerant containers and the recovery of the refrigerant remaining in the used can. Self-sealing valves are used on some containers of the product so it is an accepted technology. There is still some uncertainty how refrigerant recovery from the used containers would work although it would seem to be technically feasible.

7. Additional Considerations

The state of Wisconsin has passed regulations restricting the sale and use of HFC-134a. In addition, several local air districts in California have regulations prohibiting the release of refrigerants into the atmosphere and, in some districts, restricting the sale of small cans.

This proposed regulation is a CAT strategy and would fall under the jurisdiction of ARB since it involves emissions of the refrigerant into the atmosphere. Under the Global Warming Solutions Act, AB 32, the ARB has the regulatory authority to restrict the sale and use of HFC-134a, a high-GWP refrigerant, in this particular sector. As an Early Action Item this proposed regulation will be taken to the Board by early 2009.

8. Division: Research Division
Staff Lead: Winston Potts
Section Manager: Tao Huai
Branch Chief: Alberto Ayala

9. References:

Sciance, F., "Society of Automotive Engineers Improved Mobile Air Conditioning Cooperative Research Program," SAE 7th Alternate Refrigerant Systems Symposium, Scottsdale, AZ, June, 2006.

U.S. Consumer Buying Behaviors of R-134a Refrigerant for Light Vehicle Applications, Draft Report by Frost & Sullivan for the Automotive Refrigeration Products Institute, September 2006.

Personal communication. Rick Raborn, Sexton Can Company.

Atkinson, W., "Emissions from Refrigerant Containers, EPA Study," SAE 7th Alternate Refrigerant Systems Symposium, Scottsdale, AZ, June, 2006.

"Reducing Global Warming Emissions...while still enabling motorists to work on their car's air conditioner." Working presentation to CARB and EPA by ARPI, Dec. 13, 2006, Sacramento, CA.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *B03*
ID NUMBER: *N/A*
TITLE: *INCREASED METHANE CAPTURE FROM LANDFILLS*
PROPONENT: *AIR RESOURCES BOARD*

2. Staff Recommendation

The Board approved this measure as a discrete early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. It is anticipated that the Board will consider this item at its November 2008 hearing.

3. Early Action Description

Biological decomposition of organic waste contained in MSW landfills leads to the production of landfill gas, consisting primarily of carbon dioxide, methane, and trace amounts of non-methane organic compounds (NMOC). Methane is a potent greenhouse gas having approximately 21 times the GWP of CO_2. NMOCs are precursors to ozone formation, can be toxic, and some are odorous. In some instances, the gas may migrate laterally underground and accumulate in nearby structures on or near the MSW landfill, posing as a potential fire or explosive hazard. If uncontrolled or inadequately controlled, landfill gas eventually migrates to the surface where it could present an odor problem or adversely impact air quality. Currently, the California Energy Commission estimates GHG emissions from California's MSW landfills to be approximately 8.4 $MMTCO_2E$ (ARB staff is currently in the process of revising this emission estimate).

This strategy sets statewide standards for the installation and performance of gas collection/control systems at municipal solid waste (MSW) landfills. ARB staff, in collaboration with California Integrated Waste Management Board (CIWMB) staff, will develop a control measure to provide enhanced control of methane emissions from municipal solid waste (MSW) landfills. The control measure will require the installation of gas collection and control systems at smaller and other uncontrolled landfills that are currently not required to install emission controls. It will also include requirements to increase landfill methane capture efficiencies. Additionally, during the regulatory development process, ARB and CIWMB staff will explore opportunities to increase energy recovery from landfill methane.

4. Potential Emission Reductions

The California Integrated Waste Management Board (CIWMB) estimates that about 94 percent of the total waste-in-place in California is contained in landfills having active

gas collection systems in which the gas is collected and routed to a control device, such as a flare or engine where the methane is combusted. About 32 landfills were identified by CIWMB as not having emissions controls. Including increased energy recovery, total emission reductions are expected to be on the order of 2 to 4 $MMTCO_2E$ by 2020.

5. Estimated Costs / Economic Impacts and the Impacted Sectors/ Entities

The control measure will apply to all new and existing California landfills. It is anticipated that some landfills may be exempted from certain requirements pursuant to specific criteria related to their propensity to release methane gas. Economic impacts will be estimated as part of the regulatory development process.

6. Technical Feasibility

The technology and engineering practices necessary to reduce methane emissions from California landfills is readily available and in use (to varying degrees) at many landfills.

7. Additional Considerations

MSW landfills are regulated by local air district rules which impose federal New Source Performance Standards and Emission Guidelines (CFR Part 60 Subparts WWW and Cc) and the National Emission Standards for Hazardous Air Pollutants (40 CFR Part 63 Subpart AAAA). The federal regulations require emission controls when an MSW landfill reaches a design capacity of 2.75 million tons or greater and an NMOC emission rate of 55 tons per year or more. The federal regulations apply primarily to large MSW landfills. There are no consistent statewide standards for smaller and other uncontrolled landfills. The proposed early action measure addresses this issue.

CIWMB is developing a guidance document for landfill operators and regulators that will recommend technologies and best management practices for improving landfill design, construction, operation and closure for the purpose of reducing GHG emissions. In developing the control measures, ARB staff will work closely with CIWMB staff.

The California Energy Commission is funding a study to improve overall estimation of GHG emissions and reductions from MSW landfills. This study is not expected to be completed until 2009. ARB staff is closely monitoring the progress of the study and participating on the study's technical advisory committee.

Comments Received From: Edwards Air Force Base, Theroux Environmental, Los Angeles County Department of Public Works.

Additional comments were received by the general public.

8. Division: Stationary Source Division
Staff Lead: Renaldo Crooks
Section Manager: Richard Boyd
Branch Chief: Dan Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *B04*
ID NUMBER: *ARB 4-4*
TITLE: *SF_6 REDUCTIONS FROM THE NON-ELECTRIC SECTOR*
PROPONENT: *STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure is recommended for addition to the list of discrete early actions. The Board date for consideration of this item is anticipated in 1st quarter of 2009.

The staff recommends developing regulations that ban the use of sulfur hexafluoride (SF_6) for non-electricity sector/semiconductor applications where technologically feasible and cost-effective alternatives are available. As part of the assessment, strategies for achieving voluntary reductions will also be evaluated.

3. Early Action Description

This strategy applies to uses of SF_6 other than the electrical utility industry and the semiconductor industry, which will be evaluated under separate strategies. The largest non-utility industry, non-semiconductor industry uses of SF_6 identified by the staff to date include the magnesium manufacturing and casting operations, air quality tracer studies, and a gas for testing laboratory hoods to ensure worker safety and that Cal-OSHA ventilation requirements are met. Other uses cited include accelerators, leak detection, optical fiber production, glazing, medical, and refining, but the extent of these uses in California is currently unknown. The staff plans to identify all of the uses of SF_6 in California, and the amount used, as part of its evaluation. As part of the regulatory development process, the staff will assess other uses of SF_6, the associated emissions, mitigation options as well as cost to determine whether action is warranted. The U.S. EPA has formed a "Magnesium Industry Partnership" to voluntarily phase-out the use of SF_6 in the magnesium industry by the end of 2010, so a regulation of this industry may be unnecessary. Nationwide, emissions from the magnesium industry are about 2.7 $MMTCO_2E$ per year. There are currently only three companies in California that have magnesium production and casting operations and that are members of the EPA partnership. The SF_6 emissions from these companies are currently unknown. But scaling the nationwide estimated of 2.7 $MMTCO_2E$ per year to California by the number of production facilities gives a California number of about 0.09 $MMTCO_2E$ per year.

The staff envisions banning the use of SF_6 in non-utility, non-semiconductor applications where safe, cost-effective alternatives are available. These applications may include magnesium production and casting operations, air quality tracer gas studies, and ventilation tests for laboratory hoods. The staff will investigate other possible uses of

SF_6 during the development of the regulations. It is important that all uses of SF_6 be investigated and considered given its high GWP, particularly if the application is one in which the compound is deliberately emitted, such as tracer gas applications. One pound of SF_6 emitted is equivalent to about 10 metric tons of carbon dioxide, from a global warming perspective.

4. Potential Emission Reductions

Statewide Emission Inventory

2020 GHG Emission Inventory: It is estimated that, nationwide, about 10 percent of the total SF6 is used in applications other than the utility and semi-conductor industries. It is also estimated that about half of this 10 percent is used in the magnesium industry. The most recent estimate of emissions in California from both electric utilities and semiconductor manufacturing operations is about 1.6 MMTCO2E per year (CEC, 2006). Assuming that the proportion of SF6 emitted to the amount of SF6 used in other applications is the same as that for the utility and semiconductor applications, emissions from the other applications would be about 0.18 MMTCO2E per year in California. Nationwide, SF6 emissions from the magnesium industry are currently about 2.7 MMTCO2E per year. Scaling this number down to the number of production facilities in California gives a California emission estimate of about 0.09 MMTCO2E per year. However, if the U.S. EPA Magnesium Industry Partnership is successful in phasing out the use of SF6 by the end of 2010, the emissions from the magnesium industry will be zero in 2020. This leaves at least 0.09 MMTCO2E per year from other applications such as tracer studies and laboratory hood tests. However, it is likely that emissions from these other applications are somewhat higher than 0.09 MMTCO2E per year due to the fact that the ratio of amount of gas emitted to amount used in these applications is higher than that for utilities. In the utilities, the gas is emitted gradually as it escapes from enclosed systems, while in tracer studies and hood tests it is emitted instantaneously.

Anticipated 2020 Reductions: It is anticipated that all, or nearly all, of the emissions from non-utility, non-semiconductor use would be eliminated under the staff proposal. Therefore, the reductions are estimated to be on the order of 0.1-0.2 MMTCO2E per year.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Alternative gases have been identified for magnesium production and casting operations, and for laboratory hood tests performed to ensure adequate ventilation rates. The cost and economic impacts of using these gases will be evaluated during the regulatory development process, but the difference in cost would be expected to be modest.

6. Technical Feasibility

As part of the U.S. EPA's Magnesium Industry Partnership, magnesium production and casting operations have been developing the use of gases other than SF_6 to provide the

cover gas protection provided by SF_6. The partnership is attempting to meet the goal of phasing out SF_6 by 2010.

The staff will investigate both the technical and economic feasibility of using alternative gases in air quality tracer studies and laboratory hood tests done to comply with Cal-OSHA ventilation standards. The technical and economic feasibility of using alternative gases will also be evaluated for any other use of SF_6 identified by the staff.

7. Additional Considerations

Some of the factors that will need to be carefully evaluated include determining if there are alternative gases as safe and effective as SF_6 with lower lifecycle GHG emissions. To the extent that alternatives are available, staff would also investigate whether a voluntary measure such as a voluntary phase-out program would be as effective as a regulatory approach.

Affected Entities: Companies that produce magnesium or magnesium castings, air pollution and air quality researchers, universities, industries, and other institutions that have laboratory hoods that are subject to Cal-OSHA standards.

Trade Associations: North American Die Casting Association (DADCA), Compressed Gas Association, Associations which include industrial hygienists. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE).

Government Agencies to coordinate with: U.S. EPA, Cal-OSHA

Comments Received From: Silicon Valley Leadership Group.

Proposed Board Hearing Date: January, 2009

8. Division: Research Division
Staff Lead: Kevin Cleary
Section Manager: TBD
Branch Chief: Mike Fitzgibbon

9. References:

Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, United States Environmental Protection Agency, April 15, 2007

Inventory of California Greenhouse Gas Emissions and Sinks: 1990-2004, California Energy Commission, December, 2006

Communications with Cal-OSHA staff (Mike Horowitz)

Nationwide SF_6 Sales by End Use: 1961-2003, Fourth International Conference on SF_6 and the Environment, November, 2006, the Rand Corporation

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*B05*
ID NUMBER:	*N/A*
TITLE:	*REDUCTION OF HIGH GWP GHGs USED IN CONSUMER PRODUCTS*
PROPONENT:	*AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure is recommended for addition to the list of discrete early actions. The Board date for consideration of this item is anticipated in 4th quarter of 2008.

Some data regarding emissions of greenhouse gases is available from a recent survey of consumer products, which may represent possible reductions within the discrete early action timeframe. Manufacturers are also currently being surveyed to determine the extent of usage of high global warming potential (GWP) gases in several more categories of consumer products. These future survey results may lead to additional strategies with emission reduction potential that can be pursued after the deadline for discrete early action items.

3. Early Action Description

Consumer product formulations may be modified to reduce or eliminate the use of greenhouse gases with high GWP. Gases of interest include HFCs, HCFCs, HFEs, carbon dioxide, and nitrogen oxides, which are used as propellants in tire inflators, electronics cleaners, dust removal products, hand held sirens, hobby guns (compressed gas), party products (foam string), and other formulated consumer products. The objective of this discrete early action strategy would be to reduce the impact of high GWP GHGs used in these products when alternative formulations are available. For example, one possible form of the strategy would be to require switching when feasible from using a high GWP GHG such as HFC-134a (GWP=1300) to a GHG with a lower GWP such as HFC-152a (GWP=120). The Consumer Products Program is implemented through regulations and this proposed new discrete early action strategy would occur as part of that regulatory process.

4. Potential Emission Reductions

ARB staff estimate a potential emissions reduction of up to 0.25 MMTCO2E from consumer products. ARB is currently surveying consumer product manufacturers for specific information on product ingredients. Categories listed above that may contain high GWP GHGs are included in the survey. The required submission date for the

survey is November 21, 2007. Analysis of survey data will provide an accurate estimate of potential emission reductions.

In 2002, A. D. Little reported that the annual North American consumption and emissions of HFCs in consumer products was 10 MMTCO2E with the two highest-use products being dust removal products and tire inflators at 4.7 and 3 MMTCO2E, respectively. California's population is about eight percent of the North American population. Assuming product usage is similar across North America and scaling with population, HFC emissions from consumer products in California are about 0.8 MMTCO2E. This value seems to be confirmed by initial results from ARB's 2003 Consumer and Commercial Products Survey.

5. Estimated Costs / Economic Impacts and the Impacted Sectors/ Entities

Costs per MTCO2E are not available at this time. However, other regulations in the Consumer Products Program have been implemented in a cost effective manner. The manufacturers would bear the cost of formulation changes, then presumably pass the cost on to the consumer. Each product category would be fully evaluated for estimated costs as regulations are implemented. Any potential disproportionate impacts would depend on the individual product and whether it is used to a greater extent by any given sector of the population.

6. Technical Feasibility

The ARB staff believes technology is available to make changes in some consumer product categories to decrease the use of high GWP GHGs without increasing other emissions. ARB has not previously worked with representatives of certain segments of the industry, such as manufacturers of hobby guns that use compressed gas, so determination of the technical feasibility of GHG reductions in some applications cannot be made at this time.

7. Additional Considerations

Consumer Products are under ARB jurisdiction with legal authority for regulation. New regulations are scheduled to be heard by the Board in 2008. These regulations may address the use of high GWP GHGs in several product categories. An initial public meeting for the development of this regulation is scheduled for August 29, 2007. These regulations, already under development, will meet the statutory deadline for discrete early actions. Development of regulations for other categories of consumer products would fall under the Scoping Plan of The California Global Warming Solutions Act of 2006.

Comments Received From: DuPont Company.

8. Division: Stationary Source Division
Staff Lead: Jessica Dean
Section Manager: David Mallory
Branch Chief: Janette Brooks

9. References:

Arthur D. Little, Global Comparative Analysis of HFC and Alternative Technologies for Refrigeration, Air Conditioning, Foam, Solvent, Aerosol Propellant, and Fire Protection Applications, Final Report to the Alliance for Responsible Atmospheric Policy, March 21, 2002

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *B06*
ID NUMBER: *EJAC-4/ARB 2-14*
TITLE: *SMARTWAY TRUCK EFFICIENCY*
PROPONENT: *2006 CAT REPORT AND STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, it is recommended that this measure be reclassified as a discrete early action. The Board date for consideration of this item is anticipated in 4th quarter of 2008.

The rationale for staff's recommendation is based on the commercial availability of a wide variety of technologies that improve fuel efficiency of heavy-duty vehicles that pay for themselves from fuel savings in a very short time. Although these technologies are commercially available, the trucking industry has been reluctant in using them due to the high initial capital investment and logistic issues related to using some of the technology at loading docks and other locations. However, staff believes these issues can be resolved. Therefore, staff recommends developing a regulatory program and evaluate whether financial assistance would be needed to help small businesses comply with the proposed regulation.

3. Early Action Description

The strategy would require existing trucks/trailers to be retrofitted with the best available fuel efficiency "SmartWay Transport"[1] and/or ARB approved technology. Technologies that improve fuel efficiency of trucks may include devices that reduce aerodynamic drag and rolling resistance. Aerodynamic drag may be reduced using devices such as cab roof fairings, cab side gap fairings, cab side skirts, and on the trailer side, trailer side skirts, gap fairings, and trailer tail. Rolling resistance may be reduced using single wide tires or low-rolling resistance tires and automatic tire inflation systems on both the tractor and the trailer.

[1] The United States Environmental Protection Agency (U.S. EPA) in collaboration with the freight industry has developed a voluntary program designed to increase energy efficiency while significantly reducing greenhouse gases and criteria pollutants. The program, known as the SmartWay Transport Partnership (SmartWay Transport), encourages trucking companies to use technologies that improve fuel economy and reduce emissions. The SmartWay Transport also designates highly fuel efficient and emission reduction technology packages as SmartWay Upgrade Kits which can be purchased at various SmartWay partner centers, dealerships, and service centers. (http://www.epa.gov/otaq/smartway/documents/420f07027.htm)

The requirements would apply to California and out-of-state registered Class 8 trucks (gross vehicle weight rating greater than 33,000 pounds) that travel to California. Most of the newer Class 8 combination trucks are long haul trucks for which technologies that reduce both aerodynamic drag and rolling resistance would be appropriate. The older model combination trucks are typically considered short haul trucks and thus spend considerably less time at highway speeds, reducing significantly any benefits associated with aerodynamic improvements since drag varies with the square of the vehicle speed. Thus, it would be most appropriate to require only rolling resistance improvements for these trucks. Straight trucks (trucks with an integrated cargo area) would likely be required to be equipped with devices that reduce aerodynamic drag as well as rolling resistance.

Staff's preliminary thinking is that the rule could be implemented through a phase-in schedule with 10 percent of the trucks and trailers meeting the requirements in 2010, 25 percent in 2011, 60 percent in 2012, and 100 percent in 2013. This rule should also require that new 2010 and subsequent trucks and trailers that are sold in or service California be "SmartWay" certified tractors and trailers[2].

Although the cost of retrofitting the trucks and trailers would eventually be recovered through fuel savings, the upfront investment capital needed to comply with the requirements may become a financial burden to businesses, especially small businesses and those that own multiple trailers per tractor. Therefore, staff recommends that an evaluation be conducted to determine whether a financial assistance program would be needed to help small businesses comply with the requirements.

4. Potential Emission Reductions

Potential GHG emission reductions were estimated for calendar years 2010 and 2020. For 2010, the scenario assumes that 10 percent of the existing 2009 and older model year (MY) trucks and tractor-trailer combinations and all 2010 MY trucks and tractor trailer combinations comply with the requirements. MYs 2006 to 2010 trucks were assumed to be long haul, MYs 2000 to 2005 medium haul, and MYs 1990 to 1999 short haul. Based on these assumptions and considering the total vehicle miles traveled both inside and outside of California, in 2010, the estimated GHG reductions could be up to 6 $MMTCO_2E$ of which about 7% would occur within California. Similarly in 2020, MYs 2016 to 2020 were assumed to be long haul, MYs 2010 to 2015 medium haul and MYs 2000 to 2009 as short haul trucks. Thus, the 2020 estimated GHG reductions could be up to 20 $MMTCO_2E$ of which about 11% would occur within California. Requiring compliance by California registered trucks and trailers would significantly reduce the GHG benefits of this rule to 0.2 and 1.3 MMT CO_2e in 2010 and 2020, respectively. The

[2] U.S. EPA Certified SmartWay tractors and trailers are long haul tractors and trailers equipped with components that significantly reduce fuel consumption and emissions. The specifications for a U.S. EPA Certified SmartWay tractor include a model year 2007 and later engine, integrated cab-high roof fairings, cab side fairing gap reducers, tractor fuel-tank side fairings, aerodynamic bumper and mirrors, options for reducing extended engine idling, and options for low-rolling resistance tires. The specifications for a U.S. EPA Certified SmartWay trailer are side skirts, weight-saving technologies, gap reducers on the front of the trailer or trailer tail, and options for low resistance tires. For further information refer to:
http://www.epa.gov/smartway/documents/420f07033.htm .

strategy is also expected to reduce emissions of criteria pollutants and especially emissions of oxides of nitrogen (NOx) since NOx is directly related to the tractive power requirements. Staff has not yet precisely quantified the reductions in emissions of criteria pollutants that may result from this strategy, but expect them to be on the order of 10 percent reduction for pollutants such as NOx, which are closely related to fuel use.

5. Estimated Costs/ Economic Impacts and the Impacted Sectors / Entities

Entities that may be affected by this strategy include the freight industry, trailer manufacturers, truck manufacturers, tire manufactures, businesses that own trailers to haul their freight into and out of California, and cab and trailer aerodynamic device manufacturers. The strategy is expected to provide cost savings to trucking businesses over the useful life of the tractor trailer combination by reducing fuel consumption. Assuming that add-on devices result in 13.9 percent fuel economy gain, the savings are approximately $5,400 per year for a truck with a baseline fuel economy of 6.1 miles per gallon and an average mileage accrual rate of approximately 90,000 miles per year, and a fuel cost of $3.00 per gallon. The cost of the add-on devices for a tractor trailer combination, which staff estimates to be approximately $12,000[3], can therefore be recovered within 2 to 2.5 years for a trailer-to-tractor-ratio of 1 and within 8 to 10 years for a trailer-to-tractor ratio of three[4]. Businesses that own only trailers and no tractors may not be able to recover the cost of retrofitting their trailers through fuel savings, and therefore, they may need to recover their investment either by paying less to haulers or by passing it to customers by increasing the cost of their merchandise.

6. Technical Feasibility

As indicated above, technologies that improve fuel economy of trucks are currently commercially available. Most of the tractors currently on the road are equipped with cab roof fairings and cab side fairing gap reducers. Trailer side skirts, trailer side fairing gap reducers, single wide tires and automatic tire inflation systems are also commercially available as SmartWay Upgrade Kits. However, there are some minor technical issues with these technologies that will need to be resolved. Retrofit of cab aerodynamics may or may not be possible depending on whether the tractor has factory installed reinforcements or not. Trailer side skirts may be problematic on some trailers where the side skirt interferes with access to equipment. Also, some fleets have expressed concern on trailer side skirts getting damaged when driving over road dips or bumps. The use of trailer tails is currently very limited due to functionality problems at loading docks. Currently, manufacturers of SmartWay devices are working on solutions to these problems and staff believes that these minor technical problems will be resolved by the time the rule is implemented or can be addressed in the development of this rule.

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[3] The $12,000 estimate includes the cost for trailer aerodynamics (side skirts, gap fairings, and trailer tail), single wide tires and wheels for the tractor and trailer, automatic tire inflation system, and installation cost.

[4] The industry average trailer-to-tractor ratio is not exactly known. However, the most commonly cited numbers range between 2 to 3 trailers-per-tractor. The higher the number of trailers per tractor, the longer it takes to recover the cost from fuel savings.

7. Additional Considerations

This regulatory strategy is motivated primarily by its potential to reduce GHGs. All portions of this strategy can be accomplished under the authority granted by the California Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32). AB 32 provides the Air Resources Board (Board) with the authority to regulate sources of GHGs to achieve the maximum and cost-effective GHG emission reductions from these sources. The item can be taken to the Board by the 4th quarter of 2008 but requires additional resources.

Affected Entities:	Truck carriers, shipper carriers, trailer manufacturers, truck manufactures, truck and trailer aerodynamic device manufacturers, tire manufacturers, businesses that own trailers to haul their freight into and out of California
Trade Associations:	American Trucking Association, California Trucking Association, Truck Manufacturers Association, Truck Trailer Manufacturers Association, California Chamber of Commerce, The Owner-Operator Independent Drivers Association.
Comments Received From:	California Trucking Association, Advanced Transit Dynamics, Inc., Harmon Trucking, Airman Inc., Natural Resources Defense Council, Laydon Composites Ltd., Community Recycling & Resource Recovery, Maersk Inc. and APM Terminals, Nose Cone Mfg. Co./FitzGerald Corp., The Owner-Operator Independent Drivers Association, California League of Food Processors,

Additional comments were received by the general public.

Government Agencies to coordinate with: None.

8. Division:	Mobile Source Control Division
Staff Lead:	Daniel Hawelti
Section Manager:	Stephan Lemieux
Branch Chief:	Michael Carter

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *B07*
ID NUMBER: *EA 2-20*
TITLE: *TIRE PRESSURE PROGRAM*
PROPONENT: *AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, it is recommended that this measure be reclassified as a discrete early action. The Board date for consideration of this item is anticipated in 1st quarter of 2009.

Maintaining a vehicle's tire pressure to the manufacturer's recommended specifications is a practical strategy to achieving early greenhouse gas (GHG) emission reductions. Current Federal law requires auto manufacturers to install tire pressure monitoring systems in all new vehicles beginning September 1, 2007. Staff recommends that the ARB investigate strategies to ensure that the tire pressures in older vehicles are also monitored, as well as requiring the tires to be checked and inflated at regular service intervals. One potential strategy would be to require all vehicle service facilities, such as, dealerships, maintenance garages, and smog check stations, to check and inflate tires.

Staff also recommends that the feasibility of conducting an extensive outreach program be investigated. The outreach program could entail placards being placed above each fueling dispenser to encourage drivers to properly maintain their tires each month. The placards would highlight the amount of money consumers could save as a result of lower fuel consumption, as well as, how each consumer is doing their part to help prevent climate change.

3. Early Action Description

According to the National Highway Traffic Safety Administration (NHTSA), 74% of all vehicles have at least one significantly under inflated tire[1]. The U.S. Department of Energy (DOE), California Energy Commission (CEC), and NHTSA, state that every 1 pound per square inch (PSI) drop in tire pressure equals an approximate 0.4% drop in a vehicle's gas mileage. Establishing a program to monitor and correct vehicle tire pressure could save Californians a minimum of 61 million gallons of fuel, which equates to 0.54 MMT of CO_2 emissions in 2010 (first year of implementation) and 22.5 million gallons of fuel and 0.20 MMT of CO_2 emissions in 2020. Potential savings from a program that was 100 percent effective in ensuring proper tire inflation are on the order of 96 millions gallons of fuel saved in 2010.

4. Potential Emission Reductions

The GHG emission benefit of this program is associated with the reduction in gallons of fuel consumed by California drivers. The reduction in gallons of fuel consumed is based upon 10 million vehicles visiting a repair facility at least once a year and having their tires checked and inflated to the manufacturer's recommended pressure[2]. Approximately 74 percent of vehicles in California have under inflated tires, of which, 27 percent have at least one tire severely under inflated (25 percent or more of the manufacturer's recommended pressure)[1]. On average, a vehicle tire loses approximately 1 PSI per month[2]. For every loss of 1 PSI in tire pressure, a corresponding loss in fuel economy of 0.4% can be expected[2].

It is estimated that Californians will consume approximately 14.1 billion gallons of gasoline in 2010 and 16.2 billion gallons in 2020[3]. In 2010 (first year of implementation), the predicted reduction in the consumption of fuel is 61 million gallons which equates to 0.54 MMT of CO_2. This is based on 27 percent of vehicles having at least one tire severely under-inflated, 47 percent having tires under inflated by 1 PSI, and 26 percent having the correct pressure[1]. In 2020, emissions reductions are expected to be lower due to the recommended strategy and outreach programs and the federal requirement for tire pressure monitoring systems in all new vehicles. The reduction in gallons of fuel consumed will be approximately 22.5 million gallons which equals 0.20 MMT of CO_2.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Costs associated with this program include public outreach and education, equipment costs such as compressors and accessories, and labor. One study suggested the labor rate to check and inflate tires will be approximately $3.75 per vehicle[2]. In addition, some vehicle repair facilities may be required to purchase an air compressor and accessories at an approximate cost of $500[4].

Retrofit technologies exist that can monitor tire pressure at costs ranging from $20 to $600 depending on the system and installation variables (i.e., make and model of vehicle, brakes, ABS, hourly installation rate, etc.)[4]. Additional staff work is needed to determine the feasibility and cost effectiveness of retrofits.

6. Technical Feasibility

There are no technology limitations for this strategy.

7. Additional Considerations

Several State and Federal agencies have public outreach websites that highlight the relationship between tire pressure and saving money (e.g., U.S. DOT – It All Adds Up, CEC – Fuel Efficient Tire Program, California's Energy Efficiency Program – Flex Your Power, IWMB – National Tire Safety Week). Enforcement of this type of strategy will be extremely difficult.

Affected Entities: California's vehicle repair facilities and refueling stations and vehicle owners.

Government Agencies to coordinate with: U.S. DOT, CEC, IWMB, and others as outreach information becomes available.

Comments Received From: Community Recycling & Resource Recovery.

8. Division: Stationary Source Division
Staff Lead: Theresa Anderson
Wayne Sobieralski
Section Manager: Mike Miguel
Branch Chief: Mike Tollstrup

9. References:

[1] *U.S. Department of Transportation, NPRM on Tire Pressure Monitoring System FMVSS No. 138, 09/2004*

[2] *California Inspection and Maintenance Review Committee, Review of the Smog Check Program, 11/2006*

[3] *Based on Air Resources Board's California Emissions Forecasting System, Population and Vehicle Trends Report, Statewide Daily Vehicle Fuel Consumption (Gasoline), EMFAC 2002, Version 2.2*

[4] *Based on retail quotes obtained by the Air Resources Board, 07/2007*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*B08*
ID NUMBER:	*ARB 2-4*
TITLE:	*REDUCTION OF PERFLUOROCARBONS (PFCs) FROM THE SEMICONDUCTOR INDUSTRY*
PROPONENT:	*AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, it is recommended that this measure be reclassified as a discrete early action. The Board date for consideration of this item is anticipated in 4th quarter of 2008.

3. Early Action Description

The semiconductor industry uses PFCs primarily for etching circuits in silicon wafers and cleaning chemical vapor deposition tool chambers where thin films of chemicals are laid down onto silicon wafers. During these processes, a portion of the PFC gases used is released to the atmosphere.[1] There are four technologies industry has either employed or considered to reduce PFC emissions from semiconductor production:

- Process Optimization (optimizing the use of PFCs, such as in the chamber cleaning process);
- Alternative Chemistry Development;
- Emission Abatement; and
- Recovery/Recycling (separation of fluorinated compounds from other gases for further processing and reuse).

This discrete early action item will consider mandating the process optimization and alternative chemistry development technologies currently in use by some manufacturers. ARB would also evaluate the technical and economic feasibility of requiring emissions abatement and recovery/recycling strategies that may further reduce PFC emissions. The gases that may be impacted include:

- Hexafluoroethane (C_2F_6)
- Octofluoropropane (C_3F_8)
- Nitrogen Trifluoride (NF_3)
- Tetrafluoromethane (CF_4)
- Sulfur Hexafluoride (SF_6)
- Trifluoromethane (CHF_3), and
- Octofluorocyclobutane (C_4F_8)

While this action does not prohibit the use of SF_6 in the manufacture of semiconductors, the regulation may limit its use. During the regulatory process, staff will consider other strategies to reduce PFC emissions recommended by stakeholders.

Three California manufacturers currently participate in voluntary national efforts to reduce PFC emissions to 10 percent below 1995 levels by 2010. A 2001 Memorandum of Understanding (MOU) agreement with the U.S. EPA provides details of these efforts.[2] Manufacturers and the U.S. EPA reached the agreement well before the adoption of Assembly Bill 32. Consequently, the State and federal courses of action have different goals and timeframes and information on any actions being taken by the remaining California companies to reduce PFC emissions is limited.

ARB data indicate that 93 semiconductor facilities are located in California. This figure is taken from ARB's California Emissions Inventory Development and Reporting System and is available upon request. A survey of the industry will be necessary to improve the accuracy of the emissions data. In the survey, ARB staff will request that each entity indicate whether they are a manufacturer, research and development facility, university or other type of organization and that all facilities report the use of the chemicals identified above. Results may reveal that the actual number of facilities operating within California is less than current data indicate.

Each facility affected by the regulation will be required to report emissions data to the ARB, regardless of their participation in the US EPA MOU.

4. Potential Emission Reductions

ARB staff proposed a GHG reduction goal of 0.5 $MMTCO_2$ equivalent in 2020 for the semiconductor industry in the April 2007 early actions report.[3] This goal will be further evaluated based on survey results from the industry and other data that become available over the next few months.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The complete cost of this regulation has not been determined at this time. For process optimization, higher costs could be incurred by older fabrication facilities as process parameters such as chamber pressure, temperature, cleaning gas flow rates and gas mixture ratios are changed to reduce gas use. Alternative chemistry development is expected to result in minor cost impacts as the cost of alternative gases would be about the same as PFC gases. The manufacturers could pass on any additional costs to the consumers through higher product prices. The significance of this impact is not known.

6. Technical Feasibility

The technical feasibility of two of the four technology options for reducing PFC emissions within the semiconductor industry is fairly well known at this time. Two technologies currently used by manufacturers are:

- Process optimization
  This technology reduces the amount of PFCs used and has been primarily applied to the chamber cleaning process because of high use of PFC gases for cleaning.

- Alternative Chemistry Development
  Nitrogen trifluoride (NF_3) has been used as a substitute for hexafluoroethane (C_2F_6) in the chamber cleaning process to reduce PFC emissions since NF_3 is more effectively destroyed in the process.

Two technologies that would be further evaluated are:

- Emissions abatement
  Commercially available technologies can be applied to the chamber cleaning or the etching process to reduce emissions. High temperature and catalytic oxidation and plasma destruction are the most common technologies used to abate PFCs, but little is currently known about the extent of use by California manufacturers. Furthermore, the performance of abatement systems can vary greatly depending on the abatement device and process parameters, such as temperature and PFC gas flow rates.
- Recovery/Recycling
  These technologies have not achieved as much success as others as they are more costly or require more maintenance. The recovered compounds that are separated from other gases contain more impurities than virgin chemicals and are less likely to be used by the industry.

7. Additional Considerations

Additional considerations that pertain to the measure include:

This item is regulatory and falls under ARB jurisdiction. ARB has the legal authority to pursue this discrete early action item and the Climate Action Team supports further PFC reductions by the semiconductor industry.[4] Staff recommends that this item be presented to the Board within 18 months.

Leakage Considerations: The movement of semiconductor production facilities and older equipment from California to regions beyond California may result in leakage effects. The Semiconductor Industry Association (SIA) has indicated that California semiconductor manufacturing has been in decline over the last decade. The reasons vary from high capital costs, to tax advantages offered by other state and foreign governments, to lower financial risks associated with overseas foundry manufacturing compared to self-manufacture. The illustration provided by SIA is that from 1995 to 2006, three of the six MOU California companies ceased manufacturing operations. The corresponding decline in emissions was that California went from representing nearly 8 percent of U.S. emissions to just 3 percent. Staff needs to determine if the decline in California's emissions represents a shift of PFC emissions to other countries such as China. If so, we will need to determine if those manufacturers are using older equipment sold by California firms which may result in high emissions.

Affected Entities

Industry:

- Semiconductor fabrication industry
- Semiconductor Industry Association

Government:

- Local air pollution control districts

- California Energy Commission
- U.S. EPA

Comments Received From: Silicon Valley Leadership Group, Semiconductor Industry Association.

8. Division: Stationary Source Division
Staff Lead: Dale Trenschel
Section Manager: Terrel Ferreira
Branch Chief: Barbara Fry

9. References:

1. Emission Reduction Opportunities for Non-CO2 Greenhouse Gases in California, Public Interest Energy Research Program: Final Project Report, California Energy Commission, July 2005.

2. Memorandum of Understanding between the Semiconductor Industry Association (SIA) and the United States Environmental Protection Agency, January 2001.

3. Internal estimate, spreadsheet filename cost.xls, 2007.

4. Proposed Early Actions to Mitigate Climate Change in California, Air Resources Board, April 20, 2007.

5. Climate Action Team Report to Governor Schwarzenegger and the Legislature, California Environmental Protection Agency, March 2006.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *B09*
ID NUMBER: *EJAC-14/SCAQMD-6/EA 2-16/ARB A-14*
TITLE: *GREEN PORTS*
PROPONENT: *2006 CAT REPORT AND STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, it is recommended that this measure be reclassified as a discrete early action. The Board date for consideration of this item is anticipated in 1st quarter of 2008.

Staff proposes to present the draft regulation to the Board as a measure to reduce nitrogen oxides (NO_x) and diesel particular (PM) emissions and to quantify the associated (carbon dioxide) CO_2 emission reductions. By focusing on NO_x and PM reductions, staff will address the local and regional health impacts of ships docked in California's ports, including any disproportionate impacts those emissions may have on surrounding communities.

3. Early Action Description

This early action allows docked ships to shut off their auxiliary engines by plugging into shoreside electrical outlets or other technologies. The Air Resources Board identified port electrification as a strategy to reduce the emissions of nitrogen oxides (NO_x) and diesel particulate matter (PM) when the Board approved the Goods Movement Emission Reduction Plan in April 2006. Furthermore, the Climate Action Team (CAT) recommended port electrification as a greenhouse gas (GHG) emission reduction strategy in 2006.

While a ship is docked at a berth, or "hotelled," it continuously runs at least one auxiliary engine to power lighting, ventilation, pumps, communication, and other onboard equipment. Ships can hotel for several hours or several days.

Port electrification provides an alternative source of power for these ships while they are docked. The ships can use cables to receive electricity from the shore, thereby allowing them to shut off their auxiliary engines, reducing emissions of air pollutants. Although the generation of electricity creates emissions—typically from power plants located elsewhere—these emissions are much less than those from the auxiliary engines located on the ships. Port electrification of a ship can reduce its emissions of NO_x and diesel PM by more than 90 percent. Greenhouse gas (GHG) emissions, as carbon

dioxide (CO_2), are also reduced, depending on the source of electricity provided to the berth.

To be an attractive candidate for shore electrification, a ship must visit a California port frequently, spend a sufficient number of hours in berth, and have an ample power demand while docked. The ship categories that typically meet these criteria are container ships, passenger ships, and refrigerated cargo ships. (Passenger ships, although in port for only about 10 hours, visit frequently and have tremendous power needs.) Ship categories that are not attractive candidates include bulk cargo ships, vehicle carriers, and most tankers. The ports that receive numerous calls by container ships, passenger ships, and refrigerated cargo ships—and therefore the ports most likely to employ port electrification—are Los Angeles, Long Beach, San Diego, Oakland, San Francisco, and Hueneme.

ARB staff is currently working with ports, ship operators, utility companies, local air districts, and other interested stakeholders to develop a regulation to reduce emissions from ships while docked. Although the proposed regulation will allow alternative technologies to reduce emissions, the key component of the regulation will be port electrification. Staff expects to take the proposed regulation to the Board for its consideration by the end of 2007.

4. Potential Emission Reductions

ARB staff is pursuing the port electrification strategy as a measure to reduce NO_x and diesel PM emissions. This strategy was identified in the Goods Movement Emissions Reduction Plan (GMERP), approved by the Board in April 2006. The reduction of these pollutants is essential for protecting public health near California's ports and for the South Coast Air Basin to eventually achieve and maintain health-based ambient air quality standards for ozone and fine particulate matter. The reduction of CO_2 is a co-benefit of the proposed at-berth emission reduction regulation.

Although the proposed regulation is not yet fully developed, staff estimates that the regulation may result in the following emission reductions:

Pollutant	**2015**	**2020**
NO_x (Tons)	15,000	19,000
Diesel PM (Tons)	400	500
CO_2 (Million Metric Tons)	0.3	0.5

Staff expects port electrification to achieve emission reductions in 2010—largely due to the commitments of the Port of Los Angeles and the Port of Long Beach through their Clean Air Action Plan—however, the emission reductions from the proposed regulation will not be substantial until after 2010.

The potential CO_2 emission reductions of port electrification are dependent on the source of the electricity provided to the port. If the electricity portfolio of the utility company has a significant portion of renewable sources, such as wind, solar, or biomass, then the CO_2 reductions may be substantial. Similarly, if the portfolio contains sources of electricity that generate considerable amounts of CO_2—say, out-of-state coal-fired plants—then the potential CO_2 emissions would be diminished.

For the purpose of this analysis, ARB staff used a CO_2 emission factor of 0.25 MMT CO_2/MW-hr for the electrical grid and 0.69 MMT CO_2/MW-hr for the auxiliary engines. Staff will consider utility-specific CO_2 emissions and marginal electricity generation CO_2 emissions (typically combined-cycle gas turbines) as the development of the regulation proceeds.

As mentioned earlier, the proposed regulation will allow alternative technologies to achieve required emission reductions. These alternatives may include ship-side technologies, such as post-combustion devices, alternative fuels, or cleaner engines, or shore-side technologies, including distributed generation or emission-capture-and treatment devices. These technologies will probably be less effective in reducing GHG emissions when compared to port electrification; however, their overall deployment and impact are uncertain.

As a GHG emission reduction strategy, port electrification has the potential to reduce CO2 emissions on the order of 0.3 to 0.5 MMTCO_2 per year. This estimate does not consider the climate benefit associated with reduction of black carbon, a component of diesel PM.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Staff estimates that port electrification, as currently proposed, will cost more than $1.2 billion, roughly one-third of that cost borne by the ports and terminals, two-thirds by the ship operators.

The growth in port activity—especially the substantial increase in containers expected to be handled by the ports and the projected surge in cruise-ship vacations—will have a significant impact on the number of ships that must be built or retrofitted to accommodate port electrification. ARB staff estimates the number of ships to be affected by the proposed regulation as:

Ships Affected	**2015**	**2020**
Container	500	1,200
Passenger	76	110
Refrigerated Cargo	10	25

In addition to the recovery of that capital expenditure, annual operating expenses will include labor costs necessary to connect and disconnect the ships to shore power and the cost of the electricity itself. Fuel savings realized by shutting down the auxiliary engines will help offset the electricity costs.

Staff estimates that the annual costs of port electrification are as follows:

Annual Costs	**2015**	**2020**
Capital Costs	$148 million	$250 million
Operating Costs	$42 million	$ 75 million
Total	**$190 million**	**$325 million**

As mentioned above, port electrification is considered foremost a measure to reduce NO_x and diesel PM emissions with GHG emission reductions being a co-benefit. The cost effectiveness of port electrification for 2020 is estimated at $17,000/ ton for NO_x or $640,000/ ton for PM. These values represent the cost of the regulation completely allocated to either NOx or diesel PM; a sharing of the total costs between these two pollutants would further enhance their cost effectiveness.

If NO_x and diesel PM emission reductions were not considered, and port electrification were considered solely as a GHG emission reduction measure, the cost effectiveness in 2020 would be $650/MT CO_2.

Staff proposes to present the draft regulation to the Board as a measure to reduce NO_x and diesel PM and to quantify the associated co-benefit of CO_2 emission reductions. By focusing on NO_x and PM reductions, staff will address the local and regional health impacts of ships docked in California's ports, including any disproportionate impacts those emissions may have on surrounding communities.

6. Technical Feasibility

Port electrification is a proven technology. The U.S. Navy has been employing it worldwide for decades. Princess Cruise Lines currently uses port electrification in Juneau, AK and Seattle, WA, as does China Shipping at the Port of Los Angeles (POLA). The NYK Atlas has recently plugged in at POLA, and British Petroleum is expected to utilize port electrification by the end of the year at the Port of Long Beach for two of its diesel-electric tankers.

Although technically feasible, port electrification is not without its challenges, including the availability of electricity, the standardization of electrical hookups, and sufficient visits to electrified berths by retrofitted ships to make the emissions reductions cost-effective. Staff has been discussing the necessary electrical infrastructure and supply with the major ports and utility companies. The International Maritime Organization (IMO) is considering standard electrical connections for port electrification, and several California ports and other organizations are participating in that effort.

7. Additional Considerations

California will be the first state to require port electrification, or its equivalent, if the Board adopts a proposed regulation within the next six months. Current port electrification projects within California and the United States have been required on a case-by-case basis.

The requirement to reduce emissions from ships while docked at California ports is clearly within the jurisdiction of the Air Resources Board. Port electrification has been identified as a strategy to reduce NO_x and diesel PM in the Goods Movement Emission Reduction Plan and as a GHG emission reduction strategy by the CAT. Staff will bring a proposed regulation to the Board within the next six months.

Comments Received From: Natural Resources Defense Council, Maersk Inc. and APM Terminals.

8. Division: Stationary Source Division
Staff Lead: Grant Chin
Section Manager: Mike Waugh
Branch Chief: Mike Tollstrup

9. References:

Draft Evaluation of Cold-Ironing Ocean-Going Vessels at California Ports (ARB, March 2006)

Documentation to Climate Action Team, December 2006

APPENDIX C – Staff Evaluations of Other Approved or Recommended Early Actions

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Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C01*
ID NUMBER:	*ARB 2-11*
TITLE:	*FORESTRY PROTOCOL ADOPTION*
PROPONENT:	*STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in the 4th quarter of 2007.

Staff recommends this strategy remain on the list as an early action by Board adoption of the California Climate Action Registry (CCAR) forestry protocols for immediate use to enhance voluntary greenhouse gas emissions reductions. Staff recommends a two-phase process that allows early action by bringing existing sector, project, and certification protocols, developed by CCAR, to the Board for approval in October 2007 and also allows for longer term consideration and review of additional forestry protocol development as determined in the initial public workshop process. Adoption of sector and project forest protocols would be non-regulatory, because their use would be voluntary.

3. Early Action Description

Forestry is the only sector that *actively removes* greenhouse gases from the atmosphere. The CCAR forestry protocols represent the work of leading experts in the field of forestry and in protocol development, the input of stakeholders and the public over a 4-year public process, and the review by 50 external experts, representing the forest industry, policy and academia. The protocols have been approved by the Board of Forestry (2004) and the CCAR Board (2005). The three protocols together – the sector, project, and certification protocols – are a cohesive and comprehensive set of methodologies for forest carbon accounting, and contain the elements necessary to generate high quality, conservative carbon credits. The first step to effective carbon reduction is accurate carbon accounting.

Unlike other sectors, immediate action in the forest sector does not result in instantaneous greenhouse gas reduction, because forests need time to grow to realize reduction benefits. Therefore, the sooner these voluntary protocols are adopted, the faster forest projects can be put in place, to establish *future* reductions. The three carbon reduction project types – reforestation, conservation forest management, and avoided development – provide an accounting framework for maximizing carbon sequestration and minimizing carbon loss without compromising the other ecosystem

functions forest provide (habitat, structure, nutrient cycling), as well as the suite of other benefits humans depend on from the forests (water storage, soil stability, temperature modification, air and water purification, wood products, recreation). As such, they are ready for use in voluntary measures to reduce carbon emissions in California.

4. Potential Emission Reductions

Because they are critical to accurate carbon accounting, the forestry protocols are required in several of the forest-related Climate Action Team (CAT) strategy implementation plans. A third of carbon reductions through the forest CAT plan depend on application of these forest protocols which equates to a cumulative sequestration of roughly 10 $MMTCO_2eq$ between now and 2020. The CAT-strategy reforestation projects in the year 2020 are expected to result in GHG emissions reduction of 2 MMTCO2eq (CAT, 2007). While there is already interest in the protocols from the private forest sector, the potential emissions reduction from the voluntary use of the protocols could vary depending on a variety of factors, including management activity, site fertility, and available funding. One unpublished industry study suggests a potential increase of 2¼-fold in the pine zone (Steve Brink, California Forestry Association, pers. comm.). Nationally, an additional 100 to 200 Tg C/yr of forest carbon sequestration is achievable, but would require investment in inventory and monitoring, development of technology and practices, and assistance for land managers (Birdsey et al. 2006).

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Currently, the methodologies for carbon stock assessment require intensive sampling programs to meet the required confidence levels for verification. This is labor and time intensive, and therefore costly. There is currently no better technology/methodology to measure carbon if a high degree of certainty is required in carbon stock assessment. Carbon stock certainty should meet the criteria of other carbon emission estimates in the state (20% of the mean estimate). Smaller landowners may find the cost to implement the sampling and subsequent verification too burdensome to participate. The larger industrial landowners (>30,000 acres) should be able to use forest stocking data from sustained-yield management plans which they are required to submit to California Department of Fire and Forest Protection (CalFire). Data for inventorying large land areas may be accessible from CalFire plot data and USFS Forest Inventory and Analysis plot data.

6. Technical Feasibility

The carbon accounting techniques used in the forest protocols are standard forest measurement techniques.

7. Additional Considerations

The forestry protocols are designed for small to mid-sized private forest ownerships. There is a need for continued development of forest accounting methodologies to address outstanding issues for: 1) public forest ownerships and for 2) industrial forest private land ownerships. These issues can be addressed within the framework of the existing protocols by defining additional project types beyond the three project types (reforestation, conservation forest management, and avoided deforestation) in the

current protocols. For public landowners, issues to resolve include legality of permanent easement transfer, baseline/additionality definition, and carbon offset ownership. By recognizing the need for additional project types in the future, the existing forestry protocols can be moved forward through the public process, adoption and implementation immediately while the new project types are developed through a longer term public process. This will expedite the availability of the forest protocols for immediate use, while still allowing due consideration to the different needs of the industrial and public forest sector.

Affected Entities: Any forest ownership in California could participate in all forest project types, including state and federal public forests, and private forests. Many non-forest entities might participate in reforestation activities, including local governments, utilities, others.

Trade Associations: California Forestry Association.

Comments Received From: Sierra Pacific Industries, Green Diamond Resource Company, California Resources Agency, California Forestry Association.

Government Agencies Coordination: California Department of Forest and Fire Protection, Board of Forestry, United States Forest Service.

8. Division: Planning and Technical Support Division
Staff Lead: Jeanne Panek
Section Manager: Dale Shimp
Branch Chief: Richard Bode

9. References:

The protocols can be found in their entirety on the California Climate Action Registry website at: http://www.climateregistry.org/PROTOCOLS/FP/

Birdsey, R., K. Pregitzer, and A. Lucier. 2007. Forest Carbon Management in the United States: 1600–2100. J. Environ. Qual. 35:1461–1469.

CAT, Climate Action Team. 2007. Climate Action Team proposed early actions to mitigate climate change in California. Draft for public review. April 2007. www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.PDF

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C02*
ID NUMBER:	*ARB 2-1 / EJAC-2*
TITLE:	*MANURE DIGESTER PROTOCOL FOR CALCULATING GREENHOUSE GAS MITIGATION*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 3rd quarter of 2008.

Specifically, staff recommends Board adoption of the California Climate Action Registry (CCAR) manure digester protocol in order to promote voluntary greenhouse gas emissions reductions.

3. Early Action Description

Description of Protocol – The manure digester protocol provides methodologies for calculating reductions in the emissions of greenhouse gases resulting from the installation of a manure digester at an animal agricultural facility.

Technology Description – Manure digesters (also called biogas control systems) are systems which trap gaseous emissions from manure (primarily methane) and combust the gas. The trapping process is achieved by enclosing the manure, which often involves covering a manure lagoon with plastic or otherwise isolating the manure from the ambient environment. The combustion process occurs either by combusting the trapped methane biogas in an engine in order to generate electricity, or by venting and flaring the gases.

CCAR Protocol Development Process – CCAR began developing a protocol for calculating manure greenhouse gas emission back in April 2006. The protocol development process began with a first scoping meeting, included multiple working group meetings and document reviews, and included representatives from nearly every stakeholder group, including industry, government, academia, and the general public.

Need for Digester Protocol Adoption – Although this protocol was adopted by CCAR, adoption by the Board would send a clear signal that the ARB considers the protocols to be accurate and acceptable for voluntary GHG emissions reductions. To achieve this end, the ARB is initiating a process to continue discussions on the protocol by holding workshops to solicit comments on the protocol and to identify potential improvements. The ultimate goal is to present the protocol to our Board for adoption as a voluntary greenhouse gas reduction measure.

Establishing a voluntary protocol can help incentivize the installation of manure digesters by legitimizing the technology and offering a pathway to quantify and verify the greenhouse gas benefits. Keeping this protocol a voluntary measure helps avoid premature technology mandates which could have significant cost and environmental drawbacks due to digesters currently being a costly, combustion-oriented technology.

4. Potential Emission Reductions

Digesters have the potential to provide a 50 percent reduction in GHG emissions resulting from manure storage (0.006 MMT CO2E per digester) as well provide electrical energy, offsetting the production of additional GHGs.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Cost per digester can range from the low hundreds of thousands of dollars to over a million dollars, depending on the digester type (covered lagoon, plug flow, etc.) and the amount of manure and biogas being processed. The captured biogas can be valuable if used for heating (water, animal housing) or combusted in an engine/ generator to produce electricity. Thus, the digester can reduce farm costs and may provide income if the gas or electricity is sold to other entities or back to the grid.

6. Technical Feasibility

Manure digesters are currently installed and operating at a limited number of farms in California.

7. Additional Considerations

Affected Entities: Farmers, energy companies, and any companies involved in the business of mitigating greenhouse gases (AgCert, CEERT, etc.)

Trade Associations: California Farm Bureau, Western United Dairymen, California Dairy Campaign.

Government Agencies Coordination: State Water Resources Control Board, local Air Pollution Control Districts, California Department of Food and Agriculture, California Climate Action Registry and others.

Proposed Board Hearing Date: September 2008

8. Division: Planning and Technical Support Division
Staff Lead: Kevin Eslinger
Section Manager: Dale Shimp
Branch Chief: Richard Bode

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C03*
ID NUMBER:	*ARB 2-6*
TITLE:	*GUIDANCE AND PROTOCOLS FOR LOCAL GOVERNMENTS TO FACILITATE GHG EMISSION REDUCTIONS*
PROPONENT:	*AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 3nd quarter of 2008.

Local governments have the power to affect the main sources of pollution directly linked to climate change through infrastructure investments, land use decisions, building codes, and municipal service management. While a handful of local governments in California have already started to plan and implement local GHG reduction measures, development of a State guidance document and local government protocols is needed to encourage and support greater and coordinated local action statewide. Furthermore, development of these items will help ensure consistency and coordination between the multiple state agencies involved with implementing AB 32, with regard to supporting and advising Local Government actions for GHG reductions.

Staff recommend developing guidance documents for Local Governments that outline GHG reduction opportunities, as well as protocols for emission reduction accounting.

3. Early Action Description

The first step of this strategy will be to coordinate with the Climate Action Team, local governments, the California Climate Action Registry, and local government support organizations like ICLEI (Local Governments for Sustainability). The guidance document will address: 1) best practices for local governments to reduce GHG emissions; 2) categorization and prioritization of strategies by applicability to community types (i.e., urban, suburban, rural), cost-effectiveness, time needed to achieve reductions, etc.; 3) local government protocols for emission reduction accounting; and 4) appropriate modeling tools to support emission quantification at the local level.

Specific recommendations could include: implementing green building standards, stronger recycling programs, energy conservation, changing municipal fleets to cleaner alternatives (gas-electric hybrids, natural gas fueled vehicles, etc.), promoting sustainable communities and smart growth; encouraging LED street and traffic lights;

promoting alternative energy (e.g. solar). These are effective actions that local governments can implement to reduce carbon emissions, which not only help the environment but could be cost effective.
Guidance documents and protocols from this strategy will be voluntary not regulatory and will be developed in close coordination with stakeholders representing state, local, regional and industry perspectives. A strong long-term local level education program will be necessary for successful implementation.

Groups to work with include:

Trade Associations: California Building Industry Association (CBIA), League of California Cities, California State Association of Counties (CSAC), California Association of Councils of Governments (CALCOG).

Government Agencies: Governor's Office of Planning and Research, California Air Pollution Control Officers Association (CAPCOA), and Local Air Pollution Control Districts, local government agencies, Cal/EPA's Climate Action Team and its Land Use/Smart Growth Subgroup, Department of Community and Housing Development, Department of Transportation, California Energy Commission, Integrated Waste Management Board.

4. Potential Emission Reductions

Potential emission reduction impacts are difficult to predict with current knowledge.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Estimated costs and economic impacts are difficult to determine and this time.

6. Technical Feasibility

With regard to developing a best practices document for Local Government, many other cities, states, and private organizations have acknowledged the need to reduce global warming pollution and have taken steps to coordinate concerted efforts. Below is a list of just a few national and international programs that staff will consider closely:

- U.S. Mayors for Climate Protection - promote actions that city governments can do to profitably and reduce carbon emissions.
- The Clinton Climate Initiative - works with C40 Large Cities Climate Leadership Group, an association of large cities dedicated to tackling climate change—to develop and implement a range of actions that will accelerate greenhouse gas emissions reductions.
- ICLEI's Cities for Climate Protection™ (CCP) Campaign - assists cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability. More than 800 local governments participate in the CCP, integrating climate change mitigation into their decision-making processes.

As for protocols for emission reduction accounting, the California Climate Action Registry (CCAR) is currently under contract with the ARB to develop a suite of protocols for reporting and certifying GHG emission reductions for Local Governments. As part of this

effort, CCAR will be preparing a scoping document that describes the full scope of local government activities and operations to which quantification protocols can be applied. Data and analysis from this work will support development of a Local Government guidance document.

7. Additional Considerations

Many of the actions that may be recommended fall under the jurisdiction of other state and local agencies therefore this strategy will provide advice and support action, rather than mandate.

An important aspect of this strategy will be verification of the emission reductions and the value associated with it. Future efforts will focus on how local governments can take credit for net reductions and best uses for those credits.

Proposed Board Hearing Date: July 2008

Comments Received From: Community Recycling & Resource Recovery, DuPont Company, Californians Against Waste.

Additional comments were received by the general public.

8. Division: Office of Climate Change
Staff Lead: James Goldstene

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C04*
ID NUMBER:	*2-7*
TITLE:	*GUIDANCE/PROTOCOLS FOR BUSINESSES TO FACILITATE GHG EMISSION REDUCTIONS*
PROPONENT:	*AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 2nd quarter of 2008.

Currently, California businesses' energy consumption contributes approximately 12 MMTCO2E GHG emissions per year. Through strategies such as efficient building practices, motor vehicle fleet changes, operational changes, fossil fuel switching, and recycling, local businesses can reduce cost effectively their carbon footprint. These emission reductions range from quite minor to very significant and all reductions will assist the State in meeting its targets under AB32.

Greenhouse gas emission reduction guidance and suggested strategies for local businesses will be presented to the Board in July 2008. At present, it is anticipated that implementation of local business reduction measures will be strongly encouraged, but strictly on a voluntary basis with a dedicated and aggressive educational outreach effort. It is also anticipated that initially, guidance will be broad and, hence applicable to a broad spectrum of businesses. In time, the guidance will evolved into focused, sector-specific recommendations. To the extent possible, a robust emission verification element will be integrated into the guidance so that reductions can be quantified.

3. Early Action Description

This strategy will provide guidance and informational resources to local businesses on best practices, emission calculation and verification methods, case studies, cost-effectiveness information, and other tools to assist in reducing greenhouse gas emissions. The guidance will seek to distill and translate the vast amount of information already existing into tangible and concrete steps that local business can implement. Staff's efforts will be focused on reaching out to small/mid-size businesses to engage them in the development of actions, to offer guidance for estimating emissions, identifying and quantifying reductions, and facilitating actions to reduce carbon footprints. Information on relevant options, particularly those that have been implemented successfully by others at a local or national level will be highlighted.

This strategy will focus on businesses ranging from a small office to mid-size corporations and will address the climate benefits of both operational and behavioral changes. Operational changes could include the use of *Energy Star* equipment, compact fluorescent light bulbs, water conservation, recycling, and motor vehicle fleet changes. In addition to physical changes to the operation of the business (e.g., new construction, retrofits to existing buildings), the guidance will address the benefits of behavioral changes such as incentives for carpooling/walking/bicycling to the workplace, facilitate employees walking to lunch, procuring "green" products, incentives for reducing waste/electricity consumption, Governor's Awards program to recognize green business leaders, etc. Businesses that choose to pledge to participate in the effort for climate protection will be encouraged and assisted to inventory and report their emissions via recognized channels such as the California Climate Action Registry.

To be successful, this strategy must convince businesses to embrace new projects and initiatives from both environmental and economic perspectives. Thus, a key element of success in the strategy will be to determine how enhancements of operational efficiencies can result in increased profits for a participating business via savings in energy consumption. In addition to working with established organizations that represent or have strong ties with the targeted audience (small and medium business owners/managers), emphasis will be placed on implementation through a variety of means (e.g., information in association newsletters, presentations at trade meeting, web-based tools, etc.). ARB staff will monitor the effectiveness of and response to efforts in order and make necessary adjustments as needed to strengthen the program into the future.

4. Potential Emission Reductions

Energy efficiency measures associated with green buildings address lighting, heating and cooling, water conservation, refrigeration, and recycling and often lead to a large decrease in GHG emissions. The US Department of Energy states that new energy-efficient design can cut energy usage by 50%; renovation of existing buildings can yield savings of up to 30%. Governor Schwarzenegger signed Executive Order S-20-04 in 2004, which sets a goal of reducing energy use in State-owned buildings 20% by 2015 (from a 2003 baseline). The private commercial sector is encouraged to do the same. The California Energy Commission estimated 2004 GHG emissions in the commercial sector to be approximately 12 MMTCO2E. Thus, achieving a 20% reduction in GHG emissions as called for in the Executive Order could potentially realize a reduction of more than 2 MMTCO2E in the commercial sector.

5. Estimated Costs / Economic Impacts and the Impacted Sectors/ Entities

Cost information will vary widely depending on the specific action implemented by a local business. Thus, it is premature to report this information at this time. However, information coming from existing examples that have successfully achieved improvements indicates that the return on investment for energy efficiency measures is often recovered in three to five years, resulting in long term cost savings due to lower utility bills. Measures that could be implemented pursuant to this proposed early action are quite varied and potentially include installation of LED exit signs, efficient refrigeration systems, improved building insulation, purchase of *Energy Star* appliances and office equipment, and implementation of recycling programs. Improvements that are

scaleable to square footage of operations will be pursued so that the emission reduction benefits can be pursued across all sizes of businesses.

6. Technical Feasibility

The proposed strategy benefits from the successful experience from several local businesses and other entities that have already set targets and developed climate action plans. The mitigation strategies will likely be a suite of best practices already in use and proven to be feasible and effective. Staff will work with the business community to ensure that this strategy focuses on activities and provide information that will promote real, quantifiable, and sustainable reductions. We will also focus on the most effective ways to target the information at decision makers. Hurdles may include developing and implementing guidance that is sufficiently specific and documented.

7. Additional Considerations

ARB will work in consultation with several agencies including: 1) California Energy Commission, 2) Business Associations 3) California Climate Action Registry 4) California Chamber of Commerce, 5) Utility providers, as well as many others.

Comments Received From: TrafficBulldog, DuPont Company. Silicon Valley Leadership Group, Californians Against Waste.

Additional comments were received by the general public.

8. Division: Research Division/Planning and Technical Support Division/Office of Climate Change
Staff Lead: TBD
Section Manager: Annmarie Mora
Branch Chief: Alberto Ayala

9. References:

California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004, October 2006.

U.S. Department of Energy, Energy Efficiency and Renewable Energy, Building Technologies Program, http://www.eere.energy.gov/buildings/info/office/index.html, January 27, 2006.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C05*
ID NUMBER:	*SCAQMD-3/ARB 2-9*
TITLE:	*COOL COMMUNITIES PROGRAM*
PROPONENT:	*SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, it is recommended that this measure remain as an early action item. The Board date for consideration of this item is anticipated in 3rd quarter of 2008.

A non-regulatory strategy (guidance) for further action by businesses, developers, and/or individuals to reduce GHG emissions remains an early action as approved by the Board at its June 2007 hearing. In coordination with the California Energy Commission and the Lawrence Berkeley National Lab (LBNL), staff will develop research and real-world experience-based guidelines on actions that could be taken, documenting options, costs, and benefits. We would draw from local, national, and international experience. The guidelines would be neither a complete nor a necessarily suitable recommendation for every community, but rather a foundation or menu of options applicable to a broad range of communities. The development of the guidance may reveal the need for supplemental tools (e.g., calculators, sector targeted guidelines). Guidelines will be developed in close collaboration with business, community, and environmental stakeholders to ensure that the approach is as effective as possible.

3. Early Action Description

We recommend a non-regulatory voluntary program with a set of guidelines to be adopted to foster the establishment or transition to cool communities in California. The affected economic sector is the construction industry. Many of the technologies are already well established. Below is a brief description of the strategies expected to be addressed in the guidelines.

Cool Roofs

Cool roof programs as part of the Building Energy Efficiency standards (Title 24) which can save as much as 15 percent of cooling energy use during hot months of the year. Such a program has already been proposed (Hebert, 2005). Confined to a residential cool community program, the per-house cost premium is estimated at about $500 (Professor Akbari).

Cool Pavements

Pomerantz (1999) suggests that for the urban area of Los Angeles (10,000 km^2 and 1,250 km^2 paved), a change to cool pavements can result in reduction of ambient

temperature by 0.6℃ (1℉). This reduction is esti mated to result in ozone avoidance benefits of $75 million ($228 million extrapolated to California) and energy conservation benefits of $15 million per year. In 1990, California had 410,000 km^2 in total area with 28 urbanized areas with a total of 15,624 km^2 (5,091 km^2 in Los Angeles). By 1999, the urban area of the state may have reached 30,689 km^2 and the total paved area may have been 3,836 km^2 (3800 km^2 available for cool pavement retrofit).

It is estimated that a cool pavements program would require a premium price of $0.5 per square yard as there are additional costs associated with painting the surfaces. Manville and Shoup (2005) identified the fraction of paved area devoted to parking as 24% for the Los Angeles business district, leaving 76% of paved area for the cool pavement program; this is to keep separate the cool pavement and the parking shade program.

Shade Trees and Urban Forest

The Tree Benefit Estimator reports that a mature tree system would save about 700 kWh of energy (1,100 kg of CO_2 per household) (http://www.appanet.org/treeben/calculate.asp). Mature trees can cost as much as $300 per tree or $1200 for 4 trees surrounding a residence.

Taha et al. (2000) reported ("Three Cities,") an ambient temperature reduction of 1.2K to 1.6K for a heavily vegetated scenario; Scott et al. (1999) reported increased parking lot shade reductions of 5℃ to 7℃ (2,592 m^2 shaded area covered by 23 mature trees) while the City of Sacramento guidelines recommend 22 trees providing 776 m^2 of shade. Manville and Shoup (2005) identified 24 percent of the paved area of Los Angeles central business district (LACBD) devoted to parking. Following that same logic and using Scott et al. nearly 8 million mature trees would be needed to offer complete shade to every parking lot in California. For Sacramento, 486 mW peak power (and 92,000 $MTCO_2$ emissions) may be avoided (Taha et al.).

4. Potential Emission Reductions

As the proposed strategy consists of voluntary guidance, estimating the emission reductions is a function of the actual strategies employed as well as the magnitude of adoption. As such, potential emission reduction estimates are to be determined as part of the development of the guidelines.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Developing effective guidelines will also increase energy independence, reduce peak energy that is quite often highly polluting, have air pollution benefits through reductions in precursors to ozone and particulate matter, and offer impetus to gentrification and increases in real estate values (Thériault et al. (2005)). Application of the guidance would likely increase construction costs in California. Rise of a new California-specific construction sector would however be a significant boon to our economy. Small businesses have the flexibility of becoming a part of this new expertise construction sector. Environmental justice communities would benefit from gentrification and increases in real estate value. Significant funding from point sources, local and state governments, and the public sector could be expected.

6. Technical Feasibility

Cool roofs are already a part of Title 24, and urban forestry has long been recognized a key to energy conservation and urban gentrification, thus, these technologies are feasible and proven.

7. Additional Considerations

Affected Entities: Construction permit jurisdictions, state and local governments, construction industry

Trade Associations: Construction industry associations

Additional comments were received by the general public.

Government Agencies to coordinate with: California Energy Commission & LBNL

8. Division: Research Division
Staff Lead: Ash Lashgari
Section Manager: Eileen McCauley
Branch Chief: Michael FitzGibbon

9. References

Akbari, Hashem, Professor at Lawrence Berkeley National Lab, Personal Communication, July 30, 2007

Appendix A (~1990), "California Urbanized Areas, Raw Data," http://www.sprawlcity.org/studyCA/CAappendices.pdf

City of Sacramento's parking lot shading design and maintenance guidelines http://www.cityofsacramento.org/parksandrecreation/ppdd/pdf/SHADING_GUIDELINES_06-05-03.pdf

Hebert, Elaine (2005), "Cool Roofs in California's Title 24 2005 Building Energy Efficiency Code," California Energy Commission, Presentation http://www.buildingmedia.com/calbo/sg/PlanReview.pdf.

Langford, S & Williams, K (2007), "The State of Housing, HCD Director Lynn Jacobs Outlines California's Housing Shortage — and How to Fix It — In 2007," California Builder, Official Publication of California Building Industry Association, April. http://www.californiabuildermagazine.com/internal.asp?pid=325&spid=

Manville, M. & D. Shoup (2005), "Parking, People, and Cities," Journal of Urban Planning & Development, ASCE, pp. 233-244, December.

Pomerantz, Melvin (1999), "Benefits of Cooler Pavements," Lawrence Berkeley National Laboratory, posted presentation http://eetd.lbl.gov/HeatIsland/Pavements/Overview/index.html

Scott, K.I., Jim Simpson, and E. Gregory McPherson (1999), "Effects of Tree Cover on Parking Lot Microclimate and Vehicle Emissions," Journal of Arboriculture, Vol. 25, No. 3, pp. 129-142.

Table 2, http://www.eia.doe.gov/emeu/recs/recs2001/enduse2001/enduse2001.html

Taha, H., Chang, S-C, & Akbari, H. (2000), "Meteorological and Air Quality Impacts of Heat Island Mitigation Measures in Three U.S. Cities," Lawrence Berkeley National Lab Report No. 44222, April.

Thériault, M. Yan Kestens and François Des Rosiers (2005), "The impact of mature trees on house values and on residential location choices in Quebec City,"
http://www.iemss.org/iemss2002/proceedings/pdf/volume%20due/191.pdf

USCB (United States Census Bureau) (2005), "Table 3, California: Selected Economic Characteristics, 2003" last revised, June 28, 2005.
http://www.census.gov/acs/www/Products/Profiles/Single/2003/ACS/Tabular/040/04000US063.htm

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C06*
ID NUMBER:	*ENVIRO-2*
TITLE:	*ANTI-IDLING ENFORCEMENT*
PROPONENT:	*ENVIRONMENTAL STAKEHOLDERS*

2. Staff Recommendation

This measure is recommended for addition to the list of early actions. The Board date for consideration of this non-regulatory item would be the 4th quarter of 2008.

This strategy will ensure that climate change benefits are realized from an existing anti-idling rule. It is believed that the 0.7 million metric tons per year CO_2 reduction listed in the 2005 staff report for the anti-idling rule have not yet been claimed.

Summary: Restricting vehicle idling (in this case, heavy-duty commercial diesel vehicles) reduces the amount of fuel burned which in turn, causes fewer emissions of greenhouse gases. Staff recommends that this measure become an early action item for the following reasons:

1) An anti-idling regulation is currently in place;
2) An enhanced version of the current anti-idling regulation is slated to commence enforcement on January 1, 2008; and
3) Proposed legislation (Assembly Bill [AB] 233, Jones), if adopted, would authorize and require ARB to further enhance its enforcement of the anti-idling regulation. This bill calls for an enhanced enforcement plan to be adopted by the Board by January 1, 2009.

If this bill is not enacted, staff could include enforcement enhancements through a Board action directed at reviewing and amending the current anti-idling regulation (with Board hearing no sooner than 2011).

3. Early Action Description

The burning of diesel fuel contributes to greenhouse gas emissions. This strategy will reduce greenhouse gases by reducing the amount of fuel burned through unnecessary idling. AB 233 calls for adoption of an enhanced enforcement plan that would be heard by the Board as a non-regulatory item.

1) ARB adopted a diesel particulate air toxic control measure (Title 13 of the California Code of Regulations, Section 2485) in June 2004 to control idling of diesel-fueled commercial motor vehicles. Enforcement commenced the following year. This rule prohibits, with some exceptions, the idling of diesel-fueled commercial motor vehicles for more than five minutes, and applies to both trucks and buses greater than 10,000 lbs. gross vehicle weight. The measure also

prohibits operation of a diesel-fueled auxiliary power system for more than five minutes within 100 feet of individual or multi-family housing units. The penalty for violating the idling regulation is currently a minimum of $100.

2) In October 2005, the Board approved an additional regulatory measure that eliminated the exemption for new and in-use trucks with sleeper berths starting in January 2008, thus requiring sleeper berth trucks to shut down and use alternative cab climate control technologies. In addition, the Board approved an amendment requiring that all new California-certified 2008 and subsequent model year heavy duty diesel engines be equipped with a non-programmable engine shutdown system that automatically turns off the engine after five minutes of idling. Enforcement of these provisions will begin in 2008.

3) AB 233, Jones, currently pending approval by the California Legislature, calls for:

   a) Enhanced field enforcement of anti-idling and other ARB regulations. AB 233 would require ARB to review existing enforcement regulations and adopt a plan for enhanced and coordinated enforcement of these regulations by January 1, 2009. Implementation of the plan would address staffing needs, goals for inspection efforts, education and training. Increases in field enforcement would flush out additional violators and give them fewer opportunities to disobey the regulation.

   b) Increased penalties for violations of anti-idling regulations. It is assumed that increasing the penalty from $100 to $300 per violation will increase the deterrent effect, resulting in improved compliance.

   c) Restriction on registrations of heavy-duty diesel vehicles with uncorrected idling violations. This would serve as an additional enforcement tool to encourage compliance.

4. Potential Emission Reductions

The emission numbers in the tables below do not represent an additional benefit due to enhanced enforcement. Rather, the numbers show the benefits of 100% compliance with the existing anti-idling rule. Enhanced enforcement is necessary in order to achieve a high compliance rate.

The elimination of non-essential diesel fueled vehicle idling reduces greenhouse gases as reported in ARB's anti-idling program staff reports. According to ARB's Initial Statement of Reasons for Proposed Rulemaking dated September 2005, the proposed sleeper berth anti-idling regulation amendments alone will reduce CO_2 emissions by nearly 1,751 metric tons per day (MTPD) and 0.6 million metric tons per year (MTPY) in 2010, and 2,068 MTPD and 0.7 million MTPY in 2020. (See www.arb.ca.gov/regact/hdvidle/isor.pdf, page 46). Enhanced enforcement of these anti-idling regulations will reduce greenhouse gas emissions by ensuring that the intended benefit of 0.7 million MTPY is fully realized by 2020.

The tables below provide the estimated statewide emissions benefits projected in metric tons per year for the currently enforced anti-idling regulation and the sleeper berth exemption amendments to these regulations. However, these benefits assume 100% compliance. History has shown that no program achieves 100% compliance and that enhanced enforcement does lead to higher compliance rates. Based on a relatively small

sample of idling inspections, the current program's rate of compliance is approximately 95%. However, given the limited number of idling inspections (due to resource constraints), it is assumed that this is not representative of statewide compliance rates.

Estimated Statewide Idling Emission Benefits - Non-Sleeper Trucks (Metric Tons/Year) – Beginning in 2005

	PM	NO_X	HC	CO	CO_2
CA Registered	151	4717	671	2631	312,344

Source: ARB's Initial Statement of Reasons for Proposed Rulemaking, July 22, 2004.

2010 Estimated Statewide Idling Emission Benefits – Sleeper Trucks Only

Baseline Emissions (Metric Tons/Year) Calendar Year 2010

	Vehicles	NO_X	ROG	PM	CO_2
CA Registered Sleeper Trucks	30,161	6570	694	128	397,485
Out-of-State Sleeper Trucks	45,241	10,950	840	113	596,045
Total Baseline	75,402	17,520	1533	241	993,530

Emission Reductions (Metric Tons/Year) Calendar Year 2010

	Vehicles	NO_X	ROG	PM	CO_2
CA Registered Sleeper Trucks	30,161	5475	621	88	255,135
Out-of-State Sleeper Trucks	45,241	9490	730	55	383,980
Total Baseline	75,402	15,330	1387	139	639,115

2020 Estimated Statewide Idling Emission Benefits – Sleeper Trucks Only

Baseline Emissions (Metric Tons/Year) Calendar Year 2020

	Vehicles	NO_X	ROG	PM	CO_2
CA Registered Sleeper Trucks	35,652	8760	657	55	470,120
Out-of-State Sleeper Trucks	53,478	12,775	913	26	705,180
Total Baseline	89,130	21,535	1606	81	1.18M

Emission Reductions (Metric Tons/Year) - Calendar Year 2020

	Vehicles	NO_X	ROG	PM	CO_2
CA Registered Sleeper Trucks	35,652	7300	584	26	301,490
Out-of-State Sleeper Trucks	53,478	11,315	876	7.3	453,695
Total Baseline	89,130	18,615	1460	33	754,820

Source: ARB's Initial Statement of Reasons for Proposed Rulemaking, September 1, 2005

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The current anti-idling regulations provide for savings of approximately $100 million per year in reduced fuel and maintenance costs. The sleeper berth exemption amendments to these regulations provide an additional annual savings of approximately $20 million per year in reduced fuel and maintenance costs. The sleeper berth exemption also is projected to save approximately 70 million gallons of diesel fuel per year.

To comply with the sleeper berth exemption amendments, vehicle owners may spend between $1,000 and $10,500 depending on the type of alternative power selected and the application needed. However, it is expected that vehicle owners will recover their initial investments over time through the fuel and maintenance savings discussed above. Although ARB estimates cost recovery times to range between 8 months and 3 years, actual recovery times will solely depend on the alternative(s) selected and the amount of time spent at idle. Financial incentives may be available for qualified zero-emissions technologies through the Carl Moyer Program.

Costs to State – If enhanced enforcement is to be achieved, additional resources will be necessary to increase enforcement presence.

6. Technical Feasibility

Technologies that will allow vehicle operators to maintain cab comfort while not running the vehicle's main engine are currently available. Some of these technologies are diesel-fueled auxiliary power systems, fuel-fired heaters, battery-electric auxiliary power systems, vehicle-battery-powered systems, truck stop electrification (on-board and off-board power infrastructure), and thermal energy storage systems.

7. Additional Considerations

A number of states have similar laws and some are more stringent than California's current law. However in 2008, California's law will no longer exempt idling of a vehicle's main engine while the operator sleeps in a sleeper berth.

This existing rule can be enforced by ARB staff, as well as by peace officers and air district personnel. This strategy is not a regulatory item. If AB 233 is approved, it calls for ARB to adopt a comprehensive enforcement plan by January 1, 2009.

AB 233 has not yet been approved (as of August 15, 2007).

Trade Associations: Truck Manufacturers Association

Comments Received From: Harmon Trucking

Additional comments were received by the general public.

8. Division: Enforcement Division
Staff Lead: Nancy O'Connor
Section Manager: Judy Lewis
Branch Chief: Paul E. Jacobs

9. References:

Assembly Bill 233 of 2007, Jones.

Senate Transportation & Housing Committee Analysis of AB 233, June 1, 2007.

ARB webpage: http://www.arb.ca.gov/msprog/truck-idling/truck-idling.htm

ARB webpage: http://www.arb.ca.gov/regact/hdvidle/isor.pdf

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C07*
ID NUMBER: *EA 2-15*
TITLE: *COOL PAINTS FOR AUTOMOBILES*
PROPONENT: *EARLY ACTION REPORT OF APRIL 21, 2007 AND STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 2nd quarter of 2009.

3. Early Action Description

Cool paints are highly solar energy reflective coatings formulated with pigments that have low absorption (high reflectance) of sunlight. White is considered to reflect more sunlight than any other color. But while white paints reflect the visible light, they may or may not reflect the balance of the sunlight. The majority of solar energy is not in the visible range, therefore careful formulation of pigments can allow the reflectance of near-infrared (NIR) sunlight which contains about 52 percent of the solar energy, while maintaining visible light reflectance (i.e., perceived color). For vehicles, the more solar energy is reflected, the less the vehicle's interior will heat up when it is parked in the sun.

Cool paints have been demonstrated by the Society of Automotive Engineers as part of the Improved Mobile Air Conditioning Cooperative Research Program. They are technically feasible in the near-term for new vehicles. Researchers at Lawrence Berkeley National Laboratory (LBNL) tested various automotive paints formulated for use between 1992 and 2002[1]. Using a solar spectrometer, they determined the reflectance of both visible and NIR light wavelengths. Table 1 presents the reflectance of light (higher reflectance equals cooler paint). As expected, the dark colors tended to reflect less light; more light energy is absorbed. The potential of cool paints can be readily seen when examining the results for red paints, shown in **bold** on the table. The red paints ranged from a reflectance of 0.13, not much better than the black paint tested, to a high of 0.37. While that does not approach the 0.70 seen for the white vehicle, it is nearly three times more reflective than the worst performing red paint.

[1] These paints were all tested with a white primer.

Table 1. Reflectance of Vehicle Paints

Vehicle Paint Color	Visible light	NIR	Total
Black, 1998 Ford	0.04	0.04	0.04
Dark Grey, 1998 Dodge Intrepid	0.06	0.05	0.06
Grey Metallic, 1992 GM Buick	0.21	0.25	0.22
Silver, 1992 Ford Escort	0.49	0.54	0.50
Gold Metallic, 1998 Ford Taurus	0.46	0.56	0.49
Light Blue Metallic, 1994 Honda Accord	0.33	0.44	0.39
Blue Metallic, 2001 GM	0.06	0.13	0.10
Green, 1995 Chevy Camero	0.07	0.08	0.08
Red, Chevy	0.08	0.18	**0.13**
Red, 2000 Ford Escort	0.14	0.50	**0.33**
Red, 2002 Chevy Avalanche	0.15	0.35	**0.25**
Red, 1993 Chevy S10 Blazer	0.15	0.57	**0.37**
White, 1997 GM Park Avenue	0.70	0.77	0.70

4. Potential Emission Reductions

The concept behind this proposed action item is that the use of cool paints would reduce the solar heat gain in a vehicle parked in the sun. A cooler interior would provide drivers with less need to activate the air conditioner (A/C).

LBNL researchers have investigated the CO_2 reduction that would result from a 5°F reduction in vehicle temperature at start up.[2] LBNL's Dr. Hashem Akbari estimates that such a reduction in temperatures, applied to the light duty vehicle fleet in California, would reduce CO_2 emissions from A/C use by about 25 percent, reducing current CO_2 estimates of A/C related emissions of 10.2 million metric tons per year (MT/yr) to 7.8 MT/yr, a 2.4 MT/yr reduction.[3]

Staff also requested input from Dr. John Rugh, National Renewable Energy Laboratory, on the probability of A/C use for a given reduction in temperatures. Dr. Rugh is currently involved in a global effort led by the Society of Automotive Engineers (SAE) to come up with an agreed upon method to determine life cycle climate performance. This effort is known as SAE's Improved Mobile Air Conditioning Cooperative Research Program. Dr. Rugh provided a draft analysis from Phoenix, showing the percent of time the A/C is in use for given ambient temperature ranges. As would be expected, at low ambient temperatures, very little A/C is used: As temperatures increase to around 18°C, A/C use begins to increase. Use continues to increase steadily until the A/C is in use nearly 100 percent of the time, around 38°C. During the rising

[2] A 5°F reduction in interior temperature has been measured by Toyota when changing from a metallic blue paint with a solar reflectivity of 10 percent to one with a reflectivity of 20 percent. Table 1 shows NIR reflectivity of 0.77 for white paint. This could be applicable to all paints, and could probably be improved to reach values closer to 100 percent reflectivity. Therefore, even the metallic blue paint should be able to achieve a reflectivity of at least 50 percent. Thus, the anticipated CO_2 reduction should be conservative.

[3] Literature on cool paints and window glazings typically model the potential for downsizing the A/C unit that exists due to measured reductions in soak temperature. Statements of the amount of downsizing feasible for equivalent cooling times are typically followed by an associated reduction in CO2 emissions. Dr. Akbari presumes improvements in emissions would result whether the A/C unit was downsized or the existing unit was simply used less frequently.

portion of the curve, A/C use increases about 5 percent per °C. If it is presumed that increased ambient temperatures are associated with increased soak temperatures, it would be logical to correlate a reduction in soak temperature in the midsection of the graph with a reduction in A/C use. Thus, a reduction in temperature of about 2.7°C (5°F), as seen in the Toyota test, would be expected to result in 14 percent less A/C use when ambient temperatures are in the rising portion of the curve. Staff applied that figure to the methodology developed by Dr. Akbari, and found a predicted reduction in CO_2 emission from a 2.7°C reduction in temperature of 2.1 MT/yr, which is comparable to the estimate presented by Dr. Akbari.

The following bullets summarize the issue:

- Slightly over half of all solar energy is in the form of NIR radiation, which is not visible to the naked eye. Cool paints use pigments that have low absorptance of NIR while maintaining a variety of visible colors.
- The benefits of cool paints include:
  - Lower external surface temperatures, reducing burn hazard and the transfer of heat to the interior of the vehicle.
  - Lower interior temperatures, resulting in greater driver comfort and potentially reduced A/C demand.
  - Potential to reduce size of air conditioner. According to LBNL staff, a vehicle's A/C is currently designed to cool a black vehicle parked for 4 hours in the summer sun in Phoenix within a set time period. If that vehicle is painted with cool black paint, the soak temperature would be reduced and the A/C load reduced. Downsizing the A/C would allow it to operate at more efficient loads while maintaining desired interior temperatures.
  - Reduced use of and/or downsizing of an A/C would result in reduced GHG emissions. Analyses indicate a reduction of 2.1 to 2.4 MT/yr CO_2e could be achieved for the light duty fleet with a relatively small improvement in solar reflectivity. Additional reductions for the medium and heavy duty fleets would likely increase this figure.
  - Possible increased lifespan of exterior paint, interior plastics and other materials

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

There are few disbenefits to this technology beyond a slight increase in coating cost. This may be more than offset by reduced A/C use or A/C downsizing, if this occurs. Cool paints currently cost about $10 more per vehicle than traditional paints. Literature indicates these paints are applied with standard equipment and methods. The small increased cost could be more than offset by a downsized A/C unit, and would be offset by improvements in operational costs due to reduced A/C use. In addition, the increased comfort should be of value to many consumers.

These paints would have the most benefit if used in conjunction with other technologies (e.g., window glazing, passive ventilation) to reduce a vehicle's interior temperatures. Therefore with the development of this rulemaking, staff will also evaluate other technologies that will reduce the heat load on the vehicle's A/C and determine if it would be appropriate to include these technologies in the "cool paints" proposal.

6. Technical Feasibility

7. Other Considerations:

Cool paints can be formulated with existing paint formulations such that supply should not be an issue. BASF, DuPont, Sherwin Williams, many other paint manufacturers do have cool versions of at least some paints developed. Cool paints do not limit consumer choice of color. Cool paints use pigments that have low absorbance of the non-visible spectrum while maintaining the same variety of visible colors that consumers demand. Presently, cost and car maker acceptance appear to be the only show-stoppers for the use of cool paints and other complimentary cool car technologies.

An evaluation should be done to determine if the reformulated "cool paint" will result in an increased toxic exposure risk during the paint application process and disposal. Staff believes this exposure risk should be minimal due to the fact that research thus far, shows that "cool paints" can be formulated using existing pigments; however it is an issue that needs to addressed during the formal rulemaking process.

Comments Received From: DuPont Company.

8. Division: Mobile Source Control Division
Staff Lead: Marijke Bekken
Section Manager: Sharon Lemieux
Branch Chief: Michael Carter

9. References:

Akbari, Hashem, "Coatings for Cool Vehicles" Presentation, March 16, 2007

Lawrence Berkeley National Laboratory, Heat Island Group, http://CoolColors.LBL.gov

Rugh, J., "Assessing the Vehicle Level and National A/C Fuel Use Impact of Advanced Climate Control Technologies," International Energy Agency Workshop – Cooling Cars with Less Fuel, Paris, France, Oct. 23, 2006.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C08*
ID NUMBER:	*EA B-1, B-2*
TITLE:	*CEMENT (A): ENERGY EFFICIENCY OF CALIFORNIA CEMENT FACILITIES*
PROPONENT:	*STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure is recommended for addition to the list of early actions. The Board date for consideration of this item is anticipated in 4th quarter of 2010

Staff assessment indicates that significant near term carbon dioxide (CO_2) reductions might be obtained by implementing energy efficient practices and technologies at California's cement facilities.

A proposed measure to consider greater reduction from low-carbon fuels in the cement sector is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation, which could entail large cost impacts on cement production in California.

3. Early Action Description

California's eleven cement facilities manufacture between 10 to 15 percent of the United States cement production. Annually, these eleven facilities use large amounts of energy: 1440 gigawatt hours (GWh) of electricity (7.2% of total energy used), 17.6 million therms of natural gas (2.6%), 2.3 million tons of coal (87.9%), 0.25 tons of coke (<0.1%), and burns 5.9 million tires[1] (2.3%). The three sources that result in CO_2 emissions from cement facilities are: 1) direct emissions from fuel combustion, 2) direct emissions from limestone calcination, and 3) indirect emissions from electricity use. Reducing CO_2 emissions from fuel combustion, calcination, and electricity use requires facilities to convert to using a low-carbon fuel, decrease fuel consumption, and improve energy efficiency practices and technologies in cement production[2].

4. Potential Emission Reductions

In 2004, CO_2 emissions from fuel combustion, limestone calcination, and electricity use are estimated at 10.8 million metric tons of CO_2 equivalent per year ($MMTCO_2E$). Staff estimates that CO_2 emissions from fuel combustion are 4.1 $MMTCO_2E$, limestone calcination 5.9 $MMTCO_2E$, and electricity use at 0.8 $MMTCO_2E$.

Potential carbon dioxide reductions are estimated for all three of those categories listed below:

A. Fuel Combustion

Clinker production is the most energy-intensive stage in cement production, accounting for over 90% of total industry energy use[3]. The most prominent fuel source used for clinker production in California is coal. Coal accounts for over 95% of all CO_2 emissions from fuel consumption. Coal emits over 210 pounds of CO_2 per million Btu (MBtu) compared to 117 pounds of CO_2 per MBtu of natural gas[4, 5]. If a low-carbon fuel, such as natural gas, is substituted for coal, potential reductions could exceed 1 $MMTCO_2$ reduction per year can be obtained. Further evaluation and information is needed to determine the feasibility of this proposed measure. Issues such as cost, infrastructure, plant modifications, and operational requirements need to be evaluated in more detail to determine if switching to low-carbon fuels can be recommended as a strategy for reducing greenhouse gas emissions.

B. Energy-efficiency Practices and Technologies

Energy-efficiency practices and technologies in cement production can be implemented to decrease CO_2 emissions. Energy consumption in the cement plant sector consists of energy used for raw material preparation, clinker production and finish grinding[6]. Raw material preparation and finish grinding is an electricity-intensive (indirect emissions) production. However, electricity accounts for only 10% of the overall energy use at cement plants[7].

1. Raw Materials Preparation

The standard raw materials used in California for cement production are limestone, chalk, and clay. These materials are usually extracted from a quarry close to the plant. Approximately 1.5 tons of raw materials are required to produce one ton of Portland cement. Raw materials preparation involves transport systems, blending, grinding mills, and classifiers (separators). Using the most highly efficient equipment in this category can save electricity and reduce indirect CO_2 emissions by 0.2 $MMTCO_2E$ at power plants.

2. Clinker Production

The heating of cement kilns to produce clinker is the largest user of energy at these facilities. To improve the energy-efficiency in clinker production, improved control systems, improved combustion system, reduction in kiln heat loss, grate coolers, preheater/precalciner type systems, newer mill drives, and use of secondary fuels can be utilized. Staff lacks sufficient data to estimate potential CO_2 reductions from California facilities. Much of the information available is based on national averages of cement plant efficiencies. Using this data, potential energy efficiency improvements could result in up to 0.7 $MMTCO_2E$ annually. Staff believes this estimate overstates the potential CO_2 reductions because a study by Lawrence Berkeley National Lab[8] found that California plants operate more efficiently than the national average. In order to more accurately assess potential reductions, staff needs to obtain plant specific information from each California facility.

3. Finish Grinding

To produce powdered cement, clinker is ground to the consistency of face powder. Finish grinding involves process control, grinding mills, and classifiers. Carbon dioxide emissions reduction of 0.1 $MMTCO_2E$ can be accomplished with high-efficiency equipment.

5. Estimated Costs/Economic Impacts and the Impacted Sectors/Entities

The estimated cost impact to California's cement industry to use cleaner fuels and more energy-efficient equipment/technologies is about one billion dollars annually. These costs are discussed below.

Coal is the major fuel used in California to heat the kiln used in clinker production. If coal was replaced by natural gas, total annual cost increase for California facilities would be estimated at $500 million. This equates to approximately $200 per metric ton of carbon dioxide equivalent ($MTCO_2E$) reduced per year. It should be noted that this number only reflects the difference in fuel costs. Additional work is needed to determine infrastructure and other costs that may significantly change the cost effectiveness.

Several technologies and practices exist that can reduce the energy intensity of various process stages of cement production. If each cement facility changed to higher energy-efficiency equipment for raw material preparation, the total cost is estimated at $258 million. This corresponds to approximately $1,300 per $MTCO_2E$ reduced. The finish grinding process is estimated at $111 million if all cement facilities changed equipment for higher energy-efficiency. This equates to $1,100 per $MTCO_2E$ reduced. Finally, improved energy-efficiency for clinker production involves many technical stages. Total cost for modification is estimated at $90 million. This corresponds to $125 per $MTCO_2E$ reduced. Additional information is necessary to more accurately determine energy efficiency strategies.

6. Technical Feasibility

This measure is technically feasible by applying low-carbon fuels for heating cement kilns and using more efficient equipment at various process stages of cement production. However, staff lacks information regarding the actual benefits that would be achieved by replacing existing equipment with more energy efficient equipment used at each California cement facility. Administering these measures could be costly to industry.

7. Additional Considerations

- Applicability of technological changes will depend on the current and future situations regarding individual plants. Capital projects would be implemented only if the company has more than 50 years of limestone reserve remaining. Cement plants with a shorter supply would most likely implement minor upgrades and focus on energy management measures.

- Mercury emissions from coal and raw materials needs to be evaluated. An assessment needs to be implemented concurrently with greenhouse gas reduction strategies to better understand impacts to industry.

Comments Received From: Natural Resources Defense Council, Geomatrix Consultants, Inc.

8. Division: Stationary Source
Staff Lead: Jim Stebbins
Section Manager: Todd Wong
Branch Chief: Michael Tollstrup

9. References

[1] *Coito F, Friedmann R, Powell F, Price L, and Worrell E. 2005. Case Study of the California Cement Industry. Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-59938*

[2] *Martin N, Worrell E, and Price L. 1999. Energy Efficiency and Carbon Dioxide Emissions Reduction Opportunities in the U.S. Cement Industry. Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-44182*

[3] *Ruth M, Worrell E, Price L. 2000. Evaluating Clean Development Mechanism Projects in the Cement Industry Using a Process-Step Benchmarking Approach. Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-45346*

[4] *ICF Consulting. 1999. Emissions Factors, Global Warming Potentials, Unit Conversions, Emissions, and Related Facts.*
Website: http://www.p2pays.org/ref/07/06861.pdf

[5] *Leonardo Academy, Inc. – Multiple Pollutant Emission Reduction Reporting System (MPERRS). 2007. Emission Factors and Energy Prices for Leonardo Academy's Cleaner and Greener Program.*
Website: http://www.cleanerandgreener.org/download/efactors.pdf

[6] *Worrell E and Galitsky C. 2004. Energy Efficiency Improvement Opportunities for Cement Making – An Energy Star Guide for Energy and Plant Managers. Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-54036*

[7] *Van Oss HG. 2005. Background Facts and Issues Concerning Cement and Cement Data. United States Geological Survey. Open-file Report 2005-1152*

[8] *Masanet E, Price L, de la Rue du Can S, and Brown R. 2005. Optimization of Product Life Cycles to Reduce Greenhouse Gas Emissions in California. Lawrence Berkeley National Laboratory for the California Energy Commission. CEC-500-2005-110-F.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C09*
ID NUMBER: *EA B-1, B-2*
TITLE: *CEMENT (B): BLENDED CEMENTS*
PROPONENT: *ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for addition to the list of early actions. The Board date for consideration of this item is anticipated in 2nd quarter of 2009.

3. Early Action Description

From cement plants, carbon dioxide (CO_2) emissions are released into the atmosphere during the calcination process and the burning of fuels to produce clinker, the main ingredient in Portland Cement. The calcination process involves the decomposition of calcium carbonate (limestone) to calcium oxide (clinker or lime), in which CO_2 is released. Calcination is carried out in furnaces or kilns under very high temperatures.

A strategy to reduce CO_2 emissions involves the addition of blending materials such as limestone, fly ash, natural pozzolan and/or slag to replace some of the clinker in the production of Portland Cement. Currently, ASTM cement specifications allow for replacement of up to 5% clinker with limestone. Most manufacturers could in fact replace up to 4% with limestone. Caltrans allows for 2.5% average limestone replacement until testing of the long term performance of the concrete is complete. Caltrans currently has over $1 million in task orders and is devoting considerable staff resources to the evaluation of limestone blending in cement. Caltrans also currently has standards for using flyash and slag in concrete. Other blending practices will be explored.

Industrial wastes such as coal fly ash, blast furnace slag, and silica fume have cementitious properties and can be blended with clinker or added at the concrete mixing stage. The quality of these blended cements is comparable to Portland cement. The differences are lower initial strength, but higher final strength, and improved resistance to sulfates and seawater. In the United States, one study estimated that these blended cements account for about one percent of the domestic cement shipments. Limitations on further penetration of fly ash, slag, and silica fume into the concrete market depends on the availability, construction standards, transportation costs, and user preferences; however, the potential CO_2 emission reduction potential warrants further examination. Caltrans mandates 25% fly ash in almost all of its concrete and allows up to 35% fly ash replacement of cement. Caltrans also allows up to 60% slag replacement of cement in all concrete. Additional staff work is needed to determine other current blending practices in the State.

4. Potential Emission Reductions

In 2004, cement plants in California produced about 11.2 million metric (MM) tons of clinker, which corresponds to about 10.8 MM tons of CO_2 emitted from the production of clinker. Blending with 25% fly ash, slag, or silica fume has a potential to reduce CO_2 emissions by reducing the need to produce an equivalent amount of clinker. For each percent of cement replaced by these blending materials, CO_2 emissions may be reduced proportionally. At this time, ARB staff does not have information on how much of blended cements are used in California and further evaluations are needed to estimate the potential use of these blended cements to reduce CO_2 emissions. It should be noted that this strategy may not reduce CO_2 emissions in California, but is expected that cement imports would be reduced and thus result in reduced emissions elsewhere.

Fly ash that is typically blended is a by-product of coal combustion and may contain mercury. Mercury levels in fly ash need to be evaluated.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The production of clinker is an energy intensive process, which involves heating and maintaining high temperatures in the cement kilns and its associated equipment (pre-heaters/pre-calciners). This strategy may result in the production of less clinker per unit of cement produced. In blending with 5% limestone, it is estimated that clinker production could be reduced by 0.56 MM tons, resulting in a reduction in energy use of 2.14×10^6 MMBtu. This is equivalent to not burning 75,000 tons of coal and saving plant operators in the State about $3 million. Due to the lack of information, the economic impacts of blending 25% fly ash or slag can not be determined at this time.

6. Technical Feasibility

The replacement of Portland Cement with limestone is technically feasible and may reduce CO2 emissions per unit of cement produced. However, additional evaluations are warranted to assess the feasibility, availability, and cost of blended cements containing fly ash and slag.

7. Additional Considerations

- The cement plant industry and environmental groups support the use of blending cements.
- The production of clinker at cement plants is also a source of mercury emissions caused by naturally occurring mercury found in the raw materials and from the combustion of coal. ARB staff has begun its efforts to understand the processes involved with the production of Portland cement, gather information to assess the impacts of both CO_2 and mercury emissions, evaluate control options for all pollutants, and assess the economic impacts to the industry and the public. It is not yet fully understood the potential impacts of blending on mercury emissions from cement manufacturing facilities.
- Ongoing and future discussions with Caltrans and other agencies will ensure that the addition of blended cements will meet their specifications and approval.
- Additional work is needed is needed to determine the extent to which blending currently

is being done and the technical feasibility of establishing limits for the blending of fly ash and slag as a strategy to reduce CO_2 emissions.

Comments Received From: Natural Resources Defense Council, Geomatrix Consultants, Inc.

8. **Division:** Stationary Source Division
Staff Lead: Duc Tran
Section Manager: Todd Wong
Branch Chief: Michael Tollstrup

9. References

Van Oss HG. 2005. Background Facts and Issues Concerning Cement and Cement Data. United States Geological Survey. Open-file Report 2005-1152.

Website: http:www.ket.org/Trips/Coal/AGSMM/agsmmtypes.html

U.S Cement Plant Detail by State, PCA, December 31, 2004

Lisa J. Hanle, CO_2 Emission Profile of the U.S Cement Industry,
U.S. Environmental Protection Agency.
Kamala R. Jayaraman and Joshua S. Smith, ICF Consulting

PCA, Cement Kiln Dust Production Summary for California Portland Cement Plants.

Peter Hawkins, Paul Tennis, and Rachel Detwiler, The Use of Limestone in Portland Cement: A state-of-the-Art Review, PCA.

Climate Action Program at Caltrans, California Department of Transportation, December 2006.

Using Coal Ash in Highway Construction: A Guide to Benefits and Impacts
Website: http://www.epa.gov/epaoswer/osw/conserve/c2p2/pubs/greenbk508.pdf

Joe Seay, HeadWaters, Incorporated, August 2, 2007, Personal Communication.

Pam Herman Milmoe and Martin Ross, United States Environmental Protection Agency, Evaluation of the Environmental Impacts from APCA/CW Partnership, presented at the 1999 American Council for an Energy Efficient Economy (ACEEE)

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C10*
ID NUMBER:	*ARB 2-18 / EJAC-2*
TITLE:	*ENFORCEMENT OF FEDERAL BAN ON HFC RELEASE DURING SERVICE/DISMANTLING OF MVACS*
PROPONENT:	*2006 CAT REPORT*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2009.

This non-regulatory strategy is expected to be developed in close collaboration with the United States Environmental Protection Agency (US EPA). The strategy is not a stand-alone measure. Rather, it is designed to be implemented in concert with a number of other strategies that staff has identified for mitigating the climate impact of HFCs.

3. Early Action Description

The goal of this non-regulatory strategy is improved compliance with a regulation of US EPA (40 CFR 82.154) that prohibits the venting of certain types of refrigerant, including HFCs, to the atmosphere when MVACS equipment is serviced or dismantled. Venting is avoided by recovering refrigerants with specialized equipment. The recovered refrigerant can be re-used by the owner or transferred to re-processors approved by US EPA.

The main focus of the proposed strategy would be the climate impact abatement of HFCs used in the air-conditioning (A/C) systems of vehicles that are to be dismantled. The current degree of compliance with 40 CFR 82.154 is poorly documented but under review. Per this strategy, better compliance by dismantlers would be obtained via a cooperative program that would be created among ARB's Enforcement Division, appropriate offices in the US EPA, and the environmental protection offices of the counties where dismantling activity is taking place. The specific form of the program has not been determined yet, pending quantification of the avoidable emissions of HFCs. However, the anticipated approach would emphasize enhanced enforcement of existing federal requirements for recovery via audits of activities and documentation.

4. Potential Emission Reductions

Potential emission reductions from dismantling have been estimated to be in the range of 0.1 to 0.6 MMTCO2E in 2010 and 0.1 MMTCO2E in 2020. The potential reductions are lower in the year 2020 because it is assumed that half of the cars going to the dismantlers will have new

low-GWP refrigerant in the A/C system instead of HFC-134a as called for in other companion HFC reduction strategies. Preliminary estimates suggest that the refrigerant bank in EOL vehicles could be as high as 0.5 $MMTCO_2E$ per year. Estimates of annual A/C servicing emissions ranges from 0.3 to 0.6 $MMTCO_2E$. The ARB staff has initiated extramural research to estimate the annual amount of HFC that is available for recovery from vehicle at end-of-life and we will continue to work with the USEPA to develop improved estimates of the portion of the available amount that is being recovered and other parameters.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Some dismantlers may not have the latest compliant hardware for recovering refrigerants or any equipment at all. Each such dismantler who would be prompted to purchase the equipment would have to spend in the neighborhood of $3000 to $4000 per unit. The number of units needed would depend on the size of the operation (vehicle throughput). However, this would be an expense that the dismantler has so far avoided only through failure to comply with the existing federal regulation. Thus, this is not a cost burden associated with the proposed strategy.

The same statements apply to obtaining certification for technicians who use the recovery equipment, but with minimal anticipated costs. Training for the US EPA's certification program is offered by various commercial schools. In addition, the Mobile Air Conditioning Society offers free training (a downloadable pamphlet) and a nominal exam fee, so the necessary expense for operator certification should be minimal.

6. Technical Feasibility

This measure is technically feasible because it is the current federal law, which has been in existence for some time. As such, the equipment exists to recover the refrigerant from automobile A/C systems whether they are being serviced or dismantled. The rigorous enforcement of the federal regulation in California is meant to force vehicle dismantlers to universally use refrigerant-recovery equipment as required by law. The same is true for garages and auto service centers that service MVACS; however, the fraction of such shops that do not have the requisite equipment may be small. It should be noted that recovery procedures and equipment are being revised by industry standard setting bodies to make the process more effective with a higher recovery rates of the refrigerant.

7. Additional Considerations

This strategy involves the enforcement of an existing federal regulation (U.S. EPA- 40 CFR 82.154) that prohibits the venting of refrigerants to the atmosphere when the MVACS is being serviced or dismantled. Some local air districts adopt the federal regulation by reference and others have their own regulation which prohibits the release of refrigerants into the atmosphere. Originally, this item was a strategy in the Climate Action Team Report of March 2006 that ARB intends to pursue as one of suite of measures designed for reducing HFC refrigerant impacts. This strategy involves the creation of a cooperative program among ARB's Enforcement Division, appropriate offices in the U.S. EPA, and local air districts in California. U.S. EPA is currently working on a regulatory impacts assessment that will estimate the emission reductions and costs associated with this type of measure. That work and other on-going activities are expected to yield the necessary additional information for strategy development such as the number of non-compliant dismantlers and shops that perform MVACS servicing in California.

Comments Received From: DuPont Company.

8. Division: Research Division
Staff Lead: Winston Potts
Section Manager: Tao Huai
Branch Chief: Alberto Ayala

9. References:

[1]Vincent, R., *"HFC Reduction Strategy 2-2-5, Enforcement of the Federal Ban on Releasing HFCs During Servicing and Dismantling of MVACS," California Air Resources Board, 2006. As presented in the Climate Action Team Report of March 2006.*

[2]*Air Resources Board, HFC-134a as an Automotive Refrigerant - Background, Emissions and Effects of Potential Controls, August 6, 2004 (www.arb.ca.gov/cc/cc.htm)*

[3] *Karen Thundiyil, USEPA, personal communication, 7/26/07.*

[4] *Improved Mobile Air Conditioning Program (IMAC), "Reducing Refrigerant Emissions at Service and Vehicle End of Life," June 30, 2007*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C11*
ID NUMBER:	*EJAC-12/ARB 2-23*
TITLE:	*ADDITION OF AC LEAK TEST AND REPAIR REQUIREMENTS TO SMOG CHECK*
PROPONENT:	*2006 CAT REPORT AND ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 1st quarter of 2011.

The strategy proposes to explore the addition of a new motor vehicle air conditioning system (MVACS) leak test and repair requirements to the existing California Smog Check program for HFC-based MVACSs. To the extent that a cost-benefit analysis supports this measure, implementation will require the 1) identification, selection and verification of one or more reliable and low cost HFC refrigerant leak detectors to be used in the Smog Check station setting; 2) development of a new Refrigerant Leak Check I/M procedure and protocol; 3) new and additional training of the Smog Check technicians including achieving appropriate technician A/C repair certification; and 4) working with the Bureau of Automotive Repair (BAR) of the Department of Consumer Affairs (DCA) for mandating the new procedure to be integrated into the statewide Smog Check program. Research will be needed to evaluate the feasibility of the new test and extensive discussions among multiple stakeholders, including first and foremost BAR and legislature staff are anticipated. For this reasons, this strategies cannot be developed before 2010 to meet the definition of a discrete early action.

3. Early Action Description

The proposed strategy will explore the addition of a refrigerant leak check to the "pass" criteria for the California vehicular inspection and maintenance (I/M) program, Smog Check, for all vehicles that undergo the test. As a result, all vehicles that pass Smog Check would have MACS that are either nearly leak-free or empty and excluded from further use of the AC system unless the leak is repaired. Vehicles that are determined to have unacceptable leak rates would be required to be repaired as a condition for registration. A similar requirement is already in place and enforced by some local air quality management districts. Thus, the proposed early action seeks to expand these local requirements statewide.

4. Potential Emission Reductions

The proposed strategy was included in the Climate Action Team report of March 2006 and it emerged from ARB's regulatory work for the motor vehicle greenhouse gas emissions regulation (AB1493). That work suggests that potential GHG emission reductions for a leak test and repair program in California are on the order of 0.45 MMTCO2E by 2020. However, the uncertainty with the estimate is on the order of 50%.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Some preliminary, but incomplete cost information exists. In 2005, BAR licensed approximately 9,700 Smog Check stations and almost 14,000 Smog Check technicians. Approximately 9.2 million Smog Check inspections were conducted at these Smog Check stations in 2005[1]. Each Smog Check station would have additional one-time estimated expenditures of about $200~$300 for each hand-held HFC leak detector. Technician training for AC service certification would cost up to $280 per person. Based on above information, the total cost for equipment and training in California would be approximately $6M; $2M for equipment and $4M for training. In addition, the leak test would add time to the current Smog Check test, impacting the shop and the customer. Finally, in the case where a MVACS is found to require repairs, the customer would incur additional and potentially significant costs. Technology is also rapidly evolving and improving. Today's MVACS are much tighter than older system and the industry, in response in part to regulatory interest, is proactively seeking refrigerant leak improvements in the system sold to car makers. These factors and many other economic impacts have not been thoroughly researched and additional time is needed to complete a full cost-benefit analysis of the proposed measure.

6. Technical Feasibility

There are several commercially available hand-held HFC leak detectors or "sniffers" on the market. These detectors are currently in use by the AC service and repair industry. The detectors would need to be demonstrated capable of reliable and accurate determination of refrigerant leaks in the Smog Check station setting at rates as determined in the proposed strategy. All MVACSs leak refrigerant naturally as the systems are not hermetic and deterioration is expected. A pass criterion based on a reasonable threshold leak rate requiring professional AC servicing or system disabling needs to be defined rigorously, perhaps as a fraction of the original system charge or other appropriate metric. The current commercially available sniffers can detect a concentration of refrigerant in a sample volume of some currently unknown combination of leakage and ambient air. Further investigation is needed to define the pass criterion for either a threshold concentration or leak rate.

Currently, the service industry standard established by the Society of Automotive Engineers, SAE J1628 Standard[2], requires charging the AC with sufficient refrigerant prior to conducting a leak check. This procedure might be not suitable for the implementation of this strategy because the leak check would be conducted at Smog Check Stations, which normally do not have AC charging equipment. A new leak check protocol would be necessary. The measure must also require professional AC servicing or system disabling when leakage is found. Other methods, such as injection of dye gases, are under investigation.

7. Additional Considerations

ARB and BAR would need to work closely as both agencies share responsibility for Smog Check. Roles and responsibilities for both agencies in the context of the proposed strategy should further analysis suggest to proceed to full development and implementation will need to be defined.

Affected Entities: The I/M program operators at the Smog Check stations, the owners of all vehicles required to undergo I/M, shops that repair vehicular AC systems, BAR, and DCA, The I/M operators would have to become certified for AC maintenance, purchase new instruments for detection of HFC emissions, and adopt the new protocols for including the new test into the Smog Check procedure. BAR and DCA would be expected to develop a new I/M procedure and protocol to accommodate the new HFC leak check. The agencies would be impacted with additional enforcement requirements for the proposed strategy.

Comments Received From: DuPont Company.

8. Division: Research Division

Staff Lead: Dorothy Shimer
Tao Zhan

Section Manager: Tao Huai

Branch Chief: Alberto Ayala

9. References:

[1] *California Inspection and Maintenance Review Committee, Review of the Smog Check Program, September 29, 2006. http://www.imreview.ca.gov/reports/final_report.pdf*

[2] *SAE J1628, Technician Procedure for Using Electronic Refrigerant Leak Detectors for Service of Mobile Air-Conditioning Systems, November 1998.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C12*
ID NUMBER: *N/A*
TITLE: *COLLABORATIVE RESEARCH TO UNDERSTAND HOW TO REDUCE GHG EMISSIONS FROM NITROGEN LAND APPLICATION*
PROPONENT: *STAKEHOLDERS SUGGESTIONS*

2. Staff Recommendation

This measure is recommended for addition to the list of early actions. The Board date for consideration of this item is anticipated in 4th quarter of 2010.

3. Early Action Description

Staff analysis suggests that nitrogen land application may be a significant source of nitrous oxide, which is a potent greenhouse gas. In order to reduce greenhouse gases while benefiting agricultural systems, landscaping and other uses staff needs to identify methodologies for better characterizing California's nitrogen cycle.

An important first step to better characterizing the relationship between nitrogen land application and nitrous oxide formation in California agriculture, landscaping and other uses as well as opportunities for emission reductions is a collaborative research effort with stakeholders. The research is expected to focus on identifying optimal ways to reduce nitrous oxide emissions while increasing soil retention of nitrogen for plant uptake. Factors such as the total acreage of crop field, the annual amount and type of nitrogen applied, the method of application, soil properties, the irrigation regime, and drainage conditions can all play a role in characterizing nitrous oxide formation and would therefore be expected to be studied as part of the work. As part of the research the ARB will collaborate with the California Department of Food and Agriculture, Department of Pesticide Regulation, commodity groups, and other stakeholders. The research is expected to ultimately support the development of guidance to improve the characterization of nitrous oxide emissions from nitrogen land applications as well as identify effective strategies for emission reductions.

4. Potential Emission Reductions

The potential benefit of nitrous oxide emission reductions following from the research effort requires further assessment and is therefore to be determined. However, given the current nitrogen fertilizer use efficiency and portfolio, possible reductions from guidance that builds on the research may be on the order of 1 $MMTCO_2E$.

5. Estimated Costs / Economic Impacts and the Impacted Sectors/ Entities

Entities expected to participate in the collaborative research effort as well as the subsequent development of guidance includes farm owners and operators, nitrogen fertilizer manufacturers and distributors, the California Department of Food and Agriculture, Department of Pesticide Regulation, Regional Water Boards, commodity groups, and other stakeholders. The estimated costs of the research are to be determined as are any costs or savings associated with implementing subsequent guidance.

6. Technical Feasibility

The ARB has an established track record of collaborating with stakeholders to ensure that high quality research is conducted and that the research facilitates the identification of effective mitigation strategies. It is anticipated that the necessary expertise to conduct the research can be secured via a contract with in-state experts.

7. Additional Considerations

The ARB will coordinate with the California Department of Food and Agriculture, Regional Water Control Boards, and local air quality management districts in their efforts related to Nutrient Management Plans.

Comments Received From: Community Recycling & Resource Recovery, Californians Against Waste.

8. Division: Planning and Technical Support Division/Research Division
Staff Lead: TBD
Section Manager: TBD
Branch Chief: TBD

9. References:

Blaylock, A.D., R. D. Dowbenko, J. Kaufmann, G. D. Binford, and R. Islam. 2004. ESN® controlled-release nitrogen for enhanced nitrogen efficiency and improved environmental safety. Picogram and Abstracts, America Chemical Society, Philadelphia, PA.
http://membership.acs.org/a/agro/Picogram/PicogramV67Fall2004.pdf

Brontrager, B. 2001. Stretch your 'N' dollars using urease, nitrification inhibitors.
http://www.agprofessional.com/croptalk.php?id=1135

Burt, C. M., K. OConnor, and T.A. Ruehr. 1995. Fertigation. pp. 320Irrigation Training and Research Center. California Polytechnic State University, San Luis Obispo, CA.

Li, C.S., W. Salas, and M. L. Huertos. 2004. Quantifying carbon dynamics and greenhouse gas emissions in agricultural soils of California: A scoping study. PIER Project Report, P500-04-038. California Energy Commission, Sacramento, California.
(http://www.climatechange.ca.gov/research/options/pdfs/2004-10-08_500-04-038.pdf).

Scholefield, D. and N.M. Titchen. 1995. Development of a rapid field test for soil mineral nitrogen and its application to grazed grassland. Soil Use and Management 11 (1), 33–43.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY#	*C13*
ID NUMBER:	*EJAC 2/CAPCOA-6/ARB 2-3*
TITLE:	*SPECIFICATIONS FOR COMMERCIAL REFRIGERATION*
PROPONENT:	*2006 CAT REPORT, ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE, AND CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2010.

This timing will allow staff the time necessary to complete inventory research[1], interagency coordination, economic analyses, staff reports, stakeholder workshops, and public hearings to support the necessary regulation(s).

3. Early Action Description

This early action strategy was extracted from the updated Climate Action Team (CAT) work plan entitled "Reducing Direct and Indirect Greenhouse Gas (GHG) Emissions from Stationary Refrigeration and Air Conditioning (RAC) Sources[2]".

The strategy involves regulatory measures to require supermarket leak tightness and advanced design requirements for new systems as well as energy efficiency measures for new and existing systems. Direct and indirect emissions need to be considered together over the lifetime of the RAC equipment, so that choices made to reduce direct emissions (e.g., low-GWP refrigerants or standalone systems) do not adversely impact energy consumption and vice versa.

Based on current technologies, commercially available solutions for leak reduction in retail food systems (which contain more piping, fittings, and valves than other types of systems), can support establishing a 5 percent maximum annual leak rate for new systems in 2011 and 2 percent for new systems by 2016[3]. Currently it is estimated that the average leak rate for new

[1] Inventory work in this area is expected to be complete by late 2008.
[2] Direct GHG emissions refer to the high global warming potential (GWP) emissions of CFCs, HCFCs, and HFCs used as working fluids in RAC systems. Indirect GHG emissions refer to CO2 emissions associated with electricity required to operate the RAC equipment.
[3] This strategy, which could be applied to all RAC systems over a given capacity, basically applies to retail food systems since other "large" systems currently have much lower leak rates than retail food systems, which have baseline leak rates of 15%.

systems is approximately 15 percent minimum. The 5 percent maximum annual leak rate by 2011 is based on industry estimates for controlling leaks in centralized direct expansion (DX) systems, which are the predominant systems currently being installed in retail food stores[4]. To reach the proposed 2020 limit of 2 percent for the maximum annual leak rate, it is expected that indirect supermarket refrigeration systems will have to be adopted rather than low-leak or low-charge DX designs or distributed systems.

Additionally, based on commercially available technologies, the following energy efficiency improvements to reduce energy consumption in existing and new retail food stores are proposed: 10 percent reduction in energy usage from the current baseline in 2011 and 30 percent in 2016[5]. These measures will be pursued in coordination with the California Energy Commission (CEC).

The technologies required for leak reduction in retail food systems include the following: sensitive leak detection equipment, fixed leak detection methods, utilizing brazed (welded) joints instead of flanged or threaded (mechanical) joints, compressor vibration reduction, and improved or reduced numbers of Schrader valves. Additionally, owners and operators of retail food systems would be required to adopt general policies to have full accessibility to all refrigerant pipe work.

Technologies involved in advanced-design retail food refrigeration systems include reduced charge DX systems, distributed systems, secondary loop (indirect) systems, and CO_2 systems (indirect, cascade, and trans-critical systems). Advanced retail food refrigeration designs serve to reduce refrigerant charge (which is important in case of ruptures) as well as reducing leaks through shorter lines that employ fewer fittings.

The improvement of energy efficiency of retail food systems includes the following technologies: evaporative condensers, high efficiency compressor designs, floating head pressure controls, heat recovery, ambient or mechanical sub-cooling, variable speed fans/motors, improved heat exchangers, hot gas defrost, adding doors or night curtains to display cases, energy-efficient reach-ins, anti-sweat heater controls, indirect or energy-efficient case lighting.

4. Potential Emission Reductions

Estimated emission reductions of **4.7 MMTCO$_2$E** in 2020 are possible based on a growth rate of 2 percent for new retail food systems in California (from the updated CAT Work Plan); this number only includes reduced leak rate designs for new systems and energy efficiency improvements for new and existing supermarket systems. If closed cases or night curtains are required, further CO_2 reductions are possible.

The US EPA has indicated that statewide reductions of approximately 6.8 MMTCO$_2$E in 2020 are possible for various RAC strategies ranging from leak reduction and refrigerant recovery to indirect retail food ammonia systems[6]. Their estimate includes measures, such as mandatory

[4] Industry estimates of improvements and target dates were obtained from European studies, and were presented by The Alliance for Responsible Atmospheric Policy (ARAP) in a meeting with ARB on 10/10/06.

[5] Adding doors or night covers to display cases is not included in the energy reduction estimate, and is expected to result in even greater energy benefits if utilized.

[6] Obtained from subtracting out motor vehicle A/C reductions and distributing the national reductions to California using the 2005 population fraction of approximately 12.2%.

leak repair for existing systems, which ARB is considering separately. Furthermore, the estimate of 4.7 MMTCO2E is a lower bound, as other measures such as mandatory reporting/repair/refrigerant deposit and return, are expected to increase the turnover rate of old systems and lead to further GHG reductions.

5. Estimated Costs/Economic Impacts and the Impacted Sectors/Entities

The estimated cost of the strategies discussed in this evaluation are expected to be on the order of \$10-\$20/MTCO$_2$E in 2020. Estimates by the US EPA range from a savings of \$3/TCO$_2$E (for enhanced leak repair and refrigerant recovery) to costs of \$10/MTCO$_2$E (for installation of an ammonia-based indirect supermarket system). Costs in the updated CAT report were estimated to be \$14/MTCO2E, based on incremental cost differences of 20% between indirect systems and traditional DX systems.

Cost-effectiveness will improve as contractors gain comfort with installation of indirect systems and energy saving devices, and as prices for such devices/system components drop with increased production.

6. Technical Feasibility

Leak reduction technologies were obtained from industry estimates of possible leak tightness improvements. Performance of advanced systems designs has been documented in US EPA, California Energy Commission (CEC), and Oak Ridge National Lab (ORNL) reports.

Information on energy saving technologies were obtained from US Department of Energy (DOE), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and US EPA reports, and from presentations given by Charles Zimmerman (Wal-Mart), and Denis Clodic (ARMINES) at ARB's International Symposium On Near-Term Solutions for Climate Change Mitigation in California on March 6, 2007.

All leak reduction and energy efficiency improvement technologies appear to be proven commercially-available technologies; ARAP presented leak reduction technology to ARB based on European experiences with retail food systems, and Wal-Mart has employed advanced design refrigeration systems (secondary loop with heat reclaim) as well as other energy saving measures (LED lighting, closed cases, motion detection for lighting, machine room improvements) with aggressive energy efficiency goals of 25-30 percent reductions in 4 years.

7. Additional Considerations

Given the necessary inventory research, technical complexity and stakeholder input process, staff believes this item could be developed into a regulatory proposal to be considered by the Board by the fourth quarter of 2010.

The affected entities will be owners and operators of retail food (or similar built-up) refrigeration systems, as well as contractors/technicians who install/repair such systems and manufacturers of system components.

A partial list of trade associations possibly impacted, either positively or negatively, by the regulation follows: ARAP (described previously), the Air-Conditioning and Refrigeration Institute

(ARI), ASHRAE, North American Technician Excellence (NATE), California Grocers Associations.

Comments Received From: DuPont Company.

Coordination with the US EPA and CEC with respect to developing the regulation is ongoing.

8. Division: Research Division
Staff Lead: Whitney Leeman
Section Manager: Michael Robert
Branch Chief: Tony Andreoni

9. References

Alliance for Responsible Atmospheric Policy (ARAP)/CARB workshop, 10/06.

Arthur D. Little, Inc., Global Comparative Analysis of HFC and Alternative Technologies for Refrigeration, Air Conditioning, Foam, Solvent, Aerosol Propellant, and Fire Protection Applications, Final Report to the Alliance for Responsible Atmospheric Policy, March 21, 2002.

Arthur D. Little, Inc., Energy Savings Potential for Commercial Refrigeration Equipment Final Report, prepared for Building Equipment Division Office of Building Technologies U.S. Department of Energy, June, 1996.

ASHRAE Transactions: 2002 Transactions, Vol. 108, Pt. 1, AC-02-7-2 - Performance and Energy Impact of Installing Glass Doors on an Open Vertical Deli/Dairy Display Case.

ASHRAE Transactions: 2005 Transactions, The 2005 Winter Meeting, Orlando, Vol. 111, Pt. 1, OR-05-16-1 - Humidity Effects on Supermarket Refrigerated Case Energy Performance: A Database Review.

California EPA, Climate Action Team Report to Governor Schwarzenegger and the Legislature, 4/3/06.

David Godwin (USEPA), Marian Martin Van Pelt and Katrin Peterson (ICF Consulting), Modeling Emissions of High Global Warming Potential Gases from Ozone Depleting Substance Substitutes, 2003.

ICF Consulting, Emission Reduction Opportunities for Non-CO_2 Greenhouse Gases in California, Consultant Report prepared for CEC PIER Program, CEC-500-2005-121, July 2005.

IPCC/TEAP, IPCC Special Report on Safeguarding the Ozone Layer and the Global Climate System, Issues related to Hydrofluorocarbons and Perfluorocarbons, 2005.

Solvay Fluor, Advances in Supermarket Refrigeration Leak Reduction, Product Bulletin No. C/07.05/23/E

Southern California Edison, Foster-Miller, Inc. Investigation of Secondary Loop Supermarket Refrigeration Systems, Consultant Report prepared for CEC PIER Program, 500-04-013, March 2004.

USEPA, U.S. High GWP Emissions 1990-2010: Inventories, Projections and Opportunities for Reductions, EPA 000-F-97-000, June 2001.

US Census Bureau, 2002 Economic Census Manufacturing Industry Series, Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing: 2002, EC02-31I-333415 (RV), December 2004.

Van D. Baxter, Advances In Supermarket Refrigeration Systems, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6070

Van D. Baxter, Oak Ridge National Laboratory, IEA Annex 26: Advanced Supermarket Refrigeration/Heat Recovery Systems, Final Report Volume 1 – Executive Summary, April 2003.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C14*
ID NUMBER:	*EJAC-3/ARB 2-12*
TITLE :	*REDUCE METHANE VENTING/LEAKS FROM OIL AND GAS SYSTEMS*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE AND CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2010.

Staff recommends an evaluation of the effectiveness of the existing district rules. Most likely these rules can be amended and readily adopted by the ARB for statewide implementation. Staff also proposes to investigate the feasibility of deploying innovative technologies and to improve management practices, including the stakeholder's proposal to implement energy efficiency measures that will further promote recycling of otherwise vented gases. These combined actions could potentially reduce methane emissions from both gas and oil systems by approximately 1.0 $MMTCO_2E$ in 2020[1].

3. Early Action Description

Emissions from natural gas systems are primarily methane gas. There are four major sources of methane emissions from the systems: production, processing, transmission, and distribution of natural gas. These emissions are process related, mostly stemming from normal operations, routine maintenance, and system upsets. Also, a relatively smaller amount of methane emissions results from oil systems.

Several air districts have adopted and implemented rules to reduce volatile organic compound (VOC) emissions from natural gas and crude oil production and processing facilities. These existing rules may also reduce methane emissions. In addition, there are several proven cost-effective technologies and management practices that would result in a significant reduction of methane emissions.

Staff will take the following approach to achieve the GHG reduction goal from oil and gas systems as stated in the 2006 CAT report:

- Amend existing rules[2,3]
  Form a working group that consists of ARB, district, and interested stakeholders to review the existing rules to identify potential methane emissions reduction measures.

- Improve management practices[4]
  Encourage districts with oil and gas systems under their jurisdiction to practice directed and more frequent inspections of compressor stations, gate stations, surface and storage facilities, transmission pipelines, and off-shore platforms.

- Require the installation of cost-effective technologies[4]
  Numerous technologies have been identified and proven in the U.S. EPA Natural Gas STAR program[5], a voluntary program partnership with the oil and natural gas industries, that will pay back investments in a short period of time through saleable gas savings. These technologies include replacement of high- with low-bleed pneumatic devices, installation of a flash tank on glycol dehydrators, retrofitting compressors to capture vented gas, and using an infrared aerial imaging camera to detect leaks, etc.

4. Potential Emission Reductions

Among the above identified strategies, staff estimated installation of new technologies will provide the greatest potential GHG emissions reduction, about 70 percent of the targeted goal of 1.0 $MMTCO_2E$ in 2020, while the rest will come from the existing rule amendments (~10 percent) and enforcement (~20 percent). Collectively, these strategies will provide a medium potential of GHG emissions reduction. They will also provide further emissions reduction of VOCs and toxics, with no incurred fuel penalty.

5. Estimated Costs / Economic Impacts and the Impacted Sectors/ Entities

ARB will develop this measure in partnership with CAPCOA. ARB will need additional resources to develop and enforce the new rule. CAPCOA may also require additional resources for complementary rulemaking to ensure that the rules are consistent.

As for the oil and gas industries, investment in new technologies will likely pay for itself through net fuel savings to offset the costs. As a result, staff believes that none of the proposed strategies will cause any potential disproportionate economic impacts on small businesses or environmental justice communities from increased utility rates.

6. Technical Feasibility

Natural Gas STAR partner companies have implemented most of the new technologies identified through a voluntary program established by the U.S. EPA when the natural gas prices were relatively low. These technologies were proven to be reliable and cost-effective. With the higher gas prices today, these technologies are even more cost-effective and attractive to the industry.

7. Additional Considerations

Staff has reviewed several districts' rules, addressing VOC emissions, that may have reduced methane emissions, and will work together with the districts to identify if any oil and gas industries have implemented fuel saving technologies. The ARB has legal authority to develop regulations and outreach programs to speed up the deployment of these technologies. However, staff believes a comprehensive and uniform regulation for this CAT strategy cannot be achieved in 18 months.

Affected Entities:

Oil and gas industries, pipeline operators, gas processing and storage facilities, utility companies

Trade Associations:

American Gas Association (AGA), Gas Processors Association (GPA), Interstate Natural Gas Association of America (INGAA), Natural Gas Supply Association (NGSA), Western States Petroleum Association (WSPA)

Government Agencies to coordinate with:

Air Districts, California Air Pollution Control Officers Association (CAPCOA), California Energy Commission (CEC), California Public Utility Commission (CPUC), California State Land Commission (CSLC), Federal Energy Regulatory Commission (FERC), United States Environmental Protection Agency (U.S. EPA)

Comments Received From:

Kinder Morgan, Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SoCalGas), San Diego Gas & Electric (SDG&E), El Paso Corporation.

8. Division: Stationary Source Division
Staff Lead: Win Setiawan
Section Manager: Terrel Ferreira
Branch Chief: Barbara Fry

9. References:

[1]*California Climate Leadership: Strategies to Reduce Global Warming Emissions* July 2005, Tellus Institute.

[2]Stakeholders' comments to the ARB Proposed Early Action Measures to Reduce Greenhouse Gases, June 2007 Board Hearing, Los Angeles:
http://www.arb.ca.gov/lists/ab32eam07/67-ab32eam07-ws-5.pdf
http://www.arb.ca.gov/cc/ejac/ghg_eams_finalcommitteerec.pdf
http://www.arb.ca.gov/cc/ejac/ghg_eamcommitteelist.pdf

[3]*Various Air Districts Rules.*

[4]*U.S. Methane Emissions 1990-2020: Inventories, Projections, and Opportunities for Reductions*, EPA 430-R-99-013, September 1999, U.S. EPA.

[5]*The EPA Natural Gas STAR Program*:
http://www.epa.gov/gasstar/

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C15*
ID NUMBER:	*EJAC- 11/ARB 2-22*
TITLE:	*REQUIRE LOW GWP REFRIGERANTS FOR NEW MACS*[1]
PROPONENT:	*2006 CAT REPORT AND ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2010.

This strategy is also not a stand-alone measure. It is anticipated to be integrated into larger new measures focused on new vehicle GHG emission standards (e.g., *Pavley II* described as Summary # B33, page B-110 later in this appendix).

The central premise of the proposed strategy is the replacement of high global warming potential (GWP) refrigerants used in California's mobile air conditioning systems (MACS) with lower GWP alternatives that also represent better lifecycle climate performance (LCCP) than the current refrigerant. MACS in today's motor vehicles use nearly universally the refrigerant HFC-134a with a GWP of 1,300. A two-fold approach will be explored under the proposed new regulation. First, the core of the strategy would focus on developing new regulations requiring that new MACS use refrigerants with a lower GWP (e.g., 150 or less) in new vehicles currently not subject to the existing vehicle GHG emission standards (AB 1493). For vehicles subject to AB 1493, this strategy would explore further MACS improvements after the regulation is fully phased in 2016. Second, staff will explore the potential climate benefits from a universal phase out of HFC-134a (or other high GWP refrigerants) used in other remaining vehicle classes in the California fleet such as heavy-duty on- and off-road vehicles including new as well as in-use systems. Again, the identification of suitable alternatives would be based on lifecycle climate performance.

Alternative refrigerant development has been a highly contested arena in recent times. Driven primarily by Europe's landmark directive to phase out the use of HFC-134a in the MACSs of new vehicle types starting in 2011, several low GWP refrigerants are currently under investigation and evaluation for toxicity, safety, energy efficiency, and technical feasibility by multiple industry entities. Identification of an eligible replacement for the European car market,

[1] New alternative low GWP refrigerants in MACS are desired to the extent that these alternatives have lifecycle climate performance (LCCP) that exceeds the performance of the current refrigerant HFC-134a. Thus, new low GWP refrigerants are sought in systems that leak less and are more efficient than current systems.

the largest in the world, would boost efforts in California and could accelerate the implementation of new regulations mitigating the impact of refrigerants in MACS.

3. Early Action Description

This strategy explores the phase out of HFC-134a in all MACS in new vehicles certified for sale in California (heavy- and light-duty, on- and off-road) with the intent to reduce direct and indirect emission impacts and promote only the use of alternative refrigerants with superior lifecycle climate performance. Opportunities in the in-use fleet will also be evaluated.

Regulation of refrigerants is happening globally. The European Union (EU) is taking the lead. In 2006, the European Parliament and the Council decided that the dates for the phase-out of refrigerant HFC-134a in the European community shall be set at January 1, 2011 for new types of vehicles and January 1, 2017 for all new vehicles[1]. The US EPA's I-MAC Program[2] has generated significant debate and progress regarding alternative refrigerants and the options for the US car MACS market with the best lifecycle climate performance. Extensive cooperation between government agencies, NGOs, and industry is needed to accomplish this strategy and fully realize its benefits.

4. Potential Emission Reductions

The proposed strategy was included in the Climate Action Team report of March 2006 and it emerged from ARB's regulatory work for the motor vehicle greenhouse gas emissions regulation (AB1493). That work suggests that potential GHG emission reductions for a universal phase out of HFC-134a in new and in-used MACS in California are on the order of 2.5 MMTCO2E by 2020. However, the uncertainty with the estimate is on the order of 50%.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Preliminary cost estimates were developed for the revisions to the Climate Action Team Report of March 2006 that ARB and other agencies are undertaking. The numbers generated for that report are first-order estimates based on simple assumptions gleaned from the published literature about alternative MACS. Only estimated capital costs were considered. Additional staff analysis is needed to determine operating costs, cost savings, and economic impacts. The air conditioning system life is expected to be the same as current systems. Capital costs for the introduction of new refrigerants in the California fleet were estimated to be on the order of $150 million by in 2020 based on assumptions that changes begin to phase in around 2013. This estimate is based on an incremental cost per vehicle of €20 to €25 per LDV in 2003[3] and is also applied to the other vehicle categories. For the HFC-152a alternative refrigerant, it is not expected that maintenance costs will change significantly or that there would be cost implications when converting an existing HFC-134a system design to use HFC-152a since development is fairly advanced. Selection of some other alternative refrigerants, for example CO_2, could be significantly costlier. Incremental energy consumption estimates are not presented here. The reference below cites a potential 10% reduction in energy consumption for the HFC-152a alternative for LDVs, but this will almost certainly vary significantly with vehicle category, engine type, operating cycle, extent of optimization achieved during system redesign, etc. Also, energy consumption for some other alternative refrigerant selections, for example CO_2-refrigerant systems, can actually show an increase under some operating conditions. Significant additional analysis is needed to enable and improve cost and performance estimates of the various alternative technologies.

6. Technical Feasibility

New HFC refrigerants with GWP values less than 150, such as those currently under development for the US market by Honeywell and DuPont, and existing alternative refrigerants such as HFC-152a (with GWP approximately 120[4]) or R744 (CO_2, GWP=1), are possible substitutes for HFC-134a in new vehicles. The feasibility of these low GWP refrigerants is being investigated and evaluated extensively by multiple entities. As suggested by the European directive, all indications are that a feasible refrigerant alternative to HFC-134a is eminent.

7. Additional Considerations

The EU regulation timeline calls for the phase out of HFC-134a beginning with new vehicles types in 2011. Thus, auto makers serving that market face at present time a critical go, no-go decision point regarding refrigerant selection for their systems.

The outcome of the AB1493 legal challenges, including the pending California waiver request to the US EPA, will impact significantly the form and function of the measure as proposed.

Each alternative new refrigerant will be evaluated from a lifecycle emissions standpoint to ensure that the net impact on greenhouse gas emissions is properly characterized and in order to promote improvements not only on refrigerant containment to minimize leakage, but also in system performance to reduce the parasitic impact of the MACS on the vehicle engine.

Affected Entities: Vehicle owners and operators, vehicle manufacturers, mobile air conditioning system repair facilities, mobile air conditioning system and component manufacturers, and air conditioning refrigerant manufacturers.

Government Agencies to coordinate with: U.S. EPA and the European Commission.

Comments Received From: DuPont Company.

8. Division: Research Division
Staff Lead: Pablo Cicero
Section Manager: Tao Huai
Branch Chief: Alberto Ayala

9. References:

[1] *Schulte-Braucks, R., "Implementation of the R134a Phase Out," 2006 Mobile Air Conditioning Summit, Saalfelden, Austria, Feb. 17, 2006.*

[2] *The I-MAC Program is a consortium of government, industry, academia, and other stakeholders led by the US EPA with the objective to develop superior and improved HFC-134a mobile air conditioning technology with 50% lower leakage and 30% greater efficiency than current production-ready systems.*

[3] *Alternative Refrigerants Assessment Workshop, Presentation at the SAE 2003 Alternative Refrigerant Systems Symposium, Phoenix, Arizona, July 14, 2003*

[4] *The GWP limit is intended to be that of HFC-152a, for which the IPCC 3rd Assessment Report suggested a 100-year forcing of 120. The more recent IPCC/TEAP Special Report on HFCs and PFCs suggests a direct forcing of 122.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C16*
ID NUMBER: *EJAC-19*
TITLE: *HYBRIDIZATION OF MEDIUM- AND HEAVY-DUTY VEHICLES*
PROPONENT: *ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 1ST quarter of 2011.

ARB staff was asked to investigate the feasibility of "hybrid electric technology for medium- and heavy-duty trucks" as an early action item to address greenhouse gas (GHG) emission reductions mandated by Assembly Bill 32. Medium duty trucks are trucks with gross vehicle weight rating (GVWR) between 8,501 and 14,000 pounds and heavy-duty trucks are 14,001 pounds and greater. Staff's evaluation focuses on trucks with GVWR greater than 10,000 pounds, which hereinafter are referred to as heavy-duty trucks.

Despite the wide spread presence of hybrid electric technology in the passenger car industry, heavy-duty hybrid technology for commercial trucks are still in the pre-production development stage. The major factors hindering a rapid introduction of cost-effective hybrid technology in the heavy-duty vehicle sector are the high incremental cost and risk aversion by both hybrid builders and buyers.

Many of the present prototype heavy-duty hybrid vehicles use off-the-shelf components that are not designed and optimized for on-road heavy-duty hybrid vehicles. Some hybrid components are not commercially available and must be custom designed for the application. These components significantly increase the cost of the hybrid system due to the low production volumes. Also, reliability and maintainability of hybrid trucks are still being tested and long term durability of hybrid trucks has not been demonstrated for most applications.

Staff anticipates that hybrid technology will become available in the next 5 or more years as a commercial product for applications on urban delivery, utility, and other specialty work trucks with a potential to provide significant greenhouse gas emission reductions by 2020.

3. Early Action Description

Adopt a regulation and/or incentive program to take advantage of emerging hybrid electric technology for heavy-duty trucks.

Hybrid electric technology offers the potential to significantly improve fuel efficiency and performance while reducing emissions. However, these benefits are highly dependent on the

duty cycle of the truck application. Hybrid technology provides the greatest benefit when used in vocational applications that have significant urban, stop-and-go driving, idling, and power take-off operations in their duty cycle. Such applications include parcel delivery trucks and vans, utility trucks, garbage trucks, transit buses, and other vocational work trucks. Line haul trucks are typically operated for long periods of time at high speed and load cruise driving modes and therefore, hybrid technology may not be as beneficial for this type of truck.

Several governmental and non-governmental organizations have been sponsoring research and developing programs that will bring together hybrid developers, truck and engine manufacturers, and truck users in an effort to speed up the introduction of heavy-duty hybrid technology into the marketplace.

Among the governmental organizations, the United States Department of Energy (DOE) has initiated a cost shared research and development program for advanced heavy-duty hybrid propulsion systems that will focus on improving fuel efficiency of heavy duty trucks and buses. DOE is funding approximately $4 million per fiscal year of cost shared projects with the heavy-duty hybrid industry (50/50 cost share) on this program[1].

The United States Department of Transportation (DOT) in partnership with the North American Bus Industries, invested over $50 million, in a program that demonstrated fuel efficiency improvements of a transit bus through hybrid propulsion and weight reduction using composite materials. In addition to investing in other hybrid and fuel cell demonstration programs, DOT also continues to fund the purchase of advanced hybrid electric transit buses[1].

The United States Department of Defense is also a major sponsor in the development of heavy-duty hybrid technologies for combat vehicles and trucks.

The United States Environmental Protection Agency (U.S. EPA) has sponsored a program to develop and demonstrate the benefits of a hydraulic hybrid propulsion technology which is an alternative to hybrid electric propulsion. This system captures and stores a large portion of the braking energy by pumping hydraulic fluid into a high pressure hydraulic fluid accumulator and pressurizing an inert gas. The energy stored in the high pressure fluid is then used to help propel the vehicle during the next vehicle acceleration event[2].

Among the non-governmental organizations are the WestStart-CALSTART operated Hybrid Truck Users Forum (HTUF) and the North West Hybrid Truck Consortium. HTUF assists truck users and hybrid truck makers to move to pre-production manufacturing levels and deployment and reduce overall costs by creating common fleet requirements and joint purchase commitments. Under the HTUF program, working groups that are currently active include the Parcel Delivery Working Group, the Utility Working Group, the Refuse Truck Working Group, and the Shuttle Bus Working Group[3].

The Hybrid Parcel Delivery Truck Working Group focuses on Class 4 to 6 urban parcel delivery trucks and includes members from several major parcel delivery fleets in North America such as Federal Express (FedEx), United Parcel Service (UPS), Purolator Express, and the United States Postal Service (U.S. PS). FedEx was the first truck operator to test parcel hybrid electric trucks. It put 18 hybrid electric trucks on the road in 2005, 75 more in 2006 and is currently considering 75 more. Purolator Express has 10 hybrid electric parcel trucks and plans to add 115 trucks this year. UPS also plans to acquire 50 Eaton hydraulic hybrid trucks this year[3].

The Hybrid Utility Working Group is made up of 14 fleets and focuses on Class 5 to 7 utility and specialty work trucks. The work group has deployed 24 utility trucks nationwide and preliminary results indicate fuel savings ranging between 10 to 50 percent[3].

The Hybrid Refuse Working Group consists of 7 private and municipal refuse truck fleets. The purpose of this working group is to develop a common chassis and vehicle performance specifications in an effort to speed up the introduction of hybrid trucks for refuse fleet operations. In May 2007, the group released a request for proposals to purchase and deploy 8 preproduction hybrid refuse trucks for assessment[3].

The Northwest Hybrid Truck Consortium is a coalition of several county and city governments, and utility companies located in the state of Washington. The group works together with HTUF to identify hybrid opportunities and raise regional and state funding for hybrid deployment. In 2006, the consortium acquired $250,000 in funding from the U.S. EPA's West Coast Collaborative project, to support early hybrid truck deployments by reducing the incremental cost of the purchased hybrid trucks[4].

4. Potential Emission Reductions

To understand the potential of hybrid technology in reducing GHG emissions, staff estimated GHG emission reductions in 2020. Assuming that all new Class 3 to 5 (10,001 to 19,500 lbs) trucks sold in California beginning in 2015, use hybrid technology, the GHG emission reductions from these trucks are estimated to be 0.5 MMT of CO_2e in 2020. These hybrid trucks represent 20 percent of the total California fleet in the same class and their vehicle miles traveled represents 30 percent of the total California fleet of the same class. To put this in perspective, if 100 percent of the Class 3 to 5 trucks were hybrids in 2020, the potential GHG emission reduction could be up to 1.7 MMT of CO_2e.

Table 1

	CY 2020 (MY 2015-2020)	CY 2020 (ALL MYS)	
Vehicles (10,001 to 19,500 lbs)	53,421	273,739	- Fuel economy improvement: 35% - Base truck fuel economy: 7.2 mpg
Daily Vehicle Miles Travel	3,694,200	12,166,000	
GHGs Reduced in 2020 in MMT of CO_2e	0.5	1.7	

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

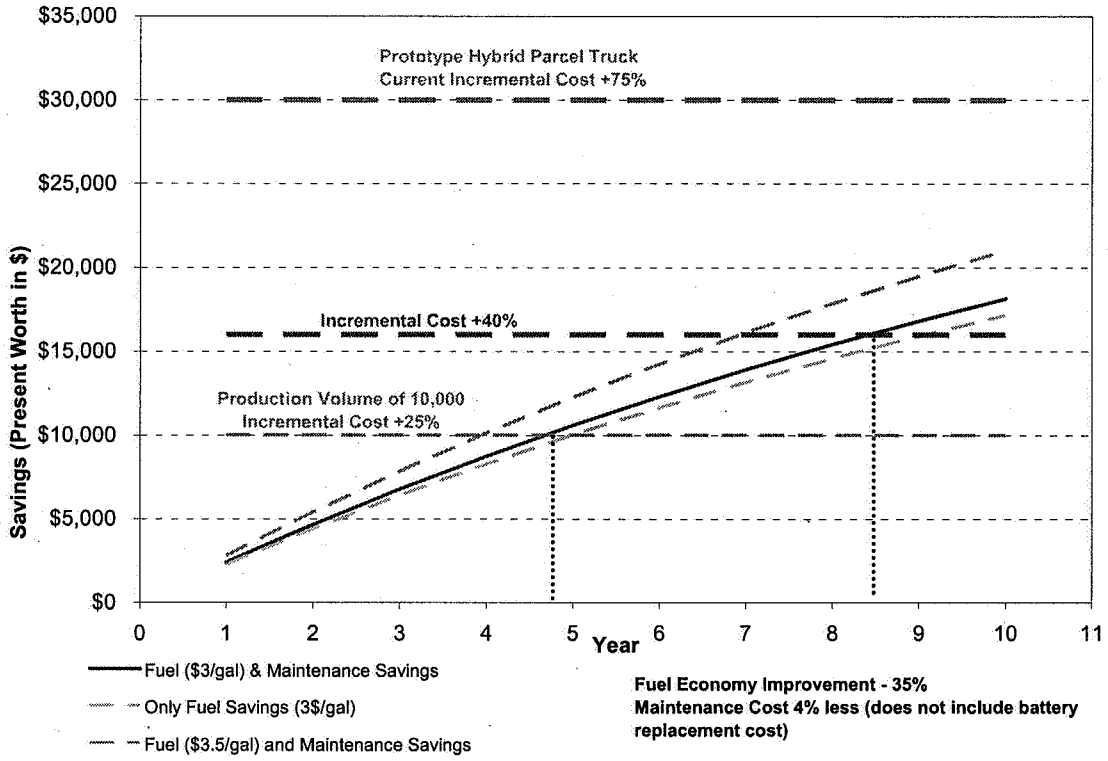
Table 2 compares a base truck with a "replacement" hybrid truck. As shown in the comments column of the table, the data were obtained from different sources. Incremental cost and in-use performance data were obtained from a hybrid truck builder and DOE published reports for hybrid buses and CNG trucks.

Table 2

	Base Diesel Truck	Parcel Hybrid Truck	Comments
Cost ($)	$40,000	$70,000	- Cost of the base truck is from a truck dealership. - Incremental cost is from a hybrid builder: $30,000 (75% above cost of base truck) for preproduction parcel trucks. ($10,000, or 25% above cost of base truck for production volume of 10,000 trucks or more)
Fuel Economy (mpg)	7	9.5	Fuel economy improvement 35% Base truck fuel economy is assumed to be 7 mpg.
Fuel Cost ($/gal)	$3.00	$3.00	In estimating fuel savings, the fuel price per gallon is assumed to remain constant during the 10 year lifetime period of the truck.
Annual VMT (miles)	22,000	22,000	Source: Parcel delivery truck feet operator
Life of the vehicle (years)	10	10	Source: Parcel delivery truck feet operator
Maintenance Cost	Unknown	Unknown	Being pre-production vehicles, the parcel fleet operator has not realized maintenance savings because of problems in software, transmission, parking brake, etc.
Assumed maintenance costs: ($/mile)	$0.16	$0.15	Base truck maintenance $0.16/mi[5] Hybrid truck maintenance cost is assumed 4% less – considers only labor and parts cost without battery replacement[6]

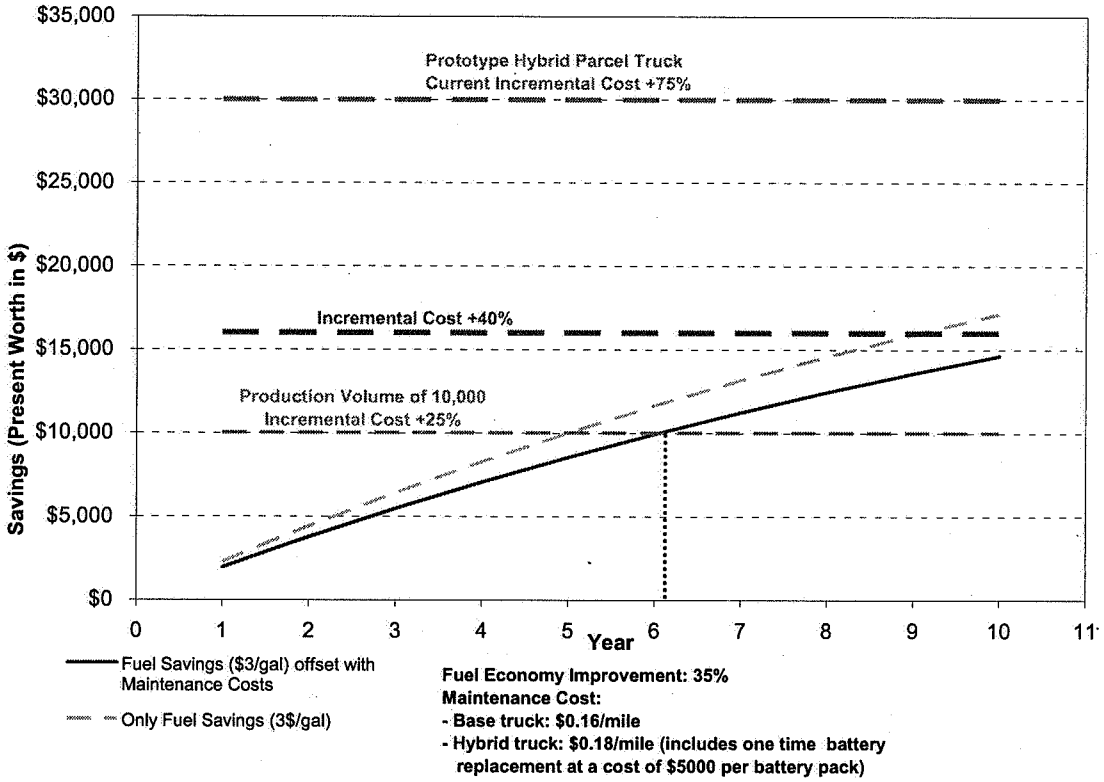
Figure 1 shows the savings realized from fuel economy improvements and reduced maintenance needs for the 10-year life of the parcel delivery truck. Future year savings were converted into 2007 dollars using a 7 percent discount rate. Assuming a 75 percent incremental cost difference, the chart shows that the preproduction hybrid parcel truck never recovers the incremental cost from fuel and maintenance savings. If production volume increases and the incremental cost drops to 25 percent of the cost of the base truck, then the hybrid truck will recover the incremental cost within 4 to 5 years. Note that in Figure 1 the maintenance cost for the hybrid truck is assumed to be 4% less than the base truck and does not include battery replacement.

Figure 1



According to one hybrid truck builder, the hybrid parcel delivery truck equipped with nickel metal hydride (NiMH) will require a one-time battery replacement during its life. The replacement battery pack costs between $5,000 to $8,000. Adding this cost to the maintenance cost of the hybrid truck results in $0.18/mile which is 10 percent higher than that of the base truck. Figure 2, below, shows the savings and payback period for this truck. It can be seen that the payback period for the high volume production hybrid truck (incremental cost of 25 percent) becomes 6 years.

Figure 2



6. Technical Feasibility

7. Additional Considerations

Additional comments were received by the general public.

8. Division: Mobile Source Control Division
Staff Lead: Daniel Hawelti
Section Manager: Stephan Lemieux
Branch Chief: Michael Carter

9. References:

[1] *U.S. Department of Energy. "21St Century Truck Partnership: Roadmap and Technical White Papers", Report No.: 21CTP-0003. December 2006. (http://www1.eere.energy.gov/vehiclesandfuels/pdfs/program/21ctp_roadmap_2007.pdf)*

[2] *U.S. Environmental Protection Agency. "World's First Full Hydraulic Hybrid in a Delivery Truck" EPA420-F-06-054, June 2006. (http://www.epa.gov/otaq/technology/420f06054.pdf)*

[3] *WestStart-CALSTART. "Hybrid Truck Users Forum". (website: http://www.calstart.org/programs/htuf/, accessed August 6, 2007)*

[4] *West Coast Collaborative. "Northwest Hybrid Truck Consortium" (website: http://www.westcoastdiesel.org/grants/wa-hybrid-trucks.htm, accessed: August 6, 2007)*

[5] *Chandler, K. and K. Walkowic. . "King County Metro Transit Hybrid Articulated Buses: Final Evaluation Results", U.S. DOE Technical Report: NREL/TP-540-40585. December 2006. (http://www1.eere.energy.gov/vehiclesandfuels/avta/pdfs/heavy/king_co_final_12-06.pdf)*

[6] *Chandler, K., K. Walkowic, and Nigel Clark. "United Parcel Service (UPS) CNG Truck Fleet: Final Results", August, 2002. (http://205.168.79.26/vehiclesandfuels/ngvtf/pdfs/31227.pdf)*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C17*
ID NUMBER: *ARB 2-8*
TITLE: *REDUCE SULFUR HEXAFLUORIDE (SF_6) FROM ELECTRICAL GENERATION*
PROPONENT: *AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 2nd quarter of 2011.

3. Early Action Description

This strategy proposes that the ARB develop a measure to reduce sulfur hexafluoride (SF_6) emissions from the electric power industry, which is the primary user of SF_6. SF_6 is a synthetic gas used as an insulating medium. The most common use for SF_6 is as an electrical insulator in high-voltage equipment that transmits and distributes electricity. Since the 1950's, the U.S. electric power industry has used SF_6 widely in circuit breakers, gas-insulated substations, and other switchgear used in the transmission system to manage the high voltages carried between generation stations and customer load centers. Fugitive emissions of SF_6 can escape from gas-insulated substations and switchgear through seals. It can also be released during equipment installation and when equipment is opened for servicing. Several factors affect SF_6 emissions from electric power systems, such as the type and age of the equipment (e.g., older circuit breakers can contain up to 2,000 pounds of SF_6, while modern breakers usually contain less than 100 pounds), and the handling and maintenance procedures practiced by the utilities.

SF_6 is a highly potent greenhouse gas. Over a 100-year period, SF_6 is 23,900 times more effective at trapping infrared radiation than an equivalent amount of carbon dioxide. SF_6 is also a very stable chemical, with an atmospheric lifetime of 3,200 years. Consequently, it will accumulate in the atmosphere.

The U.S. Environmental Protection Agency (U.S. EPA) reports that the most promising and cost-effective options to reduce SF_6 emissions are leak detection and repair, use of recycling equipment, and employee education and training.

4. Potential Emission Reductions

U.S. EPA estimates that the SF_6 emissions from electric power systems in the U.S. in 2005 were 4.9 million metric tons of CO_2-equivalent (MMTCO2E). The Cal/EPA Climate Action Team

Report states that hydrofluorocarbons, perfluorocarbons, and SF_6 accounted for about 3.5 percent of gross 2002 greenhouse gas emissions in California (CO_2-equivalent). USEPA reports that use of recycling equipment can reduce SF_6 emissions by about 10 percent, and leak detection and repair can reduce SF_6 emissions by 20 percent.

Further investigation is required to determine the portion of SF_6 emissions attributed to the California electric power industry and the most appropriate and effective emission reduction equipment and practices. Therefore, ARB staff cannot yet determine the total emission reduction potential of this strategy.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

U.S. EPA reports that cost-effective operational improvements and equipment upgrades can be accomplished at an average cost of $9.00 per pound. The cost impacts of this strategy specific to the California power sector cannot be determined at this time as further investigation is required. ARB staff assumes that costs will be borne by the power companies and could translate into increased electricity rates for consumers.

6. Technical Feasibility

The most cost-effective SF_6 emission reduction options reported by USEPA focus on maintenance and education, and therefore do not appear to have any associated major technical issues. However, to the extent that repair and replacement activities are used to reduce emissions, scheduling to minimize electrical system disruption could be an issue.

7. Additional Considerations

8. Division: Stationary Source Division
Staff Lead: Chris Gallenstein
Section Manager: Mike Waugh
Branch Chief: Mike Tollstrup

9. References:

[1] *California Environmental Protection Agency, "Climate Action Team Report to Governor Schwarzenegger and the Legislature," March 2006.*

[2] *U.S. Environmental Protection Agency, "SF6 Emission Reduction Partnership for Electric Power Systems," April 17, 2007: http://www.epa.gov/electricpower-sf6/index.html*

[3] *U.S. Environmental Protection Agency, "SF6 Emission Reduction Partnership for the Magnesium Industry," November 28, 2006: http://www.epa.gov/highgwp/magnesium-sf6/faq.html*

[4] *U.S. Environmental Protection Agency, "U.S. High GWP Gas Emissions 1990-2010: Inventories, Projections, and Opportunities for Reductions," publication #EPA-000-F-97-000, June 2001.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C18*
ID NUMBER:	*NA*
TITLE:	*REFRIGERANT TRACKING, REPORTING AND RECOVERY PROGRAM (REFRIGERANT RECOVERY FROM DECOMMISSIONED REFRIGERATED SHIPPING CONTAINERS, RESIDENTIAL REFRIGERATION PROGRAM, HIGH-GWP TRACKING/REPORTING/REPAIR/DEPOSIT PROGRAM)*
PROPONENT:	*STAKEHOLDER SUGGESTION- ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE, ARB STAFF*

2. Staff Recommendation

This combination of measures is recommended for addition to the list of early actions. The Board date for consideration of these items is anticipated in 4th quarter of 2011. It is presented as one strategy given the interrelated objective, which is to reduce emissions of high-GWP GHGs through establishing requirements for enhanced monitoring, enforcement, reporting, and recovery. It may be determined that more than one strategy is required to effectively address the sources of interest and that the strategy or strategies are likely to include both regulatory and non-regulatory elements.

3. Early Action Description

Below is a brief description of potential approaches for addressing each of the source categories considered. Staff will explore the most efficient opportunities for achieving the largest reductions from the below categories which may translate into a single or multiple strategies.

Refrigerant Recovery from Decommissioned Shipping Containers: This action consists of an assessment of the magnitude of the emissions from refrigerated shipping containers. Depending on results, the strategy may be similar in scope to the measure aimed at enforcing the federal restrictions on refrigerant venting during servicing or dismantling of motor vehicle air conditioning systems (MVACS). After the recovery from a decommissioned container, it may be desirable to disable the refrigeration unit, which may require a regulation. Enforcement personnel and federal and local air management district assistance would be needed.

Residential Refrigeration Program: This involves supporting existing voluntary programs to promote the upgrade of pre-2000 residential refrigeration equipment in need of repair, such as refrigerators and freezers. The program could potentially be expanded to include window unit air conditioners (A/Cs); upgraded HVAC units are not recommended, as the costs are likely significant and would disproportionately impact lower-income people.

A statewide effort to support programs for expanding the upgrading of old appliances to Energy Star efficiencies or better should be coordinated with various local utilities' voluntary programs and the US EPA's RAD program[1]. Given the utilities lead role in such programs, the ARB's role would be expected to consisting of enhancing its outreach efforts to underscore the benefits of participating in such programs. This program could also be coordinated with a foam recovery program, especially if automated recovery of refrigerant, foam, and scrap metal is implemented.

This program will likely result in an increased number of refrigerators entering the waste stream that will need to be properly recycled to achieve GHG emission avoidance. However, if all waste refrigerant, foam, and other materials are properly recycled/destroyed, direct GHG emissions avoidance benefits may be significant, as well as indirect GHG emissions avoidance due to energy efficiency gains[2].

Part of the residential refrigeration program includes a strategy to be developed in collaboration with the US EPA to enhance the enforcement of end-of-life (EOL) recovery of refrigerant[3].

Insulation foam contained in residential appliances will be addressed in another strategy, but there may be some overlap between refrigerant and foam recovery for appliances if the entities involved in manual refrigerant removal (which requires US EPA technician certification) are also able/willing to perform manual foam removal on appliances at end-of life (EOL).

The proposed measure will be voluntary, and ARB's role will be to promote replacement through coordination/outreach efforts with the utilities, the US EPA, and the California Energy Commission (CEC), which will enhance public awareness of energy savings and GHG benefits associated with the program.

For maximum effectiveness, this program will also have to be coordinated with ARB's planned end-of-life enforcement and foam recovery measures to ensure that old residential appliances are properly disposed of and high global warming potential (GWP) refrigerants/foams are properly recovered/recycled or destroyed.

High-GWP Tracking/Reporting/Repair/Deposit Program: This strategy involves the following: 1) expanding and enforcing the national ban on venting high-GWP GHGs (including fully emissive processes) during equipment/process lifetime; 2) requiring high-GWP GHG sales, use and energy use reporting as well as inspection and maintenance (I/M) and leak repair for equipment, cylinders, products, or systems with capacities

[1] http://www.epa.gov/ozone/snap/emissions/radp.html
[2] Dave Godwin, USEPA, personal communication, 7/06.
[3] The CFC-12 refrigerant/CFC-11 foam blowing agent combination was used for many years in residential refrigerators and freezers, and phaseout of HCFC-141b from appliance foam has only been occurring in the past four years. New refrigerators and freezers generally contain HFC-134a as the refrigerant and HFC-245fa as the foam blowing agent. Currently, ODS recovery is mandated by federal law, and venting HFCs is forbidden, but enforcement is weak and venting is not well-defined. Additionally, EOL technician certification for recovery/reclamation is only required for ODSs and is subject to little oversight/enforcement; the EOL recovery regulation would extend the certification requirement to other high-GWP GHGs and would call for additional oversight/enforcement at transfer stations, landfills, and other disposal facilities.

above some CO_2E threshold; 3) requiring technician certification for sales, purchase, transport, recovery, reclamation, resale, I/M; and 4) establishing a high-GWP GHG deposit program and/or fines for emissive processes or leaky systems.

Currently, Section 608 of the CAAA limits intentional venting of ODSs and HFCs, requires record keeping for systems employing more than 50 lbs of an ODS, and requires technician certification for ODS systems (I/M, repair, recovery, reclamation). High-GWP GHG sales are only restricted to ODSs in cylinders (not pre-charged equipment); the sales restriction does not apply to HFCs.

Reporting, in addition to record-keeping for ODS systems > 50 lbs, is required in SCAQMD (Rule 1415), and it is proposed that ARB implements a high-GWP GHG reporting requirement rather than record-keeping only. Reporting would be for any high-GWP GHG above a specified CO_2E threshold (extending beyond ODSs). The permanent reporting protocol could apply to any high-GWP GHG bought, sold, or used, by any manufacturer, retailer, distributor, repair person/technician, auditor, facility/corporate parent. Production plus imports into California (gas in cylinders or as an equipment charge) can be checked against use and exports out of California for mass balance purposes.

High-GWP GHG sales will be restricted to certified technicians (i.e., consumers cannot not buy cans or cylinders of high-GWP GHGs over some threshold value), which differs from current federal law which only limits sales of ODSs to certified technicians (except for ODS refrigerants contained in air conditioners and refrigerators).

The deposit program could apply to cylinders (raw chemical) or pre-charged equipment (such as refrigerators, A/Cs, vending machines, etc.)[4]. Furthermore, fines could be assessed based on annual use reporting and auditing for systems above some CO_2E threshold. Reporting will have little to no impact on leaking/emissive equipment if there are not financial disincentives in excess of refrigerant costs (i.e., the deposit or fine should cost more than refrigerant needed to recharge a leaky system, so that leaks are promptly fixed).

Deposit/return and/or fine programs would encourage leak-tightness and recovery of high GWP GHGs, as well as encourage upgrading of old, leaky equipment. A similar program has been adopted in Australia, and industry groups are voluntarily considering a deposit/return program in the US.

Adoption of this measure will require a blend of regulatory/non-regulatory approaches, as it will extend current regulations and also require a collaborative effort with the US EPA to enforce what is already established by law.

4. Potential Emission Reductions

Refrigerant Recovery from Decommissioned Shipping Containers: There is insufficient data on the emissions from this source. For the decommissioned shipping containers, it is estimated that the HFC-134a refrigerant bank at end-of-life could be

[4] Consumer goods would be more difficult to subject to deposit and return since they are intended to be fully emissive, but it is believed that purchases over a given CO2E limited to certified technicians will inhibit consumers from buying more than small numbers of product.

approximately 15,000 $MTCO_2E$ per year in the area surrounding the Ports of Long Beach and Los Angeles. This is based on the estimated Los Angeles-Long Beach fraction of world shipping container activity of approximately 8 percent and 30 percent of the total container population consists of refrigerated shipping containers. The percent of refrigerated containers that a ship may carry varies between 10 to 50 percent of the total container capacity. The estimated Los Angeles-Long Beach fraction of world refrigerated shipping container activity applied to the estimated annual turnover rate of refrigerated shipping containers has been estimated to be 100,000. The refrigerant charge in modern shipping containers ranges from 13 to 16 pounds. If these containers are allowed to accumulate, the bank could become on the order of 0.1 MMTCO2E in a 5 to 10 year period assuming a 10 pound refrigerant charge at decommissioning. Thus, the reduction potential of a mitigation strategy for this source would be less than 0.1 MMTCO2E in 2020. In addition, given that these shipping containers may last from 20 to 30 years, there may be a significant number of older CFC-based systems. Finally, it is important to determine what happens to the shipping containers as they approach end-of-life.

Residential Refrigeration Program: Estimated annual emission reductions of 0.8 $MMTCO_2E$ are possible for refrigerant recovery[5]. Of the 0.8 $MMTCO_2E$ of annual emissions avoided for refrigerant recovery, about 0.7 is due to recovery of R-12 refrigerant. This estimate does not include the benefits from deploying more efficient systems sooner (see energy efficiency calculations, below).

Although refrigerant recovery is currently supposed to occur at the time of disposal, destruction of refrigerant is not required, and it is generally assumed that recovered/reused refrigerant will eventually be emitted.

The CO_2E emissions avoidance was calculated for 2005, and only refrigerators and freezers going to landfills were considered; numbers of pre-2000 appliances in need of repair were not available. Inclusion of portable A/C units could increase emissions benefits, but numbers of portable units that are repaired or landfilled each year are unknown. Without knowledge of the numbers and age distributions of appliances in California, 2020 emissions reductions based on sector growth and transitional refrigerant/blowing agent use estimates were not possible. However, it is reasonable to assume that approximately 0.8 $MMTCO_2E$ reductions will be possible every year until refrigerators and freezers containing R-12 are gone, which will happen in large part by 2020.

Energy efficiency emissions avoidance in 2020 resulting from appliance retirement could not be calculated due to lack of data regarding age distribution of California appliances, but again it is reasonable to assume that an additional 0.45 $MMTCO_2$ reduction is possible annually[6].

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[5] The following assumptions were used: 1) 20 year lifetimes for refrigerators, 2) R-12 use in refrigerators stopped in 1995; from 1995 – 2005 HFC-134a was used, 3) in 2005, half of disposed refrigerators contain R-12 as the refrigerant and the other half contain HFC-134a as the refrigerant, 4) 13,000,000 refrigerator/freezers are disposed of annually in the US and 60% go to landfills or transfer stations, 5) the California population fraction was roughly 13% in 2005, 6) 100-year direct GWPs of 8100 and 1300 were used for R-12 and HFC-134a, respectively, 7) refrigerant masses of 0.23 kg/appliance and 0.16 kg/appliance for R-12 and HFC-134a, respectively, were obtained from USEPA (Dave Godwin, personal conversation, 2/07).

[6] USEPA estimates that 700 kWh/year savings are possible by replacement of a 20 yr old refrigerator with a current energy star appliance; an emission factor of approximately 1.4 lbs

To summarize, by 2020, annual emission reductions of roughly 1.25 $MMTCO_2E$ are possible by recovering refrigerant from pre-2000 refrigerators and freezers, and by requiring upgrading to Energy Star or better appliances.

High-GWP Tracking/Reporting/Repair/Deposit Program: Staff believes that significant emission reductions may be realized through the proposed strategy; however, emission reductions cannot be estimated for this strategy, as there are no data to support emission avoidance calculations.

Total Reductions: The combined annual reductions possible with this group of strategies is 1.25 $MMTCO_2E$, which is a lower-bound estimate that does not include CFC-containing shipping containers, appliances that are upgraded rather than repaired, and the impacts of requiring reporting/repair/deposits for systems over a given CO2E threshold.

5. Estimated Costs/Economic Impacts and the Impacted Sectors/Entities

Refrigerant Recovery from Decommissioned Shipping Containers: Very little specific information on costs and economic impacts is known today. Per the federal regulation (40 CFR 82), refrigerant cannot be released to the atmosphere. Specialized equipment and certified technicians are required to properly carry out this measure. Equipment to recover the refrigerant may cost $5,000. The training cost for servicing certification is minimal. Both the equipment and the certified technicians are something that businesses should already have if they are in compliance with the existing federal regulation. It is possible that existing businesses in the air conditioning and refrigeration servicing industry may be able to handle recovering the refrigerant from the decommissioned refrigerated shipping containers. There will also be a requirement to remove or disable the decommissioned refrigeration unit, which should be a minimal cost. It is believed that as these shipping containers age, they get sold to smaller shipping businesses and these may bear the brunt of the measure for decommissioned containers. In addition, some of these units may be sold to restaurants and other businesses for increased refrigeration capacity. If the federal regulation is applied to in-use containers, then all segments of the business would be affected.

Residential Refrigeration Program: The US EPA states that because of reduced energy demand, appliance incentive/disposal programs cost about $0.04 on average to reduce each kWh of demand. This translates into about $63/$MTCO_2$, which includes the incentives and credits given to upgrade older appliances[7].

The impacted sectors and entities would mostly be appliance salvagers/recyclers and individuals disposing pre-2000 appliances; however, with incentives and rebates, the cost associated with disposal and some of the cost of a new appliance is avoided.

CO2/kWh for gas-generated electricity was obtained from Carbon Dioxide Emissions from the Generation of Electric Power in the United States, DOE, 7/2000: http://tonto.eia.doe.gov/FTPROOT/environment/co2emiss00.pdf

[7] See above footnote.

The US EPA RAD program was started in 2006 and the success of the program has not been gauged yet, although it is anticipated that a mandatory program would be more effective.

High-GWP Tracking/Reporting/Repair/Deposit Program: Record-keeping, I/M and repair is already required for systems containing > 50 lbs of an ODS refrigerant; in SCAQMD, reporting is required for these systems in addition to record-keeping. Even those entities who are not yet keeping records for reporting purposes must still have some records of refrigerant/product purchases for resale and income tax purposes. Therefore, the costs associated with record-keeping and reporting are believed to be negligible.

I/M costs are not believed to be significant[8], but leak repair and/or high GWP GHG recovery for some processes may be expensive. The costs associated with I/M and leak repair cannot be estimated due to the large variety in numbers and types of equipment covered by this strategy. Costs associated with a deposit and return program are unknown, but will presumably be passed on to the consumer at the time of purchase.

6. Technical Feasibility

The technology required to remove refrigerants from shipping containers and appliances is feasible and commercially available. Automated refrigerant and foam removal from appliances is also technically feasible, and can be performed during scrap metal processing and recovery[9].

There are no anticipated technical feasibility issues for the tracking/reporting/repair/deposit program other than recovery of high-GWP GHGs for certain unknown, emissive processes.

7. Additional Considerations

All Strategies: Ozone depleting substances (ODSs) were used in the past as refrigerants and foam-blowing agents; each of the strategies described above include ODSs as they exist in older refrigeration systems, appliances, and foams. Recovering and destroying ODSs from containers and appliances is a cost-effective way to reduce high-GWP gas emissions, and also reduces negative impacts on stratospheric ozone.

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[8] Presently, owners or operators of large RAC systems should maintain and repair their systems for optimal performance and reduced energy costs, so the incremental cost of the new rule is not expected to be significantly higher than current costs, unless leaks are going undetected and unrepaired. The costs to pay for yearly inspection and maintenance by certified technicians is not expected to be more than about $200 (based on one 8-hour workday by a HVAC technician at a rate of $22/hour in California: http://www.payscale.com/research/US/Job=HVAC_Service_Technician/Hourly_Rate/by_State).

The incremental costs per system associated with an owner, operator, or HVAC technician/auditor filling out several short reporting forms is also expected to be less than $200 (see above).

[9]Guidance on the Recovery and Disposal of Controlled Substances Contained in Refrigerators and Freezers, SEPA, 2002: http://www.sepa.org.uk/pdf/consultation/closed/2003/fridge/fridge_consultation.pdf

An enforcement component for the decommiossioned container and tracking/reporting/repair/deposit measures is anticipated, since these are regulatory measures rather than voluntary measures.

Refrigerant Recovery from Shipping Containers: Staff will perform a needs assessment to improve the current understanding of overall refrigerant leakage emissions and refrigerant banks for both active and decommissioned refrigerated shipping containers. This is particularly important for the major port areas of Los Angeles, Long Beach, and Oakland. If mitigation action is supported by the analysis, the measure should involve a program enforcing the existing provisions of the existing federal regulation, 40 CFR 82. A basic inventory is needed to determine the extent that refrigerant emissions are unaccounted for. In addition, end-of-life accounting for these different types of refrigerated containers needs to be explored.

Residential Refrigeration Program: The impacted sectors and entities would mostly be appliance salvagers/recyclers and possibly individuals disposing of foam-containing appliances, as recovery costs are expected to be passed along to the user.

California trade associations associated with Certified Appliance Recyclers and recyclers of scrap metals are unknown.

Coordination with the US EPA with respect to this regulation is ongoing. Further coordination with utilities participating in appliance trade-in programs is anticipated.

High-GWP Tracking/Reporting/Repair/Deposit Program: The affected entities will be owners/operators/purchasers/sellers of high-GWP GHGs and systems containing those chemicals, as well as contractors/technicians who install/repair such systems.

A partial list of trade associations possibly impacted, either positively or negatively, by the regulation follows: ARAP (described previously), the Air-Conditioning and Refrigeration Institute (ARI), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), North American Technician Excellence (NATE), and many others unknown to staff (equipment trade associations, building trade associations, industrial chemical and consumer trade groups, semiconductor and other industrial process trade groups, etc.).

Coordination with the US EPA and SCAQMD with respect to this strategy would be ongoing.

Trade Associations: Association of Home Appliance Manufacturers.

Comments Received From: Airgas, Inc., Maersk Inc. and APM Terminals, DuPont Company, Association of Home Appliance Manufacturers.

8. **Division:** Research Division
Staff Lead: Whitney Leeman/Winston Potts
Section Manager: Michael Robert/Tao Huai
Branch Chief: Tony Andreoni/Alberto Ayala

9. References

American Association of Port Authorities (AAPA) web site: http://www.aapa-ports.org/home.cfm

Arthur D. Little, Inc., Global Comparative Analysis of HFC and Alternative Technologies for Refrigeration, Air Conditioning, Foam, Solvent, Aerosol Propellant, and Fire Protection Applications, Final Report to the Alliance for Responsible Atmospheric Policy, March 21, 2002.

David Godwin (USEPA), Marian Martin Van Pelt and Katrin Peterson (ICF Consulting), Modeling Emissions of High Global Warming Potential Gases from Ozone Depleting Substance Substitutes, 2003.

David Hatch, Carrier Transcold, personal communication, 5/07.

DOE, Carbon Dioxide Emissions from the Generation of Electric Power in the United States, DOE, 7/2000: http://tonto.eia.doe.gov/FTPROOT/environment/co2emiss00.pdf

EU (F-Gas Regulation), REGULATION (EC) No 842/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL:
http://www.fluorocarbons.org/documents/library/Legislation/JO_L161_1_842_2006_Regulation.pdf

Federal Register, Section 608 of the CAAA, and USEPA's related website:
http://www.epa.gov/oar/caa/caa608.txt
http://www.epa.gov/ozone/title6/608/index.html

Harrison, R.; "The Potential Impacts of Megaship Operations on Gulf Port," Center for Transportation Research, University of Texas

IPCC/TEAP, IPCC Special Report on Safeguarding the Ozone Layer and the Global Climate System, Issues related to Hydrofluorocarbons and Perfluorocarbons, 2005.

SEPA, Guidance on the Recovery and Disposal of Controlled Substances Contained in Refrigerators and Freezers, 2002:
http://www.sepa.org.uk/pdf/consultation/closed/2003/fridge/fridge_consultation.pdf

The Netherlands (STEK Regulation), "Order on leak-free refrigeration equipment", Dec. 18th 1994. SCAQMD, Rule 1415: http://www.aqmd.gov/rules/reg/reg14/r1415.pdf

USEPA, Draft Proposed Measures Arising from the IPCC/TEAP Special Report & its Supplement, by End-Use, Expert Workshop on IPCC/TEAP Special Report, July 2006.

USEPA, RAD program website: http://www.epa.gov/ozone/snap/emissions/radp.html

USEPA, U.S. High GWP Emissions 1990-2010: Inventories, Projections and Opportunities for Reductions, EPA 000-F-97-000, June 2001.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C19*
ID NUMBER: *ARB 2-5*
TITLE: *FOAM RECOVERY/DESTRUCTION PROGRAM*
PROPONENT: *AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2011.

This timing will allow staff the time to complete inventory research[1], interagency coordination, economic analyses, staff reports, stakeholder workshops, and public hearings to support the necessary regulation(s).

An alternative or complimentary approach may include establishing a voluntary agreement for recovery and destruction for certain foams, if the agreement can be implemented more cost-effectively and can be expected to yield similar CO_2E benefits as mandatory compliance.

3. Early Action Description

This strategy involves a regulatory measure(s) to implement a program to recover and destroy high-GWP insulating foams from buildings, other construction/demolition (C/D) waste, and appliances at end-of-life (EOL). The appliance foam recovery would be coordinated with the US EPA, as they have implemented a similar, voluntary program with some utility providers[2].

Many foams contain high-GWP GHG blowing agents, especially older insulating foams used in appliances and buildings, that contain chlorofluorocarbon (CFC) blowing agents such as CFC-11 (100-year direct GWP of 4,600).

Currently, foams are either broken (building panels) or shredded (appliances) and landfilled; at this time, no federal or state laws require that foams containing ozone

[1] Inventory work in this area is expected to be complete by late 2009.
[2] Responsible Appliance Disposal program, or RAD: http://www.epa.gov/ozone/snap/emissions/radp.html

depleting substance (ODS) or other high-GWP blowing agents in the foam be removed and destroyed[3].

Foam recovery from appliances may either be done manually, or as part of a fully automated recovery system in which appliance refrigerant is removed/de-gassed, the appliance is shredded, with the refrigerant in the foam collected from the gaseous and solid phases and subsequently destroyed.

4. Potential Emission Reductions

Estimated annual emission reductions of 0.9 $MMTCO_2E$ are currently possible for residential refrigerator and freezer foam recovery[4]. This number may be offset somewhat by CO_2 emissions associated with foam destruction[5]. Of the 0.9 $MMTCO_2E$, 0.8 $MMTCO_2E$ is due to recovery of foam containing R-11.

The CO_2E emission reductions are calculated for 2005 with only refrigerators and freezers considered since quantities of insulating foams recovered from A/Cs and building wastes annually in California are unknown. Without knowledge of the numbers and age distributions of appliances in California, 2020 emissions reductions based on sector growth and transitional blowing agent use estimates were not possible. However, it is reasonable to assume that approximately 0.9 $MMTCO_2E$ reductions will be possible every year until refrigerators and freezers containing R-11 are gone.

To summarize, by about 2012 annual emissions reductions of **0.9 $MMTCO_2E$** may be possible by recovering foams banked in old refrigerators and freezers that would otherwise go to landfills. Emissions benefits associated with foam recovery from building and additional C/D wastes could not be estimated.

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[3] Although refrigerant removal is required at appliance EOL under federal and state law, it is unknown at this time whether foam and refrigerant recovery would be performed by the same people at the same time; the process and technician certification requirements are expected to differ.

[4] The following assumptions were used: 1) 20 year lifetimes for refrigerators, 2) R-11 use in refrigerators stopped in 1995; from 1995 – 2005 HCFC-141b was used, 3) in 2005, half of disposed refrigerators contain R-11 as the foam blowing agent and the other half contain 141b, 4) 25% of the foam blowing agent is lost into the cabinet and is released into the atmosphere and that the remaining 75% is recoverable, 5) 13,000,000 refrigerator/freezers are disposed of annually in the US and 60% go to landfills or transfer stations 6) the California population fraction was roughly 13% in 2005, 7) 100-year direct GWPs of 4600 and 700 were used for R-11 and HCFC-141b, respectively, 8) blowing agent masses of 0.45 kg/appliance and 0.38 kg/appliance for R-11 and HCFC-141b, respectively, were obtained from USEPA (Dave Godwin, personal conversation, 2/07).

[5] An additional 0.8 MMT CO2E should be avoided at appliance EOL, as refrigerant recovery is mandated by federal and state law; this is discussed in the following strategy, ARB 4-2. Foam destruction would require a large amount of additional analysis; currently, USEPA is developing a plan to destroy ODSs at RCRA facilities, and the operating assumption is that the CO2 emissions associated with relatively small amounts of foams and refrigerants are small compared to the hazardous waste destruction throughput of a typical RCRA facility, but this supposition is subject to further analysis and change.

5. Estimated Costs/Economic Impacts and the Impacted Sectors/Entities

The US EPA estimates that automated foam recovery at appliance EOL costs approximately **$6.5/TCO$_2$E**, while manual foam recovery at appliance EOL costs approximately **$48/TCO$_2$E**. The US EPA states that foam recovery from steel faced building panels is cost effective where large volumes of panels are in one place[6].

The impacted sectors and entities would mostly be appliance salvagers/recyclers and possibly individuals disposing of foam-containing appliances, as recovery costs are expected to be passed along to the user. Recovery of foam from buildings is not currently performed.

A foam recovery program for appliances is currently operating as an incentive program between the US EPA and utility companies, some of which are located in California (Responsible Appliance Disposal program, or RAD, see following strategy, ARB 4-2). The program was started in 2006 and the success of the program has not been gauged yet, although it is anticipated that a mandatory program would be more effective.

6. Technical Feasibility

The technology required to remove foam blowing agents from appliances and other construction and demolition wastes is feasible, but labor intensive if manual removal is employed. Automated foam removal from appliances is technically feasible, and can be performed during scrap metal processing and recovery.

7. Additional Considerations

Ozone depleting substances (ODSs) were used in the past as foam-blowing agents; CFC-11 (100-year direct GWP of 4,600) was used for many years, and phaseout of its replacement, HCFC-141b (100-year direct GWP of 700), from appliance foam has only been occurring in the past four years. Recovering and destroying ODSs may be a cost-effective way to reduce high-GWP gas emissions, and also reduces negative impacts on stratospheric ozone.

It is also possible that special facilities will need to be constructed if automated foam removal is deemed more economically feasible than manual foam removal and would therefore need to be considered in any estimates of cost-effectiveness.

The impacted sectors and entities would mostly be appliance salvagers/recyclers and possibly individuals disposing of foam-containing appliances, as recovery costs are expected to be passed along to the user. California trade associations associated with recycling of scrap metals are unknown. Coordination with the US EPA with respect to this regulation is ongoing.

Comments Received From: DuPont Company.

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[6] USEPA, Draft Proposed Measures Arising from the IPCC/TEAP Special Report & its Supplement, by End-Use, Expert Workshop on IPCC/TEAP Special Report, July 2006.

8. Division: Research Division
Staff Lead: Whitney Leeman
Section Manager: Michael Robert
Branch Chief: Tony Andreoni

9. References

Arthur D. Little, Inc., Global Comparative Analysis of HFC and Alternative Technologies for Refrigeration, Air Conditioning, Foam, Solvent, Aerosol Propellant, and Fire Protection Applications, Final Report to the Alliance for Responsible Atmospheric Policy, March 21, 2002.

David Godwin (USEPA), Marian Martin Van Pelt and Katrin Peterson (ICF Consulting), Modeling Emissions of High Global Warming Potential Gases from Ozone Depleting Substance Substitutes, 2003.

IPCC/TEAP, IPCC Special Report on Safeguarding the Ozone Layer and the Global Climate System, Issues related to Hydrofluorocarbons and Perfluorocarbons, 2005.

SEPA, Guidance on the Recovery and Disposal of Controlled Substances Contained in Refrigerators and Freezers, 2002: http://www.sepa.org.uk/pdf/consultation/closed/2003/fridge/fridge_consultation.pdf

USEPA, Draft Proposed Measures Arising from the IPCC/TEAP Special Report & its Supplement, by End-Use, Expert Workshop on IPCC/TEAP Special Report, July 2006.

USEPA, RAD program website: http://www.epa.gov/ozone/snap/emissions/radp.html

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C20*
ID NUMBER:	*ARB 2-10*
TITLE:	*ALTERNATIVE SUPPRESSANTS IN FIRE PROTECTION SYSTEMS*
PROPONENT:	*STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2011.

Staff recommends developing a proposal for the use of lower GWP substances in fire protection systems to the extent that safe, technically feasible, and cost-effective alternatives are available. These systems, called total flooding systems, are typically used to protect large computer data management areas in commercial buildings, clean room manufacturing facilities, telecommunications equipment, museums and archives. If further evaluation supports the use of this measure as a early action, the proposal will be considered by the Board by December 2011.

One possible approach (for illustrative purposes only): By 2012, require that all new total flooding fire suppressant systems use fire suppressants with a GWP below a specified threshold. The analysis may also explore requiring, providing the options are technologically feasible and cost-effective, that existing total flooding fire suppressant systems enhance inspections of or replace systems using substances with a GWP above a specified threshold, which may or may not be different than the above-mentioned threshold.

3. Early Action Description

Use lower global warming potential (GWP) gases in new fire protection systems to the extent that safe, technically feasible, and cost-effective alternatives are available.

4. Potential Emission Reductions

Statewide Emission Inventory[1]

[1] All emissions estimates based on USEPA Vintaging Model scaled to California based on population assuming only HFC 227 since HFC 23 is only 1%, Halon emission data are not available at this time. Reduction estimates based on technical feasibility from EPA 2006 for new systems. Including reductions from replacement of systems with Halons or HFCs would increase the reduction potential.

2005 GHG Emission Inventory: 0.05 $MTCO_2$
2020 Projected GHG Emissions: 0.23 $MTCO_2$
Anticipated 2020 Reductions: <0.1 MMT CO_2E which assumes 43 percent control

Prior to the 1990s, most total flooding fire suppression systems used Halon 1301, however, it is an ozone depleting substance and, based on the Montreal Protocol on Substances that Deplete the Ozone Layer, its production in the US was completely phased out by the mid-1990s. Due to this fact, new systems have moved to Halon replacements, however, with the exception of the US Department of Defense, there has been no concerted effort to remove existing Halon 1301 systems and recycled Halon 1301 is inexpensive and widely available for recharge needs (Wickham 2002). The lifetime of a system ranges from 10 to 35 years.

There are several Halon alternatives being used in fire suppression systems. The US EPA estimates that HFC 227ea covers approximately 16 percent of the total new flooding fire protection systems with HFC 23 (<1%), inert gas (10%) and not-in-kind alternatives (NIK) such as powdered aerosols, water sprinklers and mist systems making up the remainder of the market (74%) (US EPA, 2006). Although these Halon alternatives are not ozone depletors, HFC 227ea and HFC 23 do have significant global warming potentials (GWP) of 2990 for HFC 227ea and 11700 for HFC 23 (IPCC, 1996). In comparison, Halon 1301 has a GWP of 7030, much higher than the common alternative of HFC 227ea (WMO, 2002).

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The US EPA estimates that the least cost alternative would be approximately $40/tonne CO_2E (US EPA, 2006) in the US for new systems. The estimate reflects the relative cost of alternative formulations, space costs, and costs associated with installing a new, and sometimes weightier, type of system. The costs may need to be updated and revised to reflect the situation in California. For example labor costs and heating and cooling costs differ from the average for the US. This analysis did not consider costs for replacement systems.

Total flooding systems are used by a wide variety of sectors with uses varying from data processing centers to the oil and gas industry to military weapons systems. Any requirements effecting new systems will be fairly evenly distributed among the sectors. Systems with low expected lifetimes (10-15 years) will be impacted most in the short-term as systems need to be replaced sooner. Any requirements to replace existing systems may have a larger impact on sectors with systems that have long expected lifetimes (35 years). These sectors were expecting the system to last up to 35 years but may have to upgrade the system much sooner.

6. Technical Feasibility

There are a number of low GWP alternatives to Halons and HFCs for use in total flooding fire suppression systems, however, they need to be analyzed for effectiveness, space constraints, safety concerns, and other issues. Not every alternative will work in every situation and technical feasibility will be vary based on space needs, human exposure potential for asphyxiates, and other constraints.

7. Additional Considerations

Some factors that need to be considered as part of the evaluation include whether the alternatives are as effective, do the alternatives have increased toxicity, are there any multi-media environmental impacts and whether the strategy would this apply to only new installations or would existing installations need to be retrofitted? Other questions that need to be considered include what happens to the HFCs and Halons from any systems that are phased out, and will other agencies and insurance companies allow their use? Another fundamental question concerns whether another agency would be more appropriate to adopt the strategy as well as determining if a voluntary measure be just as effective?

Affected Entities: Commercial building owners and property management companies, fire suppressant manufacturers (e.g., 3M, Great Lakes Chemical, Brownell, Dupont, Stat-X) and system manufacturers/suppliers (Sea fire, Nautical, Many suppliers – CA based include CalProtection, Chemetron, Diversified Protection, Facilities Protection Inc., Intelligent Technologies and Systems, and RFI Communications & Security).

Trade Associations: Building Industry Association, Chemical Manufacturers Association, Building Insurance, Fire Suppression Systems Association, Fire Equipment Manufacturers Association and others.

Government Agencies to coordinate with: California Department of Fire Protection, State Fire Marshall's Office, Department of General Services, OEHHA, DHS, Cal-OSHA, and others.

Comments Received From: DuPont Company, Silicon Valley Leadership Group.

Proposed Board Hearing Date: December 2011

8. Division: Research Division
Staff Lead: Elizabeth Scheehle
Section Manager: TBD
Branch Chief: Mike FitzGibbon

9. References:

Intergovernmental Panel on Climate Change (IPCC). 1996. Climate Change 1995: The Science of Climate Change. J.T. Houghton, L.G. Miera Filho, B.A. Callander, N. Harris, A. Katternberg, and K. Maskell (eds.). Cambridge, UK: Cambridge University Press.

USEPA, 2006. Global Mitigation of Non-CO_2 Greenhouse Gases, EPA Report 430-R-06-005. Available at: http://www.epa.gov/nonco2/econinv/downloads/GlobalMitigationFullReport.pdf

Wickham, Robert. 2002. Status of Industry Efforts to Replace Halon Fire Extinguishing Agents. Wickham and Associates. March 16. Available at: http://www.epa.gov/ozone/snap/fire/status.pdf.

World Meteorological Association (WMO). 2002. Scientific Assessment of Ozone Depletion: 2002. Global Ozone Research and Monitoring Project - Report No. 47, 498pp., Geneva, 2003.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C21*
ID NUMBER:	*SCAQMD-4*
TITLE:	*STRENGTHEN LIGHT-DUTY VEHCILE STANDARDS*
PROPONENT:	*SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is anticipated in 4th quarter of 2012.

In September 2004 the California Air Resources Board approved regulations to reduce greenhouse gas emissions from new motor vehicles. The regulations apply to new passenger vehicles and light duty trucks beginning with the 2009 model year. The standards adopted by the Board phase in during the 2009 through 2016 model years. When fully phased in, the near term (2009-2012) standards will result in about a 22 percent reduction as compared to the 2002 fleet, and the mid-term (2013-2016) standards will result in about a 30 percent reduction.

The proposed strategy is the second phase of the 2004 regulation. This timing of 2012 will allow staff the time necessary to complete inventory research, interagency coordination, economic analyses, staff reports, stakeholder workshops, and public hearings to support the necessary regulation(s).

3. Early Action Description

Adopt new standards to phase in beginning in the 2017 model year (following up on the existing mid-term standards that reach maximum stringency in 2016). The technologies that might be employed include highly efficient hybrid vehicles, use of lightweight materials to reduce vehicle mass, and reductions in air conditioning related emissions through the use of cool paints, low-GWP refrigerants, or other approaches.

4. Potential Emission Reductions

The currently adopted standards call for about a 30 percent reduction of GHGs by 2016. Assuming that the new standards call for about a 50 percent reduction, phased in beginning in 2017, this measure would achieve about a 4 MMT reduction in 2020. The reduction achieved by this measure would significantly increase in subsequent years as clean new vehicles replace older vehicles in the fleet—staff estimates a 2030 reduction of about 27 MMT.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Not yet determined.

6. Technical Feasibility

The technologies involved in this strategy are either being proved or showing promising technical feasible. For example, available technologies that could be widely used on light-duty vehicles by 2012 include:

- Variable valve timing & lift
- Cylinder de-activation
- Gasoline direct injection - stoichiometric
- Turbocharging or cylinder deactivation
- 6-speed automatic and automated manual transmission
- Electric power steering
- Improved alternator
- More efficient, low-leak air conditioning
- Improved aerodynamics
- E85 vehicles

Additional technologies that could be widely used by 2016

- Extensive use of E85 vehicles
- Homogenous Combustion Compression Ignition (HCCI)
- Integrated Starter Generators (ISG)
- Camless Valve Actuation (CVA)
- Diesels
- Hybrids

7. Additional Considerations

In the near term, staff will continue to evaluate emerging technologies that have the potential to provide additional greenhouse gas reductions. Some technologies discussed under this subject can be implemented via separated early actions. Please refer to this report for detailed discussion.

8. Division: Mobile Source Control Division
Staff Lead: TBD
Section Manager; TBD
Branch Chief: TBD

9. References:

Work Plan for Potential GHG Reduction Measure, Air Resources Board 2-1.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*C22*
ID NUMBER:	*EJAC-9/ARB 2-19*
TITLE:	*TRUCK STOP ELECTRIFICATION WITH INCENTIVES FOR TRUCKERS*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. The Board date for consideration of this item is waiting to be determinate.

Staff recommends that ARB considers an incentive-based strategy to expedite a comprehensive deployment of on-shore electric power infrastructure to eliminate idling emissions from heavy-duty trucks. This incentive program must consider the existing requirements of the idling regulations in order to design an approach that would yield surplus emissions through the use of financial incentives. The incentives could be structured to pay a portion of the plug-in usage fee either to the truckers or to the technology vendors. The advantage of this strategy would be the elimination (exclusive of power plant emissions) of greenhouse gas and criteria pollutant emissions resulting from truck idling activities. This approach would also provide an alternative for the trucking industry to not just comply with the idling requirements, but would allow them to go beyond those requirements to achieve zero emission through the use of financial incentives. The disadvantage of this strategy would be the high costs to obtain relatively small incremental benefits since existing regulations have already established very low emission thresholds for this source category.

3. Early Action Description

This strategy would require truck stops to install electrical power infrastructure (i.e., on-shore electrical power) to reduce heavy-duty trucks idling emissions, perhaps through the use of financial incentives. On-shore electric power involves the electrification of truck parking spaces to provide power for heating, cooling and on-board truck accessories. Affected entities of this strategy include owners and/or operators of heavy-duty trucks, truck stops owners and technology vendors.

Heavy-duty trucks idle their engines an estimated 6 hours per day, resulting in emissions of criteria pollutants and greenhouse gases. These emissions could be eliminated with the proposed electrification strategy as a result of eliminating the combustion of diesel fuel from either the truck engine or the auxiliary power unit (APU) engine. The ARB has already adopted regulations limiting the idling time of heavy-duty trucks unless the truck

is installed with appropriate low-emission technology. Starting in 2008, all trucks must comply with a 5-minute idling limit unless it has a certified APU coupled with a PM trap. Engine manufacturers also have the option of certifying model year 2008 and newer main truck engines to a low idling NOx emission level of 30 grams per hour (ARB, 2005). Since the existing regulations have already set limits and requirements on truck idling activities, this proposed strategy would provide additional emission reductions beyond those regulations by eliminating the emissions resulting from operation of the APU, or from low-idling emission engines.

Currently, there are already two on-shore power technologies that have been commercially established and have been used to eliminate truck idling emissions. The two technologies are commonly referred to as on-board power infrastructure and off-board infrastructure technologies.

On-board power infrastructure provides trucks with 110-volt AC electrical power at truck stops to run the air conditioning, heating and on-board accessories. This would require truck stops to be equipped with electrical outlets throughout the parking spaces and trucks need to be equipped or retrofitted with inverter/chargers, electrical power connections and electrically driven heating and air conditioning units. The drawbacks of this approach include the high initial infrastructure cost, cost for equipment add-ons to trucks, and its availability, which is limited to where the infrastructure is installed. The aftermarket cost for add-ons and installation is about $4,000 per truck and power infrastructure installation is about $3,500 to $6,000 per truck parking space depending on the number of power pedestals installed (Perrot, et al, 2004).

Off-board power infrastructure provides 110-volt AC electrical power through an externally installed heating and air conditioning unit, as well as hook-ups for basic telephone, internet and television services at each truck parking space. The unit is connected to the truck through a console installed to the truck window using a template insert. The console contains all the necessary connections and controls, including a card reader for the billing system. Currently the usage fee for basic services range from $1.25 to $1.50 per hour. The off-board power infrastructure installation cost is approximately $12,000 to $20,000 per parking space depending on the number of parking spaces installed (Antares, 2005). The advantage of this system is that the truck does not need to be modified with any alternative cab comfort technology, resulting in immediate benefits to the truck owner using the service through reduced fuel consumption and maintenance savings.

This strategy could be crafted as a regulation requiring all truck stops to install electric infrastructure that could be used by truckers to eliminate truck engine idling. To be effective, that regulation would also need to require the truckers to use the electric infrastructure for their idling needs instead of idling the truck engine or using the APU. However, since ARB already has existing idling regulations, one of which has already been implemented and the other will become effective in January 2008, it will be challenging to develop another regulation on top of the existing idling regulation. A less contentious approach would be through an incentive-based program to spur the installation of the appropriate electric infrastructure that would allow truckers the option to "plug in" when they park at these truck stops.

ARB has already had direct experience in implementing an incentive-based on-shore power infrastructure program. ARB executed a grant with IdleAire, a company that

developed an off-board power infrastructure technology, to assist in the installation and operation of off-board power infrastructure at various truck stops located in the San Joaquin Valley. The grant, totaling $1,334,536, was used to pay for usage ($1.50 per hour) of the IdleAire device at the 415 parking spaces at six truck stops that are spread throughout the San Joaquin Valley. The South Coast Air Quality Management District (SCAQMD) has also funded IdleAire projects in the South Coast with funding from the Carl Moyer Program and the U.S. EPA. In addition to paying for usage, at a rate of $3.94 per hour, the SCAQMD program also pays for a portion of the installation cost ($8,726 per unit) of the IdleAire power unit.

4. Potential Emission Reductions

The existing truck idling regulation limits idling time from heavy-duty trucks to 5 minutes unless the truck is equipped with an APU coupled with a particulate trap or, alternately, unless the truck is a 2008 and later model year that is certified to the low idling NOx emission standard of 30 grams per hour. Because of this requirement, the NOx idling emission rate of 30 grams per hour was used as the baseline emission level. Since existing idling regulations do not specify optional idling emission rates for pollutants other than NOx emissions, the truck baseline idling emission levels for other pollutants such as HC, PM, and CO2 were established using EMFAC2002 idling emission rates. The surplus emission reductions are calculated as going from these baseline levels to a zero emission level for each truck stop parking space that is electrified.

Based on data from Report to Congress of Adequacy of Parking Facilities, there is currently about 7,500 spaces at truck stops and 1,300 spaces in Caltrans public rest areas. Currently, about 900 parking spaces at truck stops are installed with electric power infrastructure, resulting in an estimated 2010 annual reduction of about 55,000 tons of CO2 per year (0.055 MMTCO2E). If the remaining truck stop parking spaces are electrified, an additional annual reduction of about 405,000 tons of CO2 (0.4 MMTCO2E) would result. Depending on the expected growth of available parking spaces at truck stops, the 2020 emission benefits could be adjusted accordingly. The expected CO2 emission reduction from this strategy, if fully implemented, could be on the order of >0.1 to 1.0 MMTCO2E. Emission reductions of criteria pollutants (HC, NOx, and PM) are estimated to be about 530, 1,300, and 120 tons per year, respectively, in 2010.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Given the cost of the existing on-shore electric power infrastructure technology and the expected baseline emission rates, it is estimated that the cost to reduce CO2 emissions to range from a low of about $135 per metric ton to a high of about $359 per metric ton. There are about 6,600 parking spaces at truck stops and about 1,300 parking spaces in Caltrans public rest areas that are currently do not have electric power infrastructure, for a total of about 7,900 truck non-electrified parking spaces. Assuming the cost of on-shore power infrastructure to range from $7,500 to $20,000, including the cost of on-truck equipment in the case of the on-board power infrastructure technology, the total cost to electrify all 6,600 parking spaces at truck stops would be about $49,500,000 to $132,000,000. If the 1,300 parking spaces at Caltrans public rest areas are also to be installed with on-shore electric power infrastructure, it would cost an additional $9,750,000 to $26,000,000.

A requirement for an on-shore electric power infrastructure would impact truck stop owners, truck drivers, and technology vendors. The economic burden on truck stop owners would depend on how they structured their approach towards establishing the required infrastructure. They could purchase the equipment and have it installed at their facilities, or they could opt to lease the parking spaces to technology vendors for them to install the equipment. The cost to truckers could range from the cost to install the necessary equipment on their trucks in the case of an on-board technology to simply just paying for the hourly cost of plugging in when they use the facility. The cost to technology vendors would be the cost to manufacture, install, and operate the power infrastructure.

6. Technical Feasibility

On-shore electric power infrastructure is an established, proven commercial technology. This technology is currently being deployed at various truck stops throughout the country. In California, approximately 900 truck stop parking spaces already have on-shore electric power infrastructure. The main obstacle to more widespread deployment of this technology appears to be the relatively high initial cost of installing the necessary infrastructure.

7. Additional Considerations

Additional analysis is needed before deciding on an implementation path. It is possible that other jurisdictions have taken this action as an incentive program. Also, this strategy clearly falls under ARB jurisdiction and authority as idling limits have been adopted. Although an incentive program appears to be the best option, a regulation could be developed in the next 18 months, making the strategy a discrete early action.

Affected Entities: Truck stop owners, truck drivers, technology vendors

Trade Associations: Truck Manufacturers Association, The Owner-Operator Independent Drivers Association, Trucking associations, utilities companies

Government Agencies to coordinate with: Local air districts, local governments regarding permitting requirements

Comments Received From: Harmon Trucking, Shurepower, LLC., The Owner-Operator Independent Drivers Association.

Additional comments were received by the general public.

8. Division: Mobile Source Control Division
Staff Lead: Bob Nguyen
Section Manager: John Kato
Branch Chief: Jack Kitowski

9. References:

ARB, Notice of Public Hearing to Consider Requirements to Reduce Idling Emissions from New and In-Use Trucks, Beginning in 2008, Sacramento, September 1, 2005

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C23*
ID NUMBER: *EA 3-3*
TITLE: *VESSEL SPEED REDUCTION*
PROPONENT: *AIR RESOURCES BOARD*

2. Staff Recommendation

This measure was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this measure is recommended. At this time, staff is evaluating whether this is most appropriately managed as a regulatory item or a voluntary measure.

The staff recommends retaining the vessel speed reduction (VSR) measure as an early action for the following reasons:

- the need to gather additional information on the scope, emissions impact, cost, and environmental impacts of the measure; and
- the need for stakeholder input on whether a voluntary or regulatory approach should be taken.

Based on preliminary emissions estimates, the overall weight of evidence suggests that this measure would fall under the medium category for regulatory action (see subsection 4 for emission benefits).

3. Action Description

As part of our efforts under the Diesel Risk Reduction Plan, Goods Movement Emissions Reduction Plan, and Assembly Bill 32 - Greenhouse Gas Initiative, the Air Resources Board (ARB) staff is evaluating the need to develop an ocean-going VSR program. Ocean-going VSR is primarily a measure designed to reduce oxides of nitrogen (NOx) emissions, but also provides reductions in diesel PM emissions, oxides of sulfur (SOx) emissions, and carbon dioxide (CO_2) emissions.

Over the past six years, a VSR program has been in place at the Port of Los Angeles and Port of Long Beach (POLA/POLB). The program requests that vessels reduce their speed to 12 knots beginning 20 nautical miles (nm) off shore from the POLA/POLB. Currently, the POLB maintains a Green Flag Program which is an incentive program that offers reduced dockage fees for those vessels in compliance with VSR. The compliance rate for the POLB Green Flag Program is about 80 percent.

ARB staff has begun a technical assessment of the impacts associated with VSR for ocean-going vessels. As part of the technical assessment, staff will be evaluating

emission reduction benefits of a VSR measure in and out of California ports and along the California coast within 24 nm, 40 nm, and 100 nm.

The staff assessment is in its very early stages. ARB staff held its first VSR workshop on July 12, 2007. At this workshop, ARB staff presented an overview of their activities related to the VSR assessment and shared some key elements needing industry's assistance. To conduct a full evaluation, ARB staff is in need of additional data to refine our emissions inventory, such as emission factors, speed data from ports other than POLA/POLB, as well as, an understanding of the operating cost impacts to the industry. ARB staff expects to release a draft technical assessment report with the results of their evaluation by the end of 2007. The evaluation in this report will be key to determining the need and best approach to implement a regulatory or a voluntary VSR measure.

4. Potential Emission Reductions

VSR is primarily a measure designed to reduce NOx emissions, but also provides reductions in diesel PM emissions, SOx emissions, and CO_2 emissions. ARB staff has estimated the potential emissions reductions as a result of implementing a statewide VSR program within 24 nm and 100 nm of the California coastline. This preliminary assessment is based on the emissions benefits estimated using emissions factors from the use of low sulfur (0.1%) marine distillate in marine main and auxiliary engines and 2006 port call data from the California State Lands Commission. Our preliminary assessment suggests that the implementation of VSR reduces pollutants such as NOx, diesel PM, and SOx by an average of 30 percent within 24 nm of the California coast. In addition to these criteria pollutant emission reduction benefits, if a VSR program is implemented at 24 nm, the potential CO_2 emission reductions in 2010 are estimated to be 0.62 million metric tons of CO_2 ($MMTCO_2$) and increasing to 0.97 $MMTCO_2$ by 2020. If a VSR measure was implemented at a distance of 100 nm, then the additional CO_2 emission reductions in 2010 are estimated to be approximately 0.5 $MMTCO_2$ and in 2020 approximately 0.83 $MMTCO_2$. These estimates exclude the emissions benefits already achieved by the POLA/POLB at a compliance rate of about 80 percent.

A VSR program at other ports, such as San Diego and Hueneme, may also provide emissions benefits, and to a lesser extent, San Francisco Bay Area ports. It is questionable whether a coastline VSR measure will achieve significant emission benefits.

The CO_2 emission reduction potential rating for a VSR measure within 24 nm of the California coast is estimated to be in the medium (>0.1 to 1.0 $MMTCO_2$) category.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The estimated costs and economic impacts of a regulatory or voluntary VSR measure have not been evaluated. A cost impact analysis for either a regulatory or voluntary VSR measure would need to include an estimate of the increase in the cost of operation to shipping companies due to reducing speeds in and out of California ports and along the coastline, increase cost of fuel used in auxiliary engines due to increased time traveling to port versus the fuel savings due to decreased ship engine power requirements, costs borne by the industries/terminals affected by a VSR measure, costs to ports in developing infrastructure improvements (i.e., radar equipment), and costs needed for enforcing any speed reduction measure. In addition to the POLA/POLB, staff is currently evaluating other major ports such as those in the Bay Area, San Diego, and

Hueneme. Staff is also looking at the impact to the industry if VSR was implemented while transiting along the California coastline within 24 nm and 100 nm.

Voluntary measures, such as seen in the POLB Green Flag Incentive Program, may require port and terminal-specific costs. Some of the incentives of this program include reduced dock fees for those complying with the VSR program and tariff reduction incentives. The San Pedro Bay Clean Air Action Plan adopted in 2006 for the POLA/POLB, have estimated the costs of controls for the voluntary VSR measure to be approximately 4.4 million dollars for 2010. The POLA/POLB has already committed to fund a maximum of 11.3 million dollars through 2010/2011 for each port to implement the port's Clean Air Action Plan.

6. Technical Feasibility

A voluntary VSR program has been in place at the POLA/POLB over the past six years. The POLA/POLB accounts for over half of the port calls statewide. This VSR program requested ships to voluntarily reduce their speed to 12 knots at a distance of 20 nm from the California coast. Currently, the POLB maintains the Green Flag Incentive Program which offers reduced dockage fees and environmental awards for vessels that voluntarily reduce their speeds in and out of the POLB. This program has been very successful as shown by its current 80 percent compliance rate. A VSR program is clearly technologically feasible. However, reducing speeds for an extended period of time transiting along the coast has not been evaluated. There is some information that maintaining a slower speed for extended distances may cause adverse mechanical effects on a vessel's main engine. This analysis will need further evaluation.

7. Additional Considerations

- With the exception of the voluntary programs at the POLA/POLB, no federal or other state VSR regulations are currently in place.
- VSR activity falls under ARB jurisdiction and legal authority. ARB's authority to regulate emissions beyond 3 nm is being challenged in court. Significant legal challenges are likely if the ARB elects to implement a VSR regulation beyond 24 nm.
- At this time, we are evaluating the feasibility of both regulatory and voluntary measures. Both approaches will consider speed reductions from direct travel in and out of major ports and evaluate the inclusion of transiting up and down the California coast. Voluntary approaches can include agreements or incentive programs between port and terminal operators, vessel owners and operators, and government agencies. Regulatory measures would take the form of an airborne toxic control measure.

8. Division: Stationary Source Division
Staff Lead: Hafizur Chowdhury
Section Manager: Robert Krieger
Branch Chief: Dan Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Action Strategy Name and Proponent

SUMMARY #	*C24*
ID NUMBER:	*EJAC-7/ARB 2-17*
TITLE:	*TRANSPORT REFRIGERATION UNITS, ELECTRIC STANDBY*
PROPONENT:	*2006 CAT REPORT AND ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This strategy was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this strategy is recommended. Costs for this strategy are high and new information indicates costs may be 30 to 50 percent higher than originally estimated. An extensive amount of coordination with industry remains to be completed before any regulatory action can proceed. This is due to a variety of factors, including the lack of industry standards for electric power use on transport refrigeration units (TRUs). For example, more than four optional voltages are used, along with both single phase and 3-phase frequencies, and many electric power plug configurations are in use (see Part 7 for more information). Therefore, a Board hearing date is not indicated.

3. Description

Transport refrigeration units are refrigeration systems powered by integral internal combustion engines designed to control the environment of temperature sensitive products that are transported in trucks, trailers, shipping containers, and railcars. In 2004, the TRU Airborne Toxic Control Measure (ATCM) was adopted to reduce diesel particulate matter (PM) emissions from TRU engines. ARB staff is currently implementing this ATCM. As conceived, this strategy would go beyond current ATCM requirements with a regulatory action to require that no TRU-equipped trucks, trailers, shipping containers, or railcars that are used at a large distribution center for outbound loads would be allowed to be powered by internal combustion engines for more than 30 minutes in a 24-hour period.

An optional component of this strategy would prohibit the use of internal-combustion engine-powered TRUs on trucks, trailers, shipping containers, and railcars from being used for extended cold storage at California distribution centers, grocery stores, and elsewhere. This practice occurs during the 4-to-6 week period before all of the major holidays because distribution center cold storage warehouse capacity is exceeded at about 30 percent of the distribution facilities and at an unknown number of grocery stores.

4. Potential Emission Reductions

For this strategy, staff estimates a reduction of 3.4 to 4.3 million gallons of diesel fuel used per year (with 51 to 64 GWh of new electricity use); the optional component (extended cold storage prohibition) would result in an additional reduction of 1.7 million gallons of diesel fuel used per year (with 26 GWh new electricity use). This strategy would also provide emission reduction co-benefits due to reduced diesel engine operating times; therefore, emissions of ozone precursors and diesel PM particulates would also be reduced. However, ARB staff estimates only about 0.04 million metric tons per year of CO_2 reductions could be achieved (0.45 million metric tons total by 2020).

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Capital costs are estimated to be $105 million for the first year and $3.1 to $3.6 million per year thereafter. The optional component would require an additional one-time capital cost of $44 million. New information indicates capital costs may be 30 to 50 percent higher than these early estimates. Without including these potential increases, inflation or discount factors, ARB staff estimates rough annual costs at $16.7 million per year (total accrued costs, with savings, would be approximately $167 million in 2020). Staff is still working on refining cost and is not able to provide a cost-effectiveness estimate at this time.

6. Technical Feasibility

Compliance is a critical issue which will most likely require the use of various technologies in order to ensure that adequate enforcement of the regulation occurs. Technologies exist that could be applied toward automated compliance assurance and reporting systems, but it may take several years to develop and test the reliability of such systems such that they could be used for this application. Additional regulatory action may also be necessary to ensure these compliance assurance systems provide an enforceable reporting mechanism.

7. Additional Considerations

Industry standards need to be developed and adopted to address compatibility issues, plug types, and configurations. Although electric standby (E/S) technology is available for some TRU models, less than one percent of trailer TRUs are currently equipped with E/S and retrofitting with E/S is extremely expensive and has never been attempted. Extensive design and development work is needed before E/S use could be required. Most existing TRU models will need to be redesigned to use smaller, more efficient refrigeration compressors or to use larger, more powerful electric motors to provide enough capacity for quick initial trailer cool-down prior to loading perishable goods. Current E/S designs use under-powered electric motors that are intended only to maintain a temperature set point after the diesel engine completes the initial chill down. Additionally, further investigation on the feasibility of prohibiting the use of diesel-powered TRUs for extended cold storage is needed as it may require a significant change in business practices and have unforeseen economic impacts.

8. **Division:** Stationary Source Division
   Staff Lead: Rod Hill
   Section Manager: Richard Boyd
   Branch Chief: Dan Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *C25*
ID NUMBER: *ARB 2-2*
TITLE: *STATIONARY AGRICULTURAL ENGINE ELECTRIFICATION*
PROPONENT: *AIR RESOURCES BOARD STAFF*

2. Staff Recommendation

This strategy was approved by the Board as an early action at its June 2007 hearing. Based on further evaluation by staff, no change in the classification of this strategy is recommended.

However, given that electrification of stationary agricultural diesel engines must be considered on a case-by-case basis due to operational and cost issues, a control measure to require the electrification of these engines is impractical and cost-prohibitive for many growers (see Parts 5 and 7 for additional information). Accordingly, the approach currently being implemented is an outreach effort and therefore a Board hearing is not anticipated.

3. Early Action Description

As part of the outreach being conducted for the amendments to the airborne toxic control measure (ATCM) for Stationary Compression-Ignition Engines, ARB staff is working with the local air districts to encourage replacement of diesel engines with electric motors and to take advantage of incentive funding opportunities. Outreach materials and workshops will provide information regarding ATCM compliance options, including electrification. ARB staff is encouraging growers to consider switching to electric motors, especially in those cases where irrigation pumps are located in close proximity to residential areas, schools, and hospitals.

4. Potential Emission Reductions

This effort is expected to have a low emission reduction potential. Based on discussions with the agricultural community and electric utilities, up to 20 percent of existing stationary diesel agricultural irrigation pump engines are expected to be replaced with electric motors by 2020. This would result in a 2020 reduction of approximately 0.1 million metric tons of carbon dioxide. Given the compliance schedule in the ATCM and uncertainty regarding some incentive programs, staff is unable to estimate reductions for 2010 at this time.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

ARB staff estimates the cost to electrify stationary agricultural engines at about $26 million (8,600 pump engines x 20 percent x $15,000 (average capital cost of an electric motor)). This estimate does not account for possible additional line extension and/or electrical hook-up charges (highly variable for agricultural electric customers depending on location, crop, well-depth, and other variables), which are likely to be cost prohibitive for many growers in remote areas. The estimate also does not account for any potential incentive funds that may be available to switch from diesel- to electric-powered agricultural irrigation pumps as these funds are limited and available on a first-come, first-served basis.

6. Technical Feasibility

Outreach efforts will encourage the use of electric motors, which are established and proven in agricultural operations. Approximately 82 percent of all stationary agricultural irrigation pumps in California are currently powered by electric motors, 15 percent are diesel-powered, and three percent are powered by other means (e.g., natural gas, liquefied petroleum gas, propane, butane, or gasoline).

7. Additional Considerations

The Board approved the amendments to the ATCM for Stationary Compression-Ignition Engines at the November 2006 public hearing. The amendments contain emission performance standards for agricultural engines but do not mandate electrification or any other specific compliance option. As explained in the September 2006 staff report for the ATCM, the Board had previously directed ARB staff to investigate the opportunities and challenges associated with replacing California's existing population of stationary diesel agricultural engines with electric motors. During the investigation, ARB staff identified many variables associated with farm and ranch electrical power use in California. These variables include irrigation method and schedule, availability of surface water, well pumping depth, quantity of water needed, fuel costs, electricity costs, and electrical infrastructure proximity and adequacy. Because of these variables, ARB staff concluded that any decision about the desirability or difficulty of converting stationary diesel agricultural engines to electric motors must be made on a site-by-site basis. Nonetheless, ARB staff believes that most engines will be replaced with new cleaner certified diesel engines or with electric motors. Retrofit and alternative fuels are other potential means of compliance. Staff is unable to predict which compliance option farmers will choose.

8. Division: Stationary Source Division
Staff Lead: Jon Manji
Section Manager: Richard Boyd
Branch Chief: Dan Donohoue

APPENDIX D – Staff Evaluations of Non-Classified GHG Reduction Strategies

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1. Early Actions Strategy Name and Proponent

SUMMARY # *D01*
ID NUMBER: *N/A*
TITLE: *CAPCOA RECOMMENDATIONS*
PROPONENT: *CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION (CAPCOA)*

2. Staff Recommendation

Work with CAPCOA to pursue its recommendations. The proposed CAPCOA working group can provide input into the development of the scoping plan for AB 32. Other recommendations could help in quantifying greenhouse gases reductions.

3. Action Description

CAPCOA makes five recommendations. These recommendations can support identification and quantification of greenhouse gas reductions as we proceed on AB 32 implementation.

PRIORITIZE SIP RULEMAKING

CAPCOA recommends that ARB's SIP rulemaking be ranked taking into consideration greenhouse gas emissions. The requirements of the federal Clean Air Act dictate that we proceed expeditiously with the measures needed to meet ozone and PM2.5 standards. The most critical near-term SIP rulemakings are already underway and all must be considered top priorities in order to meet federal deadlines. However, as we develop new longer-term SIP measures we will look for opportunities to reduce both criteria pollutants and greenhouse gases.

REVIEW EXISTING RULES

CAPCOA recommends a workgroup process that taps district resources and expertise to identify potential greenhouse gas reductions that could be achieved consistently statewide through local rulemaking. This would be similar to the "suggested control measure" approach that has been used for criteria pollutants. We propose to work with CAPCOA to initiate this process to support development of the AB 32 scoping plan.

MINIMIZE GHG IMPACTS OF NEW STATIONARY SOURCES

CAPCOA recommends that ARB work with local air districts to minimize impacts of new stationary sources. It suggests a coordinated approach to reviewing significant stationary sources in categories that also emit significant amounts of greenhouse gases.

The local permitting process and the environmental review (CEQA) process are suggested as possible mechanisms for achieving GHG emissions mitigation.

Staff suggests a joint effort to identify stationary source technologies for new sources that would reduce both criteria pollutant and greenhouse gases. This could include promoting development of new technologies that achieve multiple benefits.

LEVERAGE CEQA MITIGATIONS AND CAPTURE VOLUNTARY REDUCTIONS

CAPCOA recommends that ARB work with local air districts on approaches to the review of greenhouse gas impacts under the California Environmental Quality Act (CEQA) process, including GHG significance thresholds for projects, and to develop a process for the capturing of reductions that result from CEQA mitigations.

The Governor's Office of Planning and Research is charged with providing statewide guidance on CEQA implementation. With respect to quantifying any reductions that result from project level mitigation of greenhouse gas emissions, we would like to see air districts take a lead role in tracking such reductions in their regions.

4. Potential Emission Reductions

To be estimated during scoping plan development or rulemaking process.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

To be assessed during scoping plan development or rulemaking process.

6. Technical Feasibility

To be assessed during scoping plan development or rulemaking process.

7. Division: Planning and Technical Support Division
Staff Lead: Jeff Weir
Section Manager: Ravi Ramalingam
Branch Chief: Kurt Karperos

8. References:

Air Resources Board's Proposed State Strategy for California's 2007 State Implementation Plan, April 26, 2007.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *D02*
ID NUMBER: *EA B-1, B-2*
TITLE: *WAFFLEMAT SYSTEMS*
PROPONENT: *STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009.

3. Early Action Description

The WAFFLEMAT System (registered trademark) is a set of interconnected WAFFLEBOXES equally spaced within the area of a new foundation. Concrete is then poured over the WAFFLEBOXES to create a concrete slab, thereby decreasing the volume of concrete used on new foundations and indirectly reducing the amount of CO_2 emitted from the production and transportation of Portland cement. The WAFFLEMAT System is advertised by the manufacturer to reduce CO_2 emissions by 20% when used for new residential home concrete slab foundations built on "marginal" soils (e.g., expansive soil, rocky soil, and/or hydro-collapsible soil), where an increase in slab thickness is required. The 20% CO_2 emission reduction was calculated by comparing the WAFFLEMAT System to a 10 inch uniform thickness slab. The actual percentages of CO_2 emission reductions will vary depending on the type and thickness of the slab which the WAFFLEMATs are compared against.

4. Potential Emission Reductions

Based on information from the manufacturer, ARB staff estimated that utilization of the WAFFLEMAT System on new residential home construction may reduce 3.5 metric tons (MT) of CO_2 emissions per slab for a 2,000 square foot home. If one assumes that 200,000 new residential homes are built each year in California, 25% of those homes are located on marginal soils and all 25% of those homes utilize the WAFFLEMAT System, there may be an annual CO_2 emission reduction of 0.18 million MT. Using 2008 as the baseline year, by 2010 there will be a cumulative 0.35 million MT CO_2 emission reduction and by 2020 there will be a 2.1 million MT CO_2 emission reduction. The primary purpose of the WAFFLEMAT System is to displace the total amount of concrete needed in a residential foundation and still meet or exceed construction requirements. In theory, if less concrete is needed, less needs to be produced. Emission reductions of oxides of nitrogen (NO_x), particulate matter (PM), hydrocarbons, and carbon monoxide

(CO) will also be achieved with the use of the WAFFLEMAT System if it is assumed that overall less concrete will have to be used.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The WAFFLEMAT System is estimated to cost $1.20 per square foot of foundation. When compared to the cost of concrete for a 10 inch uniform thickness slab foundation on a 2,000 square foot footprint, the WAFFLEMAT System and its reduced volume of concrete may increase the price of a foundation by $1,200. This equates to an approximate cost effectiveness of $340 per MTCO2E. Additionally, the WAFFLEMAT System is advertised to provide cost savings in labor and ground preparation. ARB staff does not have information to quantify labor and ground preparation cost savings at this time.

The use of the WAFFLEMAT System is limited to use with marginal soils that generally require thicker slab foundations. Use of the WAFFLEMAT System with good soils may result in an increased use of concrete.

6. Technical Feasibility

The WAFFLEMAT System was developed in 1995 and has had over 6.5 million square feet of concrete poured on it without one structural callback or failure. Pacific Housing Systems, Inc. (the distributor) and two engineering firms conducted studies to determine the design compliance and capability of the WAFFLEMAT System. Their results showed that the WAFFLEMAT System is technically feasible and has advantages over the traditional slab foundation in areas with marginal soils. Those advantages include, but are not limited to: the slab's ability to withstand larger cantilevers, reductions in labor costs, provides a more definite value for concrete costs, and reductions in overall installation time.

7. Additional Considerations

- The use of the WAFFLEMAT System does not ensure reduction in the production of cement. CO_2 emission reductions are achieved with the use of the WAFFLEMAT System if cement plant operators reduce the production of Portland cement.
- Currently, not every new single-family residence home is built on marginal soils. We are not certain what percentage of new homes is built on marginal soils versus good soils. This could impact the CO_2 emission reduction estimates.
- Geotechnical engineers should be employed to recommend which foundation is suited for a site's soil type.
- ARB will need to work with other state and local agencies to ensure that the use of the WAFFLEMAT System meets building codes.
- ARB staff needs to work closely with legal to determine scope of authority for requiring the use of WAFFLEMAT Systems on new construction.

8. Division: Stationary Source Division
Staff Lead: Alicia Violet
Section Manager: Todd Wong
Branch Chief: Michael Tollstrup

9. References:

Altshuler, Sam. "Lowering the Carbon Footprint When Using the Wafflemat System for Concrete Slab Foundations." Suncoast Post-tension - Pacific Housing System, Inc.. February 2007.

Charlton, Aurora. "Structural Engineering Case Study Report: Wafflemat Slab On Grade Post Tensioned Foundation System." Front Range Engineering, LLC. August 2006.

Cook, John. "Wafflemat System Design Considerations." Pacific Housing Systems, Inc. and MKM and Associates. April 2006.

Richards, Tom. "A Sales/Marketing Comparison and Positioning Statement of the WAFFLEMAT System to Post-Tensioned Slabs." Pacific Housing Systems, Inc.. March 2006.

Richards, Tom. Telephone Interview and email. July 16 and 24, 2007.

State of California – Business, Transportation, and Housing Agency; Department of Housing and Community Development. "California's Deepening Housing Crisis." June 2007.

Treanor, Rich.. "Wafflemat Frequently Asked Questions." Pacific Housing Systems, Inc.. March 2006.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *D03*
ID NUMBER: *EJAC-15/ARB A-15*
TITLE: *GREEN SHIP INCENTIVE PROGRAM*
PROPONENT: *ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

This measure is focused on reducing emissions of diesel particulate matter (PM) and nitrogen oxides (NOx) by phasing in the installation of emission control devices on new or existing vessels. While reductions in NOx and the elemental carbon portion of PM may reduce global warming, other aspects of this measure may contribute to it. For example, some of the emission control devices that can be used to significantly reduce PM and NOx will have fuel penalties associated with them, resulting in higher carbon dioxide (CO_2) emissions. Other control strategies may reduce fuel consumption and CO_2 emissions. However, the overall effect of this measure on GHG emissions is expected to be minimal.

We do intend to analyze the potential to modify this measure to also address GHG emissions. However, for several reasons, this analysis cannot be conducted in a short timeframe due to the complexity of the technical and jurisdictional issues. For example, more advanced ship hull and propeller designs have been proposed as a way to reduce fuel consumption and CO_2 emissions in some studies. However, it is uncertain whether we can influence design changes on vessels built outside the United States. In addition, it is expected that ship operators would already incorporate such changes to reduce their operating expenses unless there are extremely high capital cost impacts or other barriers. Furthermore, to fully address GHG emissions, a review of all the various emissions from ships and their impact on global warming would need to be conducted. The relevant emissions would include CO_2, methane, black carbon PM, sulfur oxides, refrigerants, and NOx. Some of these emissions contribute to global warming, while others have the opposite effect. In addition, some emissions effects may be localized whereas others are not. Finally, the potential control strategies for each type of emissions would need to be determined.

3. Early Action Description

This measure is included in the ARB's Emission Reduction Plan for Ports and Goods Movement. The measure, as currently proposed, seeks to reduce emissions of PM and

NOx by phasing in the use of cleaner ships at California ports. There are two levels of clean ships: "30/30 vessels" that are 30 percent lower in NOx and PM than current vessels meeting International Maritime Organization (IMO) standards, and "60/90 ships" that are 60 percent lower in PM and 90 percent lower in NOx than IMO compliant vessels. By 2020, the goal is to have clean ships make 90 percent of all California port visits, with 30/30 vessels making 40 percent of ship visits, and 60/90 vessels making 50 percent of ship visits. The ship operator would be expected to choose the specific emission control devices. Examples of potential emission controls include selective catalytic reduction, more advanced fuel injectors, fuel/water emulsions, onboard water scrubbers, and cylinder lubricant control systems. This measure seeks to encourage or direct ship operators to either retrofit existing vessels or incorporate emission control devices into new build vessels. The measure could be and incentive program, a voluntary agreement, a regulation, or use some other mechanism.

Although this measure is currently designed to focus on PM and NOx emissions, it could be modified to also control GHG emissions. As a first step, the impact of the existing NOx and PM controls on GHG emissions should be evaluated. Next, additional opportunities to address GHG emissions would need to be investigated. Existing studies suggest a number of potential control measures that would reduce fuel consumption and therefore CO_2 emissions (as well as other pollutants). These measures include the incorporation of optimized hull and propeller designs in new ship builds, operational changes focused on fuel efficiency, new methods of hull maintenance to reduce fouling, and the use of wind, solar power, and fuel cells.

4. Potential Emission Reductions

As mentioned above, this measure is not currently designed to reduce GHG emissions, and the potential impact on GHG emissions has not been quantified. Staff believes that the impact will range from a slight increase to a slight reduction in GHG emissions.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

TBD

6. Technical Feasibility

Improved engine design in new marine engine can improve combustion characteristics and reduce CO_2 emissions. However the impact of control measures to reduce PM, NOx, and SOx may increase CO_2 emissions.

7. Additional Considerations

See discussion under **"Staff Recommendation."**

8. Division: Stationary Source Division
Staff Lead: Paul Milkey
Section Manager: Peggy Taricco
Branch Chief: Daniel Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D04*
ID NUMBER:	*EJAC-16/ARB A-19*
TITLE:	*ANTI-IDLING REQUIREMENT FOR CARGO HANDLING EQUIPMENT AT PORTS*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

Staff believes significant informational gaps or constraints exist due to the dynamics of mobile cargo handling equipment operations, union labor contracts, and safety and security concerns, which prevent the implementation of an anti-idling requirement within the timeframe required for early action measures. The very nature of these operations makes it extremely difficult to determine what constitutes unnecessary idling. To illustrate, cargo handling equipment is often required to move rapidly from one location to another; and some equipment, such as rubber-tired gantry (RTG) cranes, have operator cabs approximately 50 feet above the ground, making it unsafe for the operator to exit the cab (i.e., idling limitations prevent air conditioner operation). It is inherently problematic and may complicate the development of idling restrictions at port terminals because they are generally larger than 200 acres and at any given time may have hundreds of pieces of equipment operating. All of these issues need further evaluation and many concerns need to be addressed.

In order to pursue this strategy, it would be necessary to collect complete equipment and facility specific operational data by facility type and/or operation. This data must be analyzed to identify similarities/dissimilarities in idling (equipment specific) at each facility and determine whether certain idling durations can be minimized and still not inhibit the functionality or efficiency of their operation. The next step would be to take this information and determine the extent to which cargo handling equipment engines idle, and what fraction of this total could be considered as unnecessary idling. Data logging would be the recommended method of collecting the various operational data needs. However, the variability in facility operations and the fact that the data must be equipment specific, taking into account the duty cycle of the engine, makes this a significant challenge, albeit achievable. While many data gaps prevent us from determining what is considered unnecessary idling at existing port or intermodal rail yard operations at this time, upcoming emission control retrofit demonstration programs for port equipment (such as top picks, side picks, RTG cranes, and reach stackers) include data logging components that will provide some data to help us evaluate this issue.

These efforts will be undertaken over the next two years and will help inform the decision on the appropriateness of pursuing an anti-idling measure.

3. Action Description

This early action strategy proposes to adopt a statewide regulation to limit or prohibit unnecessary idling of mobile cargo handling equipment that operates at California ports or intermodal rail yards. The limiting or prohibiting of unnecessary idling will result in reduced fuel usage, fuel cost savings, and environmental/health benefits. A reduction in fuel consumption should result in greenhouse gas emission reductions, as well as, reductions of criteria or toxic air contaminants. However, the magnitude of these reductions is unquantifiable at this time due to lack of operational data. In the event it is determined feasible to establish restrictions on idling, the proposed strategy could be considered as amendments to the existing regulation for cargo handling equipment at ports and intermodal rail yards.

4. Potential Emission Reductions

The potential greenhouse gas emission reduction potential of idling restrictions on cargo handling equipment cannot be quantified with any certainty at this time, but is anticipated to be low given the limited number of cargo handling equipment statewide.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Information is not available to estimate costs or economic impacts of this proposed Early Actions Strategy. However, the sectors that may incur costs from a restriction on idling include engine manufacturers, distributors, dealers, facility owners or operators, shipping lines, industries that contract with the ports or intermodal rail yards for movement of goods, and ultimately the end-user of the applicable consumer products.

6. Technical Feasibility

Limiting or prohibiting engine idling of mobile cargo handling equipment is likely to be technically feasible. However, the environmental benefits, cost effectiveness, emission reduction potential, and potential economic impacts on their operations can only be determined once more research and data collection has been completed and that data substantiates the extent to which unnecessary idling occurs. (See discussion under **"Staff Recommendation."**)

7. Additional Considerations

See discussion under **"Staff Recommendation."**

8. Division: Stationary Source Division
Staff Lead: Lisa Williams
Section Manager: Cherie Rainforth
Branch Chief: Dan Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D05*
ID NUMBER:	*EJAC-26/ARB A-17*
TITLE:	*ELECTRIFICATION OF AIRPORT GROUND SUPPORT EQUIPMENT*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering this recommendation.

Those categories of ground support equipment (GSE) most amenable to being electric powered already have a high percentage of zero emission vehicles (ZEV). There may be some other categories of GSE that could be candidates for either ZEV technology or hybrid electric vehicle technology. Assessing feasibility for the early action timeframe can be addressed over the next year. The potential greenhouse gas emission reductions from this discrete strategy appear to be negligibly small because the number of affected vehicles is small.

3. Action Description

This Early Action Strategy proposes to accelerate the replacement of airport GSE by specifying electrification. The proponents of this measure did not provide any details on the dates for the accelerated electrification, the categories of GSE units specifically targeted, or the percentage of electrification required.

This measure would overlap with the implementation of two recently-adopted ARB regulations for off-road equipment that include GSE - large spark ignited (LSI) engines and in-use diesel equipment. The LSI regulation, that became effective May 12, 2007, incorporates requirements of the recently-terminated Memorandum of Understanding (MOU) with the airline industry that calls for 30% electrification of the airline-owned GSE fleet in the South Coast Air Basin by 2010. The LSI regulation applies to gasoline and liquid natural gas-powered GSE. On July 27, 2007, ARB adopted an in-use diesel off-road equipment regulation that requires diesel equipment fleet owners to reduce their fleet-average emissions of NOx and PM in future years by turnover of a specified percentage of their fleet horsepower. Until staff sorts through how this measure would mesh with these regulations, it is unclear how or if there would be conflicts between the measure and the regulations.

In addition to these two ARB regulations, the South Coast Air Quality Management District (District) has proposed a statewide measure for emission reductions from GSE in the South Coast Air Basin by requiring accelerated zero emission vehicle penetration and more stringent fleet-average emission standards for GSE. The District's proposed measure would require airlines in the South Coast to increase the percentage of ZEVs in their GSE fleets from 30% to 45% by 2014, an increase of 15% additional ZEV penetration.

4. Potential Emission Reductions

If the measure were to achieve an additional 15% electrification of the GSE fleet by 2014 as suggested by the SCAQMD, this measure would represent about 1,200 additional electric GSE units. The most likely categories of GSE that might be amenable for electrification include push back tractors and cargo loaders for which we have estimated energy requirements, fuel use, and electricity use for replacement ZEV units. Assuming that each diesel unit on average uses 2,800 gallons of diesel fuel per year (about 3.5 gallons per hour), this represents an emission reduction of 0.036 million metric tons per year of CO2 emissions. Providing electricity from the California utility grid to recharge batteries for replacement ZEV units would require approximately 67 million kWh per year and would emit approximately 0.027 million metric tons of CO2 annually, assuming each kilowatt-hour would require on average about 400 grams of CO2 (Source: CEC). Thus, the net expected CO2 emission benefit from this proposed measure would be on the order of 0.007 MMTCO2E per year.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

If we assume that the Early Action Strategy would require an additional 15 % ZEV vehicles in the GSE fleets, the airlines could incur significant costs, since the requirement would mandate the early replacement of nearly 1,200 units by 2014. Assuming average unit costs for ZEV GSE equal to $60,000, the total cost of the measure would be on the order of $70 million. For units that reach the end of their lifetime during this period, there would be no lost revenue from early replacement, but for units that have to be retired early, there would be a revenue impact on airlines.

6. Technical Feasibility

Airlines have already undertaken substantial electrification of certain categories of the GSE fleet including baggage tractors and belt loaders representing an estimated 46% of the total statewide GSE fleet, mostly in the South Coast Air Basin and at Sacramento International Airport. Other categories of GSE that might be targets for electrification are pushback tractors and cargo loaders and cargo tractors, representing about 41% of the 200 GSE fleet. Pushback tractors represent almost 70% of the potential CO2 emissions, while cargo loading and tractor equipment represents about 30% of potential CO2 emissions. Electric pushback tractors are currently deployed in limited quantities in airline GSE fleets, while electric battery powered cargo loading equipment and cargo tractors have not yet been successfully demonstrated.

7. Additional Considerations

None.

8. Division: Planning and Technical Support Division
Staff Lead: Jim Lerner
Section Manager: Gary Honcoop
Branch Chief: Kurt Karperos

9. References:

New Emission Standards, Fleet Requirements, and Test Procedures for Forklifts and Other Industrial Equipment, ARB's LSI Regulation, effective May 12, 2007

Regulation for In-use Off-Road Diesel Vehicles, approved by ARB July 27, 2007

Final Air Quality Management Plan, approved by SCAQMD June, 2007, Off-Road Measure 04

California Electricity Consumption by County in 2005, CEC.

Inventory of California Greenhouse Gas Emissions and Sinks: 1990-2004, Final Staff Report, December 22, 2006, CEC.

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1. Early Actions Strategy Name and Proponent

SUMMARY #	*D06*
ID NUMBER:	*EJAC-18*
TITLE:	*ELECTRIFICATION OF CONSTRUCTION EQUIPMENT AT URBAN SITES*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

The ARB recently adopted an off-road diesel rule at its July 2007 Board hearing. This regulatory measure is believed to address the recommendations of the Environmental Justice Advisory Committee regarding the electrification of construction equipment at urban sites. That is because the measure requires or allows for the use of lower emission technologies including electrified equipment.

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1. Early Actions Strategy Name and Proponent

SUMMARY #	*D07*
ID NUMBER:	*EJAC-22*
TITLE:	*RELATIVELY INEXPENSIVE ENERGY SAVINGS MEASURES WITH SHORT PAY BACK TIMES FOR FOSSIL FUEL POWER PLANTS BUILT PRIOR TO 1980*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid- 2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

In addition, the ARB staff recommends working with the local air districts to start a dialogue with power plant owners and operators to disseminate information on energy savings measures through an educational outreach program. For these measures, there is already inherent built-in advantages (cost savings and short payback times).

3. Early Action Description

This strategy proposes that the ARB implement relatively inexpensive energy savings measures with short payback times for fossil fuel-fired power plants constructed prior to 1980. The EJAC has identified these older electrical generating units as significant contributors to greenhouse gas emissions due to their lower thermoelectric efficiencies compared to new state-of-the-art combined-cycle power plants.

ARB staff determined that there are 59 fossil fuel-fired thermoelectric power plants within California that came online prior to 1980. In 2005, the CO_2 emissions from these facilities totaled 13.9 million metric tons of CO_2-equivalent per year (MMTCO2E) or about 25 percent of total CO_2 emissions from all power plants in California.

ARB staff has identified two potential measures that could generate energy savings with minimal investment. The U.S. Department of Energy's (DOE) Industrial Technologies Program helps industrial plants operate more efficiently and profitably by identifying ways to reduce energy use in key process systems. The program has identified that minimal improvements in burner efficiency can result in significant savings. The following case from the DOE website (www.eere.energy.gov/industry) provides an example of the potential savings:

> Case: Consider a 50,000 lb/hr process boiler with a combustion efficiency of 79% (E1). The boiler annually consumes 500,000 million Btu (MMBtu) of natural gas. At a price of $8.00/MMBtu, the annual fuel cost is $4 million. The installed cost is

$75,000 for a new burner that provides an efficiency improvement of 2% (E2). The cost savings is:

Cost Savings = Fuel Consumption x Fuel Price x (1 - E1/E2)
= 500,000 MMBtu/year x $8/MMBtu x (1 – 0.79/0.81)
= $98,760/year

The simple payback on investment is:
Simple Payback = $75,000 / $98,760/year = 0.76 year

The table below shows the annual dollar savings for 1% and 3% efficiency improvements.

Burner Combustion Efficiency Improvement	Annual Energy Savings (MMBtu/year)	Annual Dollar Savings
1%	6,250	$50,000
2%	12,345	$98,760
3%	18,290	$146,320

The second measure is the use of newly-developed "automated migration tools," which consist of control and process optimization software to enhance operations by automatically balancing the process for optimum results, coordinating boiler/turbine control, emissions monitoring, economic dispatch, and fleet management. (Westinghouse Process Control, Inc., a subsidiary of Emerson, is one such vendor of this technology.) Some of the benefits include lower maintenance and materials costs, improvements in heat rate, and reductions in unit startup time. The software allows power plants to modernize their operations for greater efficiency and output, while at the same time minimizing their generation downtime.

These efficiency-enhancing measures may be of particular interest to the coastal power plants that have once-through cooling. Once-through cooling is an effective and relatively inexpensive method for re-condensing super-heated steam after it has been used to generate power. Once-through cooling draws sea water into the plant, where it flows through a heat exchanger to cool the steam, and then subsequently returns the heated water back into the environment. Sea water is abundant and cold and represents an efficient means of handling waste heat. However, once-through cooling may have a deleterious environmental impact due to the entrainment and impingement of marine life; therefore, the State Water Resources Control Board is currently developing a statewide policy to implement federal Clean Water Act requirements for power plants that utilize once-through cooling. If a less-efficient cooling method is required by these power plants, they could suffer an energy penalty ranging from 1.7 to 8.6 percent. ARB staff has identified 17 pre-1980 plants that may need to be retrofitted to comply with proposed once-through cooling requirements. Measures to mitigate this loss in overall efficiency may be especially pertinent.

4. Potential Emission Reductions

For the example case above for a single boiler, the potential emission reductions range from 0.12 to 0.34 $MMTCO_2E$ based on the fuel savings from the burner efficiency improvements. A plant-by-plant analysis is required to determine how many generating

units in the State have not already gone through similar modifications and could benefit from this measure. In addition, ARB staff was not able to obtain information on specific efficiency rates associated with the optimization software. Further investigation is required. Therefore, ARB staff cannot yet determine the total emission reduction potential of this strategy. However, depending on annual fuel consumption rates for the 59 pre-1980 power plants and opportunities for at least one percent efficiency improvements, there is a potential for significant emission reduction.

A potential co-benefit of efficiency improvements that lower overall fuel use is a concurrent reduction in criteria pollutant emissions.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The cost of burner improvements will be site-specific. Also, ARB staff was not able to obtain information on upgrade costs associated with the optimization software, and further research is required. Therefore, the total cost of implementation cannot yet be determined due to the need to assess each generating unit on a case-by-case basis. Costs will be borne by the power plants, but the payback in efficiency and reduced fuel consumption should provide a short payback time and would not be expected to translate into increased electricity rates for consumers.

6. Technical Feasibility

In 2006, the DOE's Industrial Technologies Program completed 200 Energy Savings Assessments at U.S. industrial plants. Their website contains over 50 case studies for companies that have participated in past assessments and that are already saving energy and money. These studies describe demonstrated energy improvement projects, process improvement projects, and/or assessments at the plant level. These projects and accompanying savings can be replicated at similar plants.

With respect to optimization software, Westinghouse Process Control's website (www.emersonprocess-powerwater.com/solutions/pwr-successstories.cfm) describes experience with over 30 power generation projects across the U.S. and internationally.

7. Additional Considerations

- This measure would complement other actions taken by State agencies. In September 2005, the California Public Utilities Commission (CPUC) launched an ambitious energy efficiency and conservation campaign by authorizing energy efficiency plans and $2 billion in funding for 2006-2008 for the State's utilities.

- In addition, this item may be included under two CAT strategies to be implemented by the California Public Utilities Commission—specifically, "Investor Owned Utility Energy Efficiency Programs (including LSEs)" and "Investor-Owned Utility (IOU) Additional Energy Efficiency Programs/Demand Response."

Before taking this item to the Board, ARB staff recommends conducting further research to identify any additional low-cost energy savings opportunities for power plants and to

obtain a more accurate quantification of the potential emission reductions based on a case-by-case analysis of options.

Comments Received From: City of Commerce, Reliant Energy, Inc.

8. Division: Stationary Source Division
Staff Lead: Chris Gallenstein
Section Manager: Mike Waugh
Branch Chief: Mike Tollstrup

9. References:

California Air Resources Board, database on California power plants, based on air district permit information from 2001.

[2] *California Air Resources Board, spreadsheet on greenhouse gas emissions from power plants for 2005, based on Energy Information Administration data.*

[3] *California Energy Commission, "Integrated Energy Policy Report," Appendix A: Aging Power Plant Study Group, publication #CEC-100-2005-1007-CMF, November 2005.*

[4] *California Energy Commission, "Inventory of California Greenhouse Gas Emissions and Sinks 1990 to 2004," Staff Final Report, publication #CEC-600-2006-013-SF, December 2006.*

[5] *California Energy Commission, "Status and Known Plans of Coastal Plants using OTC," April 2007.*

[6] *California Energy Commission, spreadsheet on pre-1980 generating unit ratings and status.*

[7] *California Public Utilities Commission, "PUC's Energy Leadership," January 2007: http://www.cpuc.ca.gov/static/070319_revenergystory0107.pdf*

[8] *Emerson Process Management's Power Success Stories, April 9, 2001: http://www.emersonprocess.com/solutions/power/success_story_1.asp*

[9] *U.S. Department of Energy, Industrial Technologies Program, Energy Efficiency and Renewable Energy, Steam Tip Sheet #24, DOE/GO-102006-2269, January 2006.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D08*
ID NUMBER:	*EJAC-23/EJAC-29/ EJAC-31*
TITLE:	*IDENTIFY AND IMPLEMENT ENERGY EFFICIENCY MEASURES AT REFINERS THAT INCLUDE, BUT ARE NOT LIMITED TO, CONDUCTING AN ENERGY AUDIT*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

Several of the measures that could be implemented to realize energy efficiency savings with potential greenhouse gas (GHG) benefits are listed in the section(s) below. Staff reviewed specifics of the necessary steps/processes necessary to implement such actions. This includes permitting and construction activities. Staff has concluded that all these measures could potentially provide moderate to significant GHG benefits. However, given the remaining uncertainties with identifying a viable strategy, staff does not recommend adding the suggested measures to the list of early actions. As part of its ongoing assessments, staff plans to:

a) Perform an evaluation to determine refiner's energy use and energy efficiency.

b) Develop a detailed strategy to define a plan to monitor changes in refinery energy uses and efficiency over time.

c) Define regulatory measures that could be implemented.

Each of these activities requires detailed analyses to ensure a comprehensive plan is adopted by each refinery before energy efficiency measures could be implemented.

3. Early Action Description

U.S. Department of Energy, the American Petroleum Institute, and large refinery facilities have completed a number of energy efficiency projects and demonstration studies in the last ten years. The results from these activities are the basis of the suggested measures for energy efficiency savings. The potential measures that could achieve modest to significant energy savings include: use of an energy management assessment system to continually optimize refinery processes, installation of new or expanding existing co-generating capacity, use of new (low-energy) technologies for desulfurization of fuels, incorporating low level heat streams back into refinery processes, reducing fouling and corrosion in cooling water streams, and treating and using low BTU refinery plant gas as an energy source. Some of these measures are currently under evaluation by refiners.

4. Potential Emission Reductions

Current ARB GHG combustion estimates suggest that California refineries emit 30 million metric ton equivalents of CO_2 annually. However, energy and GHG savings need to be determined for each refinery. Co-generation reduces CO_2 emissions by ~ 25% (not plant wide but just from this source of energy) compared to steam and electricity being delivered by an external utility. Savings are mainly derived by lower transmission losses, export of electricity and better heat management at the facility. The other measures when implemented could provide for marginal to moderate reductions (< 10%) reductions in energy needs for a given refinery with attendant GHG reductions.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

All the measures indicated above have moderate to significant costs associated with planning, design, permitting, construction and maintenance. Most if not all costs associated with implementation would be the responsibility of the refinery.

6. Technical Feasibility

Most of the proposed measures have been demonstrated to be feasible and cost effective by industry and government agency projects. However, refinery specific technical feasibility analyses need to be conducted to ensure that the specifics of each refinery are considered before adopting or mandating any energy efficiency measure.

7. Additional Considerations

Significant technical challenges exist to adapting findings from energy assessments of even a small refinery. Completing such assessments could take anywhere from 12-18 months before a report could be delivered. Based on the recommendation, construction, permitting, etc. may require additional time. Hence, adoption of measures to conduct such energy assessments is reasonable but not as discrete early action measures due to the time needed to conduct a complete assessment.

A study conducted by the California Energy Commission in participation with California refiners concluded that implementation would entail time frames of 3 or more years even for measures for which there was no significant technical, regulatory, enforcement, or other challenges. This conclusion is similar to staff's assessment of timelines necessary for adoption of any of the measures discussed above.

8. Division: Stationary Source
Staff Lead: Reza Lorestany
Section Manager: John Courtis
Branch Chief: Dean Simeroth

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D09*
ID NUMBER:	*EJAC-24*
TITLE:	*ACCELERATE THE REPLACEMENT OF CARGO HANDLING EQUIPMENT AT PORTS*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

Accelerating the replacement of cargo handling equipment at ports and intermodal railyards beyond that required by the Air Resources Board's (ARB) regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards (Cargo Handling Rule) could compromise the expected reductions in NO_x and diesel PM from that rule and would have negligible impacts on greenhouse gas emissions. Accelerating the implementation dates for compliance could potentially jeopardize the overall benefits that can be realized from the Cargo Handling Rule. While there may be some near-term increase in emission reductions, a large portion of the overall benefits that are scheduled to be realized would be lost since operators would not be able to purchase the cleaner Tier 4 engines that will be available in the post 2011 timeframe. For example, for some larger equipment, such as rubber tire gantry cranes (RTG) that have long useful lives (up to 20 years or more), high horsepower ratings, and are costly (upwards of over 1 million dollars), the regulation was designed to accelerate the turnover of this equipment such that, in most cases, a new RTG would be purchased when the ultra-low emission Tier 4 engines would be available. Having this equipment replaced sooner, as proposed in this early action measure, would result in the loss of the significant emissions benefits from a Tier 4 engine since the operator would have to purchase either a Tier 2 or Tier 3 engine. Since this equipment has a long useful life, the benefits of a Tier 4 engine would be foregone for up to 20 years.

Furthermore, it is expected that the Cargo Handling Rule, or the acceleration of that rule, would result in a negligible effect on global warming. Because the Cargo Handling Rule requires operators to move from uncontrolled engines to cleaner engines with NO_x and PM controls and in some cases to apply exhaust retrofits, there can be a fuel economy penalty as high as two to four percent. When more fuel is burned, more CO_2 is produced, and CO_2 is a greenhouse gas. However, the Cargo Handling Rule does result in the reduction of black carbon emissions which also contribute to global warming and this may offset the fuel penalty effects.

Accelerating the turnover would result in the loss of NO_x and diesel PM emission reductions over the life of the equipment resulting in a loss of public health protection and without achieving any measurable greenhouse gas benefits.

3. Early Action Description

The Cargo Handling Rule became effective December 6, 2006, and established performance standards based on the best available control technology (BACT) for new and in-use cargo handling equipment operating at these facilities. Compliance with the regulation will be phased in beginning in 2007 based on the age of the engine, whether or not it is a yard truck or non-yard truck equipment, and the size of the fleets. The performance standards and compliance dates in the regulation were designed to maximize the public health benefits from the rule, taking into account the useful life of the equipment, the use and cost of new equipment, the horsepower of the engines, and when cleaner new engines, in particular the 2007 on-road engines and Tier 4 off-road engines, would be available.

This Early Action Strategy proposes to accelerate the replacement of cargo handling equipment at ports and intermodal rail yards earlier that the compliance schedules required by the existing statewide regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards. The proponents of this measure did not provide any details on the dates for acceleration or the equipment targeted.

4. Potential Emission Reductions

As discussed under **"Staff Recommendation",** we do not expect any greenhouse gas emission benefits from this proposed early action measure.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The costs associated with accelerating the implementation dates in the Cargo Handling Rule could be significant. In most cases, the useful life of equipment would be decreased even more than required by the rule, resulting in increased costs to terminal operators, shippers, and consumers.

6. Technical Feasibility

It is technically feasible to require faster turnover of equipment at ports and intermodal rail yards. However, as discussed in **"Staff Recommendation,"** accelerating the turnover would decrease the expected emission reductions of NO_x and diesel PM from the rule and have negligible impacts on greenhouse gas emissions.

7. Additional Considerations

8. Division: Stationary Source Division
Staff Lead: Lisa Williams
Section Manager: Cherie Rainforth
Branch Chief: Dan Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D10*
ID NUMBER:	*EJAC-25*
TITLE:	*EVALUATE ENCLOSED DAIRY BARNS AS AN ADDITIONAL STRATEGY FOR THE CAPTURE AND COMBUSTION OF METHANE EMISSIONS AT DAIRIES*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

In addition to this measure, ARB staff will be evaluating potential measures for modified feed management, manure removal frequency, covered and treated lagoons, and digesters as potential strategies for reducing methane emissions.

This evaluation will be undertaken as part of ARB's actions for reducing methane emissions at dairies. These actions are not appropriate for consideration as early action measures because the time-frame is not sufficient to conduct the required in-depth cost-effective analyses, develop consistent emissions testing methods, and evaluate emerging technologies or technology-transfers. These activities must be conducted in advance of proposing any measures for reducing GHG emissions from dairy operations. ARB Planning and Technical Support Division (PTSD) staff is currently developing a protocol for calculating changes in GHG gas emissions resulting from the voluntary installation of a manure digester at animal agricultural facilities. The development of this voluntary protocol has been proposed as an early action measure and is discussed in a separate white paper prepared by PTSD.

3. Early Action Description

This strategy proposes that the ARB develop a regulation to require that housing and milking barns at dairies be vented to an incinerator or biofilter/bioscrubber as a means of controlling methane emissions from enteric fermentation. This strategy consists of fully enclosing barns and exhausting the air to an incinerator or a biofilter/bioscrubber.

Incinerators can achieve a 90 percent or greater reduction in methane emissions. However, incinerators emit oxides of nitrogen, carbon dioxide, toxic air pollutants and require the use of a fuel to promote the destruction of compounds such as methane.

Biofilter/bioscrubber technology can achieve approximately 80 percent control of emissions of volatile organic compounds (VOCs), ammonia, and hydrogen sulfide. ARB staff was not not able to confirm any control efficiencies for methane from biofilters/bioscrubbers. By-products of biofilters/bioscrubbers are water and carbon dioxide.

In their May 7, 2007 letter to the Chairman of the Air Resources Board, the Center on Race, Poverty & the Environment argues 1) that cow housing is where most enteric fermentation takes place, 2) biofilter systems are already in use for swine facilities and have been reported for dairies, and 3) have been proposed by industry in California. ARB staff has not been able to confirm the extent to which these statements are true. In addition, ARB staff is not aware of any information about the cost of these technologies or their ability to reduce GHG emissions at any enclosed animal facility.

4. Potential Emission Reductions

California's dairy cow population produces about 4.7 MMTCO2E of methane from enteric fermentation. Although biofilters/bioscrubbers and incinerators can reduce methane emissions, the overall net GHG emissions (that would occur after discounting the GHG emissions emitted from electricity required to operate the technologies and as a by-product of the technologies themselves) have not been determined.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

A detailed cost-effectiveness analysis of such systems needs to be performed prior to their application. In addition, the calculation of net reduction in GHGs must include the electricity used to move contaminated air from the barns to the filtration device or incinerator. The agriculture industry, particularly sectors involved in confined animal facilities, would be impacted by this proposal.

6. Technical Feasibility

These technologies could theoretically be transferred to dairies. However, the extent to which enclosed animal barns outfitted with these technologies could achieve a net reduction in GHG emissions, particularly carbon dioxide, has not been demonstrated.

7. Additional Considerations

This is an untested technology with likely high-energy requirements for airflow and high-water requirements for evaporative cooling. There may be some benefits in milk production by maintaining the proper temperatures inside the freestall barns. Manure handling in the confined spaces may be more difficult. An increased risk to animals will occur from overheating. Marketing campaigns based on "unconfined cows" might be compromised. Animal health and welfare issues may arise.

8. Division: Stationary Source Division
Staff Lead: Dan Weller
Section Manager: Kitty Howard
Branch Chief: Michael Tollstrup
Staff Attorney: George Poppic

9. References:

1. *Dairy Permitting Advisory Group, Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley, Final Report – January 31, 2006, at 108-110 ("DPAG Report")*

2. *Letter to Dr. Robert Sawyer, Chairman of the California Air Resources Board. Dated: May 7, 2007. Received from Avinash Kar (Center on Race, Poverty, & the Environment) and Tom Frantz (Global Warming Environmental Justice Advisory Committee)*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Strategy Name and Proponent

SUMMARY #	*D11*
ID NUMBER:	*EJAC-26*
TITLE:	*COMPOSTING – ADOPT SOUTH COAST AND SAN JOAQUIN RULES STATEWIDE*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

3. Description

South Coast Air Quality Management District (SCAQMD) Rule 1133.2 and San Joaquin Valley Unified Air Pollution Control District (SJV) Rule 4565 were adopted for the purpose of controlling volatile organic compounds (VOC) and ammonia from co-composting facilities. This strategy would adopt SCAQMD and SJV rules for enclosed co-composting facilities statewide. Co-composting is the composting of a mixture of biosolids and manure with bulking agents to produce compost. Greenwaste facilities use green waste or food waste as the primary feedstock, and may add small amounts of manure or other biosolids as an amendment; chipping and grinding facilities reduce the size of greenwaste or wood waste to be used in composting, or as cover for landfills.

4. Potential Emission Reductions

This action is expected to have a low (0-0.1 million metric ton carbon equivalent) emissions reduction potential. The composting rules in SCAQMD and SJV were designed to reduce emissions of VOC and ammonia (as precursors to ozone and PM10). GHG emissions were not evaluated during the development of the district rules.

According to U.S. EPA, composting may result in emissions of methane from anaerobic decomposition, and non-biogenic emissions of carbon dioxide (CO_2) from the collection and transport of the organic materials to the composting site. U.S. EPA considers CO_2 emissions from aerobic decomposition to be "biogenic" and therefore does not include them in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*. Research indicates that efficient composting will not result in significant methane emissions, will have minimal CO_2 emissions from transportation and mechanical turning of compost piles, and can result in some carbon storage (sequestration) from the application of compost to soils. Methane emissions were estimated to be essentially zero and CO_2 emissions per ton of material composted was estimated to be 0.01 million ton carbon equivalent (MTCE) indirect CO_2. U.S. EPA estimated that centralized composting of organics

results in net GHG storage of 0.05 MTCE/wet ton of organic inputs composted and applied to agricultural soil.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

SCAQMD evaluated the cost effectiveness of Rule 1133.2 under several scenarios. Under the most likely scenario for an existing facility, with enclosures for all phases of the operation, and biofiltration, the cost was $8,700 to $10,000 per ton of VOC and ammonia reduced, depending on the type of enclosure selected. Costs for a new facility were between $11,000 and $12,000 per ton. Although greenwaste composting facilities have the largest throughput of any composting operation, they are exempt because the control options were determined to be cost-prohibitive.

6. Technical Feasibility

It would be technically feasible to have all large composting facilities in the State comply with a statewide control measure similar to the SCAQMD or SJV rules. However, it is unclear at this time if the control measure would reduce GHG emissions.

7. Additional Considerations

While implementation of this strategy would certainly result in additional statewide VOC and ammonia benefits statewide, GHG reduction benefits are currently unclear. An analysis is needed to determine whether the controls (enclosure and biofilters) will reduce GHG emissions. Additionally, the Market Advisory Committee report on the establishment of a Cap and Trade Program reported that composting does not produce net greenhouse gas emissions. Furthermore, U.S. EPA has estimated that there is a net GHG storage of 0.05 MTCE/wet ton of organic inputs composted, once they are applied to agricultural soil. Data on GHG emissions from composting operations in the SCAQMD and SJV, as well as other areas of the State, need to be obtained and analyzed in order to determine if this strategy has the potential to result in GHG emission reductions.

With low-to-zero anthropogenic GHG emissions, regulating composting facilities for their GHG emissions alone may be cost prohibitive. The Market Advisory Committee noted that local governments have created incentives for increased composting based on the need to reduce the amount of material sent to landfills. Cities and counties were mandated to achieve a 50 percent source reduction by the year 2000, compared to a 1990 baseline. The current statewide diversion rate is 42 percent. If new regulations are imposed on these facilities, it could hinder further progress towards this goal. Composting, alternatively, may be considered a method of carbon sequestration and therefore a potential offset measure (for example, United States Department of Agriculture research indicates that compost usage can reduce fertilizer requirements by at least 20 percent thereby significantly reducing net GHG emissions), which would enhance the economic viability of composting. These issues need to be carefully considered and analyzed prior to proceeding with this strategy.

8. Division: Stationary Source Division
Staff Lead: Kate MacGregor
Section Manager: Richard Boyd
Branch Chief: Dan Donohoue

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D12*
ID NUMBER:	*EJAC-27*
TITLE:	*PHASE OUT PRE-1980 POWER PLANTS GENERATING AT LEAST 100 MW AND PROVIDE INCENTIVES TO REPLACE THEM WITH CLEAN ENERGY*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

ARB staff determined that the greenhouse gas reduction potential of this strategy appears to range from low (actually an increase in emissions) to large, depending on what assumptions are used. ARB staff recommends working with the local air districts to analyze the best options for each generating unit. This work would include determining to what extent natural phase-out is occurring and at what pace; considering how the existing power plants operate versus how the replacement plants will operate (combined-cycle generation is designed for baseload operation and using it as peaking capacity could result in higher emissions due to frequent startup and shutdowns where combustion systems and controls are not optimized); analyzing how planned transmission upgrades will affect the need for Reliability Must Run (RMR) units; and looking at whether new proposed power plant projects will replace the need for old generating units.

3. Early Action Description

This strategy proposes that the ARB develop a permitting system to phase out, by 2010, fossil fuel-burning thermoelectric power plants that generate at least 100 MW and were built prior to 1980. The EJAC argues that these represent the oldest, most inefficient units. The mechanism for this phase out would be through a scaled and planned annual reduction in CO_2 emissions between 2007 and 2010. The 2010 end-goal would be an emission standard equivalent to the 2007 cleanest combined-cycle plant operating at a heat rate of 6,500 Btu/kWh. Generating units that cannot meet the emission standard would be required to shut down. The proposed phase-out would occur according to the following increments of progress:

Year	Allowable CO_2 Emission Level
2007	equivalent to 2006 emissions
2008	at least 1/2 less than the difference between 2007 emissions and the 2010 standard
2009	at least 2/3 less than the difference between 2007 emissions and the 2010 standard
2010	equivalent to California's most efficient plants built in 2007 rated at 100 MW and 6,500 Btu/kwh

EJAC also suggests that ARB prohibit an RMR designation by the California Independent System Operator (CAISO) as a means to allow a unit that does not meet the emission levels to operate.

ARB staff assumes that the power plants in question will be replaced by modern combined-cycle power plants consisting of natural gas-fired combustion turbine generators where heat is recovered from the gas turbine exhaust gases to heat water and generate steam, which is sent through a steam turbine to produce additional electricity. Therefore, the amount of fossil fuel burned to generate electricity is less than older units with no heat recovery. For example, the typical electric generation efficiency of a combined-cycle plant is estimated from 40-58 percent, while a utility boiler is estimated from 25-40 percent.

ARB staff assumes that the power plants in question will be replaced by modern combined-cycle power plants consisting of natural gas-fired combustion turbine generators where heat is recovered from the gas turbine exhaust gases to heat water and generate steam, which is sent through a steam turbine to produce additional electricity. Therefore, the amount of fossil fuel burned to generate electricity is less than older units with no heat recovery. For example, the typical electric generation efficiency of a combined-cycle plant is estimated from 40-58 percent, while a utility boiler is estimated from 25-40 percent.

ARB staff determined there are 59 fossil fuel-fired thermoelectric power plants within California that came online prior to 1980. In 2005, the CO_2 emissions from these facilities totaled 13.9 million metric tons of CO_2-equivalent per year (MMTCO2E) or about 25 percent of total CO_2 emissions from all power plants in California. Of these, 30 power plants are also rated at 100 MW or more. The 30 plants represent three percent of the number of power plants statewide, yet contribute approximately 21 percent of the total MW plant capacity in the State. If all 30 plants are phased out by 2010, the State would need to secure about 20,000 MW of capacity. The facilities are located within the jurisdiction of the following air districts: Bay Area, South Coast, Mojave Desert, San Diego, San Luis Obispo, North Coast, and Ventura. The generating units consist of natural gas-fired utility boilers and combustion turbines, with the exception of one facility that uses jet fuel.

Of these 30 power plants, high heat rates and future longevity may soon be less of an issue due to several factors. First, ARB staff has determined that 18 plants have either replaced all or a portion of their generating units or the old generating units are retired or soon to be retired. Secondly, the State Water Resources Control Board is currently developing a statewide policy to implement federal Clean Water Act requirements for cooling water intake structures related to the mitigation of entrainment and impingement

of marine life at power plants that utilize once-through cooling. ARB staff has identified 17 plants (14,479 MW) that may need to be retrofitted to comply with proposed once-through cooling requirements. These plants may be retired due to the cost to retrofit or may suffer an energy penalty ranging from 1.7 to 8.6 percent (at 67 percent load) to install wet or dry cooling.

Regarding reliance on RMR units, one of the ways to reduce the need to sign RMR contracts is to invest in transmission upgrades. Upgrades that increase the ability to import energy from neighboring states and Mexico, and increase the amount of energy that can be delivered to the major load centers in California, minimize the need to sign RMR contracts with aging facilities in these areas for local reliability purposes. Two major upgrades are scheduled to operating by 2008 and will increase the transmission networks import capability into Southern California by as much as 1,160 MW. The Miguel-Mission 230 kV line #2 will increase the import capability into San Diego by 560 MW and is expected to be operating by June of 2006. The short-term Southwest Transmission Expansion Plan upgrades will increase the import capability into the Los Angeles Basin by approximately 500 MW. There are no other major projects planned to increase the transmission capacity into California before 2009.

As a companion to the phase out of older, higher-emitting plants, this strategy proposes that incentives be provided to encourage clean energy substitutions. Identifying available incentive programs would be included as part of the evaluation for the Scoping Plan. However, there is a potential incentive in Assembly Bill 32 (AB 32) for facilities that implement voluntary reduction measures. AB 32 requires that adopted regulations ensure entities that have voluntarily reduced their greenhouse gas emissions prior to the implementation of these regulations receive appropriate credit for early voluntary reductions (Health and Safety Code Section 38562 (b)(3)). To support these reductions, ARB is required to adopt methodologies for the quantification of voluntary greenhouse gas emission reductions, and adopt regulations to verify and enforce any voluntary reductions that are authorized for use to comply with emission limits established by ARB (Health and Safety Code Section 38571).

4. Potential Emission Reductions

In 2005, the 59 pre-1980 power plants produced 13.9 million metric tons of CO_2-equivalent per year (MMTCO2E), which is equivalent to 24 percent of the CO_2 produced by power plants. Although available data were incomplete, plant numbers indicate capacity factors[1] ranging from 1.3 to 36.1 percent (average 13.2 percent). While recent data shows these plants operate infrequently, replacing them with new natural gas combined-cycle units would mean that the new plants will operate more because they are designed for baseload generation. Combined-cycle plants tend to have capacity factors around 85 percent[2]. Based on these assumptions, ARB staff estimates the potential emissions impact due to shut down of pre-1980 power plants and replacement with combined-cycle generation in 2010 ranging from a 2.4 MMTCO2E reduction (at

[1] A percentage that tells how much of a power plant's capacity is used over time. It is the ratio of the electrical energy produced by a generating unit for the period of time considered to the electrical energy that could have been produced at continuous full power operation during the same period.

[2] Assumed CO_2 emission factor for combined-cycle generation is 1,100 lb CO_2/MWh, as proposed in SB 1368 regulations.

13.2 percent capacity factor) to a 60.4 MMTCO2E increase (at 85 percent capacity factor). Therefore, the emission reduction potential of this strategy is considered from low to large.

Depending on how well-controlled the existing plants are, there is the potential for criteria pollutant reductions from combined cycle. At the same time, depending on how the new facilities are operated, there is the potential for an overall increase in emissions due to frequent startups and shutdowns or higher capacity factors.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

ARB staff estimates that the cost to implement this strategy is simply the cost of replacing the old power plants with new combined-cycle power plants of identical capacity. As mentioned above, the potential replacement capacity is 20,000 MW. To replace this capacity with equivalent combined cycle generation is estimated to range from $1.4 to 8.7 billion (using a levelized cost for combined cycle of 5.85 cents/kWh[3]) based on capacity factors from 13.2 to 85 percent. If there is a reduction in emissions, the cost effectiveness is $564 per-$MTCO_2E$. The bulk of the costs will be borne by the electric utility industry. In turn, this could impact consumers in the form of increased electricity rates.

6. Technical Feasibility

The siting of large natural gas-fired combined-cycle plants in California started in 1997, coinciding with the passage of legislation in 1996 deregulating the California electric utility industry. Since then, 19 of these plants, totaling over 10,000 MW, are currently operating throughout the State. Therefore, the technology is proven and well-established.

7. Additional Considerations

Rules of the Oregon Energy Facility Siting Council set CO_2 emission standards for new energy facilities. The standards apply to baseload gas plants, non-baseload power plants, and non-generating energy facilities that emit CO_2. For baseload gas plants and non-baseload plants, the standard sets the net emissions rate at 0.675 pounds CO_2/kWh (675 pounds CO_2/MWh).

On October 30, 2006, the California Energy Commission (CEC) instituted a proceeding to establish a greenhouse gas emission performance standard to implement Senate Bill 1368 (Stats. 2000, Ch. 598). The bill directs the CEC, in consultation with the California Public Utilities Commission and the California Air Resources Board, to establish a greenhouse gas emission performance standard for all baseload[4] generation of local publicly owned electric utilities at a rate no higher than the rate of emissions for natural gas-fired combined-cycle baseload generation. The proposed standard was set at 1,100 pounds of CO_2/MWh, based on evaluating the performance of existing

[3] Represents an average of several cost estimates.
[4] ARB staff is awaiting interpretation from the CEC and California Public Utilities Commission regarding whether plants currently operating with low capacity factors (but which were originally designed and intended for baseload operation) are subject to SB 1368 regulations.

combined-cycle natural gas baseload plants throughout the west, with special attention paid to the performance of units in California.

The CEC adopted the regulations pursuant to SB 1368 on May 28, 2007. The final rulemaking package was submitted to the Office of Administrative Law on June 1, 2007. On June 29, 2007, OAL issued a decision disapproving the action. The CEC is currently working on addressing the decision and determining what changes should be made to the proposed regulations to address OAL's concerns.

Comments Received From: Reliant Energy, Inc.

8. Division: Stationary Source Division
Staff Lead: Chris Gallenstein
Section Manager: Mike Waugh
Branch Chief: Mike Tollstrup

9. References:

[1] *California Air Resources Board, database on California power plants, based on air district permit information from 2001.*

[2] *California Air Resources Board, spreadsheet on greenhouse gas emissions from power plants for 2005, based on Energy Information Administration data.*

[3] *California Energy Commission, "Comparative Cost of California Central Station Electricity Generation Technologies," Staff Report, publication #100-03-001, August 2003.*

[4] *California Energy Commission, "Initial Statement of Reasons for Adoption of Regulations Establishing and Implementing a Greenhouse Gases Emission Performance Standard for Local Publicly Owned Electric Utilities," Docket #06-OIR-1, February 2007.*

[5] *California Energy Commission, "Integrated Energy Policy Report," Appendix A: Aging Power Plant Study Group, publication #CEC-100-2005-1007-CMF, November 2005.*

[6] *California Energy Commission, "Inventory of California Greenhouse Gas Emissions and Sinks 1990 to 2004," Staff Final Report, publication #CEC-600-2006-013-SF, December 2006.*

[7] *California Energy Commission, Power Plant Licensing Cases, Status of All Projects, last updated 7/25/07: http://www.energy.ca.gov/sitingcases/all_projects.html*

[8] *California Energy Commission, "Proposed 15-Day Changes to Regulations Establishing and Implementing a Greenhouse Gases Emission Performance Standard for Local Publicly Owned Electric Utilities," Docket #06-OIR-1, May 2007.*

[9] *California Energy Commission, "Resource, Reliability and Environmental Concerns of Aging Power Plant Operations and Retirements," Draft Staff White Paper, publication #100-04-005D, August 13, 2004.*

[10] *California Energy Commission, "Status and Known Plans of Coastal Plants using OTC," April 2007.*

[11] *California Energy Commission, spreadsheet on pre-1980 generating unit ratings and status.*

[12] *Council of Industrial Boiler Owners, "Energy Efficiency & Industrial Boiler Efficiency: An Industry Perspective," March 2003.*

[13] *Energy Information Administration Glossary: http://www.eia.doe.gov/glossaryindex.html*

[14] *Julie Gill, CAISO, personal communication, 7/24/07.*

[15] *Oregon's Power Plant Offset Program: http://www.climatetrust.org/programs_powerplant.php*

[16] *Siemens Power Generation, Combined Cycle Plant Ratings, January 2006: http://www.powergeneration.siemens.com/en/plantrating/index.cfm*

[17] *U.S. Department of Energy, Energy Information Administration, Office of Integrated Analysis and Forecasting, "Annual Energy Outlook 2007 with Projections to 2030," February 2007.*

[18] *U.S. Department of Energy, National Energy Technology Laboratory, "Cost and Performance Baseline for Fossil Energy Plants," Volume I, DOE/NETL-2007/1281, May 2007.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D13*
ID NUMBER:	*EJAC-28*
TITLE:	*PROHIBIT FUEL OIL BURNING IN PRE-1980 POWER PLANTS GENERATING AT LEAST 100 MW*
PROPONENT:	*ENVIRONMENTAL JUSTICE ADVISORY COMMITTEE*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

ARB staff determined that the greenhouse gas reduction potential of this strategy is low. All power plants in California built prior to 1980 and rated at 100 MW or more with oil-firing capability utilize fuel oil only for backup purposes. There is one small plant on Catalina Island rated at 9.3 MW that uses diesel as the primary fuel.

3. Early Action Description

This strategy proposes that the ARB develop a regulation to prohibit the burning of fuel oil at power plants that generate at least 100 MW and were built prior to 1980. ARB staff determined there are no power plants of 100 MW or more in California that were constructed before 1980 and that burn fuel oil as the primary fuel. There are, however, 11 plants greater than 100 MW that are permitted to burn fuel oil as backup. They are located within the jurisdiction of the following air districts: Imperial, San Diego, South Coast, North Coast, and Bay Area. During 2005, four of these 11 plants used fuel oil for some portion of the year. The combined diesel and residual fuel oil consumption during 2005 emitted an estimated 0.068 million metric tons of CO_2-equivalent (MMTCO2E), or only 0.12 percent of the total CO_2 emissions from all California power plants.

In addition, there are five power plants rated less than 100 MW that utilize fuel oil as the primary fuel. They are located in South Coast, Placer County, and Northern Sierra air districts. Generating units at four of the five plants have been retired; only the Pebbly Beach Generating Station on Catalina Island remains operational.

The longevity of four of the 11 power plants may be affected by proposed State Water Resources Board policy pertaining to coastal power plants that have once-through cooling. Once-through cooling draws sea water into the plant, where it flows through a heat exchanger to cool the steam, and then subsequently returns the heated water back to the source. Sea water is abundant and cold and represents an efficient means of handling plant waste heat. However, once-through cooling may have a deleterious

environmental impact due to the entrainment and impingement of marine life; therefore, the State Water Resources Control Board is currently developing a statewide policy to implement federal Clean Water Act requirements for power plants that utilize once-through cooling. The policy may require retrofit with an alternative cooling system such as wet or dry cooling. These plants may be retired due to the cost to retrofit.

4. Potential Emission Reductions

To determine potential emission reductions, ARB staff looked at the difference in emissions due to use of alternative fossil fuels with a lower carbon profile using 2005 as the baseline and assuming 2010 consumption data will be similar. As stated above, diesel and fuel oil burning in 2005 produced 0.068 MMTCO2E. Replacing fuel oil with liquefied petroleum gas (LPG) would result in a 14 percent reduction (0.010 $MMTCO_2e$) in 2010. To replace with natural gas would result in a 25 percent reduction (0.017 $MMTCO_2e$). Therefore, the emission reduction potential of this strategy is considered to be low.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The primary cost associated with this strategy is expected to consist of either the cost of lost power when it is needed (i.e., during a gas curtailment) or the price and cost of an alternative fuel, such as LPG, and its associated infrastructure. It is also possible that some of the generating units (e.g., burners) may need to be retrofitted to accommodate a different fuel.

The costs to businesses and consumers for lost power requires more in-depth research and was not determined for purposes of this analysis; however, it is expected to be significant, particularly depending on the frequency, timing, and duration of these events.

With respect to the use of alternative fuels, the cost of an equivalent amount of LPG is less than the combined diesel and fuel oil consumption for 2005. However, without specific plant information, ARB staff cannot determine any additional costs associated with infrastructure and equipment retrofits at this time.

6. Technical Feasibility

Power generating boilers, combustion turbines, and reciprocating engines that operate on a variety of fossil fuels are not new technologies. Some of the generating units in question may already have dual-fuel firing capability and thus the conversion from oil burning to a lower carbon fuel is not expected to require any equipment retrofits. Other units will have to be looked at on a case-by-case basis to determine the feasibility of retrofits such as replacement of burner orifices to accommodate various fuels.

Another factor to consider with respect to feasibility is that facilities may be limited by geography in terms of fuel supply choices. For example, the Pebbly Beach Generating Station is located on Catalina Island just off the coast from Los Angeles and utilizes diesel fuel in their reciprocating engine generators. In addition, some regions have the need for dual-fuel capability due to natural gas curtailments. Adverse weather conditions, particularly in Northern California, during which commercial and industrial

space heating loads are high, can result in natural gas curtailments and spur the need for dual-fuel capability to meet power requirements.

7. Additional Considerations

Some California local air districts have prohibitory rules that apply to power generating units that directly prohibit oil burning after a certain date. Other district rules may indirectly result in the phase out of oil burning through average emission standards that apply to multiple generating units. In order to maximize operation, these power plants would be motivated to switch to cleaner-burning fuels, install emission control technologies, or a combination of both.

8. Division: Stationary Source Division
Staff Lead: Chris Gallenstein
Section Manager: Mike Waugh
Branch Chief: Mike Tollstrup

9. References:

California Air Resources Board, database on California power plants, based on air district permit information from 2001.

[2] *California Air Resources Board, District Rules Database, main page last updated 3/24/05: http://www.arb.ca.gov/drdb/drdb.htm*

[3] *California Air Resources Board, spreadsheet on greenhouse gas emissions from power plants for 2005, based on Energy Information Administration data.*

[4] *California Energy Commission, "Integrated Energy Policy Report," Appendix A: Aging Power Plant Study Group, publication #CEC-100-2005-1007-CMF, November 2005.*

[5] *California Energy Commission, "Inventory of California Greenhouse Gas Emissions and Sinks 1990 to 2004," Staff Final Report, publication #CEC-600-2006-013-SF, December 2006.*

[6] *California Energy Commission, "Resource, Reliability and Environmental Concerns of Aging Power Plant Operations and Retirements," Draft Staff White Paper, publication #100-04-005D, August 13, 2004.*

[7] *California Energy Commission, "Status and Known Plans of Coastal Plants using OTC," April 2007.*

[8] *California Energy Commission, spreadsheet on pre-1980 generating unit ratings and status.*

[9] *Energy Information Administration, Spot Prices for Crude Oil and Petroleum Products, last updated 7/25/07: http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_d.htm*

[10] *Energy Information Administration, Spot Prices for Crude Oil and Petroleum Products, last updated 7/25/07: http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm*

[11] *Energy Information Administration, Weekly Heating Oil and Propane Prices, last updated 4/19/07: http://tonto.eia.doe.gov/dnav/pet/pet_pri_wfr_dcus_nus_w.htm*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY # *D14*
ID NUMBER: *EJAC-30/ARB 1*
TITLE: *REFINERY METHANE EMISSIONS*
PROPONENT: *2006 CAT REPORT and STAKEHOLDER SUGGESTION*

2. Staff Recommendation

This measure is recommended for evaluation in the Scoping Plan which will be developed as a draft by mid-2008 and must be considered by the Board prior to January 1, 2009. Evaluation as part of the Scoping Plan provides the most effective approach for fully considering the recommendation.

Currently, there is no reporting system that identifies the sources and quantity of methane emissions from refineries. However, the draft 2004 California GHG inventory lists California petroleum refinery emissions as 30 million metric tons of CO_2 equivalents. Using Air Resources Board (ARB) Emission Inventory Data[1] and ARB refinery speciation profiles it is estimated that refinery methane emissions are 1.4 million metric tons of CO_2 equivalents. Recent refinery studies[2] suggest that the majority of the methane emissions come from crude oil transfer operations, fugitive losses (valves and fittings), flares, cooling towers, and wastewater treatment.

Staff proposes to:

(a) Perform an evaluation to determine sources and magnitude of refinery methane emissions; and

(b) Develop a detailed strategy to define regulatory measures for monitoring and control of methane exemptions granted to refineries. This will include methane control measures for refinery processes currently controlled under non-methane volatile organic compounds emission limits, and for some sources with limited control requirements, e.g., cooling towers, wastewater treatment, and ponds.

3. Early Action Description

Methane is emitted from many refining operations. The major sources of methane emissions are vapor displacement from crude tanks from marine off-loading and refinery desalter emissions. During the refining processes, methane is separated from the crude oil through vacuum or atmospheric distillation. Methane emissions occur when gaseous streams are transported at various points in the refinery. The primary method for

[1] ARB Almanac database
[2] *Phone communication with Don Robinson, ICF Consulting, 7/20/2007. ICF Consulting is performing a methane study for the American Petroleum Institute. The study will determine the GHG emissions for refineries. This analysis will determine CO_2, methane, and N_2O for all U.S. refineries.* Email Communication: Don Robinson DRobinson@icfi.com

controlling methane emissions is the use of combustion devices, i.e., flare. If one excludes marine off-loading and refinery desalter emissions, most if not all refinery methane sources are low energy, i.e., low heating value, vapor streams[3] that cannot be economically recovered.

4. Potential Emission Reductions

The potential emission reductions from this measure are unknown.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

There is no accurate estimate of the costs or the economic impacts. It is expected that the costs, depending on the source, could range from low to high. For new or exempt sources the costs may be high. In contrast, existing non-methane hydrocarbon control systems already control methane emissions by default. The major impact on existing control systems would be to require that methane be included in emission capture or destruction efficiencies.

6. Technical Feasibility

Monitoring and implementation of methane emission control measures is technically feasible. However, many California refineries do not use Best Available Control Technology (BACT) for known methane sources. Use of methane BACT may require additional work for design, local planning approval, and installation. Technology that meets refinery methane BACT has been installed in some California refineries. Use of a catalytic combustion device at the Shell Martinez marine loading terminal is a good example of a methane BACT installation. Mandatory use of BACT for all crude transfer operations and refinery desalter emissions will control most methane emissions by default.

7. Additional Considerations

None

8. Division: Stationary Source Division
Staff Lead: Tim Dunn
Section Manager: John Courtis
Branch Chief: Dean Simeroth

[3] Ernest Orlando Lawrence Berkeley National Laboratory, Environmental Energy Technologies Division, *Profile of the Petroleum Refining Industry of California* (March 2004). The report was supported by the California Energy Commission through the U.S. Department of Energy under Contract No. DE-AC03-76SF00098.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D15*
ID NUMBER:	*SCAQMD-1*
TITLE:	*ACCELERATE INTRODUCTION AND DEPLOYMENT OF LIGHT-DUTY VEHICLE (PASSENGER) HYBRID TECHNOLOGY*
PROPONENT:	*SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT*

2. Staff Recommendation

Hybrid technology is an element anticipated to be embedded in additional regulatory measures aimed at further reducing greenhouse gas emissions from new motor vehicles. Thus, this measure is recommended to be considered as part of the analysis for the strategy to strengthen light-duty vehicle standards (B33).

During ARB development of the GHG regulation in response to AB 1493, staff carefully considered the strong benefits of hybrids in reducing CO_2 emissions. One of the hurdles identified to accelerating the introduction of light-duty vehicle hybrid-technology is that hybrid electric powertrains, which include an electric motor, battery pack, power controller and other components are relatively expensive. Accordingly, staff needed to consider the degree of hybridization appropriate and cost effective for the 2009-2016 timeframe. Staff concluded implementation of full hybrid electric vehicles would be premature prior to 2016 but believed that much could be done to prepare the vehicle fleet for incorporation of full hybrids in the meantime.

Accordingly, staff included integrated starter/generator (ISG) components in nearly half of the vehicle technology package combinations that were modeled and subsequently utilized to set the adopted GHG emission standards. This provides the incentive and foundation for vehicle manufacturers to include ISG components into high volume applications, thereby driving down costs of these hybrid systems. Staff concluded that once ISG components were integrated across most of the vehicle fleet, it would be further cost-effective to increase the capability and size of these components to permit cost-effective full hybrids to be developed for deployment in the post 2016 timeframe, i.e., ones that could operate on all electric power and provide plug-in capability, assuming battery development in the meantime progresses favorably to reduce their size and cost and to improve performance and durability.

Staff also identified another hurdle - lead time for incorporating major powertrain changes throughout vehicle manufacturers' product lines. Generally powertrain changes require fairly long lead times due to the need to first develop the new components, integrate them seamlessly into the powertrain, and then test and refine them for optimum performance, reliability and durability. In addition, new machinery for producing such powertrains requires considerable planning, lead time and investment. As a result, staff provided long lead times to enable major powertrain upgrades such as incorporating

hybrid systems into vehicles when manufacturers would be doing major revisions anyway as part of their normal vehicle powertrain life cycle process. This was done to avoid the excessive costs that accompany premature tear up of existing powertrains before their cycle life has expired.

3. Early Action Description

Modify the existing light-duty motor vehicle GHG emissions standards to require greater reductions, thereby forcing vehicle manufacturers to accelerate the introduction and deployment of hybrid technology.

4. Potential Emission Reductions

The currently adopted standards call for about a 30 percent reduction by 2016. Assuming that the new standards would call for about a 50 percent reduction, phased-in beginning in 2017, this measure would achieve about a 4 MMT reduction in 2020. The reduction achieved by this measure would significantly increase in subsequent years as clean new vehicles replace older vehicles in the fleet – staff estimates a 2030 reduction of about 27 MMT.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

Since the technology is at an early stage of development, it is premature to estimate costs and economic impacts.

6. Technical Feasibility

While this measure is technically feasible, for the reasons stated above staff does not believe it would be cost-effective prior to 2017.

7. Additional Considerations

Hybrid technology needs further development and cost reduction if it is to be accepted by large numbers of consumers.

8. Division: Mobile Source Control Division
Staff Lead: TBD
Section Manager: Tony Andreoni
Branch Chief: Analisa Bevan

9. References:

Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles.

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D16*
ID NUMBER:	*SCAQMD-2*
TITLE:	*NATURAL GAS REQUIREMENT OF 1360 WOBBE INDEX*
PROPONENT:	*SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT*

2. Staff Recommendation

Staff is aware that there are several outstanding issues related to establishing a statewide Wobbe Index standard and the relationship of Wobbe Index and GHG emissions. Thus, staff recommends that ARB continue to coordinate with the SCAQMD to further evaluate the appropriateness of a statewide natural gas Wobbe Index specification.

3. Early Action Description

Establishing a statewide natural gas specification of 1360 Wobbe Index would ensure that California's historical average Wobbe Index level would be maintained. California imports about 85 percent of its natural gas supplies via the interstate pipeline; this gas historically meets a 1360 Wobbe Index. However, sources of high Wobbe Index gas, which includes California gas production and potential imported gas derived from liquefied natural gas (LNG), could significantly increase the Wobbe Index of natural gas in Southern California.

Preliminary information indicates that, in general, natural gas inherently meeting a Wobbe Index of 1360 at production has a lower GHG emissions potential than natural gas inherently meeting a Wobbe Index greater that 1360. This is also true for natural gas that has been processed for natural gas liquids (NGLs) extraction to reduce the level of a high Wobbe Index gas to a lower level. In these cases, the methane content (higher hydrogen to carbon ratio) is greater in natural gas natural gas meeting a lower Wobbe Index than natural gas meeting a higher Wobbe Index. However, reducing the Wobbe Index of natural gas by inerts injection (e.g. nitrogen), would likely result in no or minimal GHG benefits since the dilution effect does not change the GHG potential on an energy (BTU) basis.

Recent action by the California State Lands Commission on the North Baja Pipeline Expansion project recognized the significance of introducing high Wobbe Index gas into California. Although the Commission approved the project, the Commission conditioned the approval by requiring the project proponent to monitor the Wobbe Index level of the gas being brought into California from the project and to mitigate possible NOx increases that could result from the use of that gas.

By establishing a natural gas specification of 1360 Wobbe Index, all gas would have to meet this standard, therefore maintaining the historical average Wobbe Index level. However, depending on the strategies used to meet this specification, GHG emission reductions may or may not be significant.

This strategy would be regulatory and affect the natural gas production and supply sectors.

4. Potential Emission Reductions

The GHG emissions benefit of this strategy is associated with the potential to avoid GHG emissions that may result from increasing the natural gas Wobbe Index above historical average levels. As discussed, the GHG emissions benefit associated with this strategy is highly dependent on the strategies used to meet a 1360 Wobbe Index specification. If natural gas liquids extraction is applied to natural gas to reduce the level of Wobbe Index to meet proposed specification, then there is a likely GHG benefit of about 1.5 percent going from a Wobbe Index of 1385 to 1360. If inerts injection were used, there would be zero to minimal GHG emissions benefit.

5. Estimated Costs / Economic Impacts and the Impacted Sectors / Entities

The cost of this strategy has not been specifically evaluated. However, rough estimates may be applicable from prior evaluations of natural gas treatment options which include NGLs extraction and inerts (e.g. nitrogen) injection. NGLs extraction can range as low as $0.04 per million BTU of gas processed and ranges from $0.24 to $0.42 per million BTU of gas processed when considering added storage and distribution infrastructure. Also, when considering inerts injection, this option ranges from $0.05 to $0.10 per million BTU of gas processed.

The natural gas industry and rate payers would be affected.

6. Technical Feasibility

Establishing a natural gas specification of 1360 Wobbe Index is technically feasible. Technology to treat natural gas to reduce the Wobbe Index is well proven but the degree of treatment is economically driven depending on the source of natural gas production and the market where the natural gas is to be sold.

7. Additional Considerations

The California Public Utilities Commission (CPUC) previously held rulemaking to establish a natural gas pipeline specification for Wobbe Index. After considering comments including a recommendation to establish a Wobbe Index of 1360, the CPUC approved a natural gas specification of 1385 Wobbe to ensure adequate supplies of natural gas. The CPUC at that time did not consider the impact of GHG emissions in their decision.

As mentioned, the jurisdiction of establishing a statewide natural gas pipeline specification for Wobbe Index needs to be clarified. Obviously, the CPUC has historical authority to regulate natural gas quality. However, under AB32, the authority to regulate

natural from a GHG perspective suggests that other agencies such as ARB now have some aspects of regulatory authority.

Currently, proposed SCAQMD -2 is not a Climate Action Team strategy.

Proposed SCAQMD-2 would be a regulatory item. Given the regulatory and technical issues that need to be addressed, development of this strategy would exceed 18 months. Further complications in developing this strategy are tied to efforts to address natural gas interchangeability. There are ongoing interchangeability test programs being sponsored by the California Energy Commission that are evaluating the effects of natural gas variability on the performance, durability, and emissions of stationary and mobile combustion equipment. Limited data indicates that certain combustion equipment can be adversely impacted as the Wobbe Index of natural gas increases resulting in increased criteria pollutants. These test programs will provide the technical basis for establishing a statewide natural gas interchangeability specification. These programs are scheduled to be completed within the next 12 to 18 months.

Comments Received From: El Paso Corporation, Insulation Contractors Association.

8. Division: Stationary Source Division
Staff Lead: Jim Guthrie
Section Manager: Gary Yee
Branch Chief: Dean Simeroth

9. References:

- *CPUC Order to Institute Rulemaking R.04-01-025*
- *CEC Public Interest Energy Research (PIER) program on natural gas interchangeability*
- *Decision of the California State Lands Commission on the North Baja Pipeline Expansion Project, July 13, 2007.*

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

1. Early Actions Strategy Name and Proponent

SUMMARY #	*D17*
ID NUMBER:	*SCAQMD-5*
TITLE:	*OFF HIGHWAY RECREATIONAL VEHICLE (OHRV) EVAPORATIVE EMISSIONS CONTROL*
PROPONENT:	*2007 STATE IMPLEMENTATION PLAN AND SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT*

2. Staff Recommendation

Staff recommends that this measure not be listed as an early action. Staff is aware of the potential climate benefit from hydrocarbon emission reductions, but additional developments are needed to address remaining scientific uncertainties regarding their climate impacts. Staff recommends that ARB continue to track the subject and further evaluation be conducted as appropriate. The strategy will remain on track for its air quality benefits.

3. Early Action Description

The OHRV category includes off highway motorcycles, ATVs, sand cars, and specialty vehicles. The OHRV evaporative emissions regulation will control primarily hydrocarbon emissions. Hydrocarbons are ozone precursors and ozone is a greenhouse gas. OHRVs will use proven automotive control technology including:

- Low Permeation Fuel Lines
- Low Permeation Fuel Tanks
- Carbon Canisters
- Fuel Injection

Additionally ARB will evaluate two implementation approaches:

1. A performance standard that will require equipment to be tested and meet a certain emission standard.
2. A design standard that will require equipment to use certified components. Each component must be tested and meet a certain emission standard.

4. Potential Emission Reduction

The OHRV regulation is expected to be implemented in 2012. When fully implemented in 2020, hydrocarbons are projected to be reduced by 11.3 TPD[1,2]. A reduction of hydrocarbon emissions will lead to a reduction in ozone. However, currently there is no model that projects the CO_2-equivalent warming impact for hydrocarbon emissions.

5. Estimated Cost / Economic Impacts and Impacted Sectors / Entities

An initial staff estimate of the increased cost to consumers to purchase an OHRV with evaporative controls is $350. It is expected that OHRV manufacturers will pass the cost of the regulation onto the OHRV consumer. When fully implemented in 2020 the total cost will be $588 million[3]. OHRV dealers may be adversely affected by an increase in equipment price of OHRVs.

6. Technical Feasibility

Potential technology that will control hydrocarbon emissions from OHRVs includes low permeation fuel tanks, low permeation fuel lines, carbon canisters, and fuel injection. These types of control technology have been proven on on-road vehicles for over 25 years. Recently evaporative controls have also been required on off-road categories such as land and garden equipment.

7. Additional Considerations

Currently ARB has aligned its regulatory approach with a U.S. EPA regulation that sets permeation standards for fuel tanks and fuel lines. However, ARB's OHRV regulatory initiative will evaluate the stringency of those standards to see if they can be tightened. ARB will also seek emission reductions from other sources within the category such as carburetors and running losses.

8. Division: Monitoring and Laboratory Division
Staff Lead: Pippin Mader
Section Manager: James Watson
Branch Chief: Manjit Ahuja

9. References

[1] Full implementation assumed at 95%

[2] All emission calculations based on ARB's Off-road 2007 Model and 75% control

[3] Controlled population of~1.68 million in 2020 times $350

Staff Analysis of Proposed Early Action for Climate Change Mitigation in California

2. Early Actions Strategy Name and Proponent

SUMMARY #	*D18*
ID NUMBER:	*SCAQMD-5*
TITLE:	*DETERMINATION OF EVAPORATIVE EMISSIONS FROM PLEASURE CRAFT*
PROPONENT:	*2007 STATE IMPLEMENTATION PLAN AND SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT*

2. Staff Recommendation

Staff recommends that this measure not be listed as an early action. Staff is aware of the potential climate benefit from hydrocarbon emission reductions, but additional developments are needed to address remaining scientific uncertainties regarding their climate impacts. Staff recommends that ARB continue to track the subject and further evaluation be conducted as appropriate. The strategy will remain on track for its air quality benefits.

3. Early Action Description.

The Pleasure Craft category includes inboard, outboard, sterndrive, and personal watercraft. The Pleasure Craft evaporative emissions control regulation will reduce hydrocarbon emissions. Hydrocarbons are ozone precursors and ozone is a greenhouse gas. Pleasure Craft will use proven automotive control technology including:

- Low Permeation Fuel Lines
- Low Permeation Fuel Tanks
- Carbon Canisters
- Fuel Injection

4. Potential Emission Reduction

The Pleasure Craft regulation is expected to be implemented in 2012. Hydrocarbon emissions are projected to be reduced by 16 TPD in 2012. When fully implemented in 2035[1,2], hydrocarbons are projected to be reduced by 53 TPD. However, currently there is no model that projects the CO_2-equivalent warming impact for hydrocarbon emissions.

5. Estimated Cost / Economic Impacts and Impacted Sectors / Entities

An initial staff estimate of the increased cost to consumers to purchase a boat with an evaporative control system is $350[3]. The estimated increased cost is minimal when compared to the current cost of a new boat. When partially implemented in 2020, the

cost to consumers is projected to be $310 million. When fully implemented in 2035 the total cost to consumers is estimated at $1.13 billion[4]. There is no foreseeable adverse impact on any businesses or individuals.

6. Technical Feasibility

Potential control technology that will reduce hydrocarbon emissions from Pleasure Craft includes low permeation fuel tanks, low permeation fuel lines, carbon canisters, and fuel injection. These types of control technology have been proven on on-road vehicles for over 25 years. Recently evaporative controls have also been required on off-road categories such as land and garden equipment. Furthermore, a 2005 in-use study of Pleasure Craft retrofitted with carbon canisters conducted by the National Marine Manufacturers Association demonstrated technical feasibility for marine applications and lessened boat manufacturer concerns.

7. Additional Considerations

The proposal being developed does not seek to retrofit existing boats with control technology due to cost and safety issues. Because of their lengthy useful life, it may take up to three decades for the inventory of Pleasure Craft to become fully compliant subsequent to implementation of the regulation 2012.

8. Division:

Staff Lead:	Fredrick Burriell
Section Manager:	James Watson
Branch Chief:	Manjit Ahuja

9. References

[1] Full implementation assumed at 95%

[2] All emission calculations based on ARB's Off-road 2007 Model and 70% control reduction

[3] Cost estimates based on a per vehicle control technology cost of $350

[4] Controlled population of ~3.22 million in 2035 times $350.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER ADOPTION OF CALIFORNIA CLIMATE ACTION REGISTRY FORESTRY GREENHOUSE GAS ACCOUNTING PROTOCOLS

The Air Resources Board (the Board or ARB) will conduct a public meeting at the time and place noted below to consider the adoption of California Climate Action Registry forestry greenhouse gas accounting protocols. Adoption is a non-regulatory action which would represent the Board's endorsement of a technically sound approach for carbon accounting in forest projects.

DATE: October 25, 2007

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I St.
Sacramento, CA 95812

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., October 25, 2007, and will continue at 8:30 a.m., October 26, 2007. This item may not be considered until October 26, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before October 25, 2007, to determine the day on which this item will be considered.

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

BACKGROUND

Staff recommends the Board adopt the California Climate Action Registry (CCAR) forestry protocols for use in voluntary greenhouse gas accounting. Adoption is a non-regulatory action which would represent the Board's endorsement of a technically sound approach for carbon accounting in forest projects. This is the first step in a process to promote projects to make use of California's forest resources to reduce greenhouse gas levels. An important step in achieving this end is scientifically based methods for accurate carbon stock accounting. The CCAR forestry protocols – the sector, project, and verification protocols – are cohesive and comprehensive sets of

methodologies for forest carbon accounting. Adoption of the CCAR sector, project and verification forest protocols is non-regulatory, and their use would be voluntary.

These protocols represent the work of leading experts in forestry and in protocol development, the input of stakeholders and the public over a four-year public process, and the review by 50 external experts representing the forest industry, policy and academia. The protocols were supported by the Board of Forestry (2004) and approved by the CCAR Board (2005).

After adopting the protocols, ARB staff will work with other state agencies and affected groups to examine the need for other forest carbon accounting methods or additional forestry protocols to address the special needs of different types of forest land holdings. This ongoing effort is needed to further promote sound forestry project development.

ARB staff will present a written report as well as oral statements at the meeting. Copies of the report may be obtained from the Board's Public Information Office, 1001 "I" Street, 1st Floor, Environmental Services Center, Sacramento, CA 95814, (916) 322-2990, on October 15, 2007. The report may also be obtained from ARB's Forestry and Climate Change internet site at **http://www.arb.ca.gov/cc/ccei/forestry/forestry.htm**.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by e-mail before the meeting. To be considered by the Board, written comments submissions not physically submitted at the meeting must be received **no later than 12:00 noon, October 24, 2007,** and addressed to the following:

Postal mail: Clerk of the Board, Air Resources Board
1001 I Street, 23rd Floor, Sacramento, California 95814

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

Facsimile submittal: (916) 322-3928

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

The Board requests, but does not require, 30 copies of any written submission. Also, the ARB requests that written and e-mail statements be filed at least ten days prior to the meeting so that ARB staff and Board members have time to fully consider each

comment. Further inquiries regarding this matter should be directed to Dale Shimp, Manager, Environmental Justice and Special Projects Section, at dshimp@arb.ca.gov, or (916) 324-7156.

CALIFORNIA AIR RESOURCES BOARD

Tom Cackette, for
Acting Executive Officer

October 11, 2007

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER THE APPROVAL OF THE SAN JOAQUIN VALLEY PM10 MAINTENANCE PLAN AND REDESIGNATION REQUEST

The Air Resources Board (the Board or ARB) will conduct a public meeting at the time and place noted below to consider the approval of the proposed 2007 plan to maintain the federal standards for inhalable particulate matter (PM10) and request for redesignation to PM10 attainment prepared by the San Joaquin Valley Unified Air Pollution Control District, and to consider modifications to the transportation conformity budgets. If adopted, ARB will submit these elements to the United States Environmental Protection Agency (U.S. EPA) for approval as a revision to the California State Implementation Plan.

DATE: October 25 and October 26, 2007

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., October 25, and may continue at 8:30 a.m., October 26, 2007. This item may not be considered until October 26, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before October 25, 2007, to determine the day on which this item will be considered.

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

BACKGROUND

The federal Clean Air Act (the Act) establishes planning requirements for those areas that routinely exceed the health-based National Ambient Air Quality Standards. These nonattainment areas must develop and implement a State Implementation Plan (SIP) that demonstrates how they will attain the standards by specified dates.

In June 2003, the San Joaquin Valley Unified Air Pollution Control District (District or Valley) adopted the 2003 PM10 Attainment Plan setting forth a control strategy for attaining the standards by December 31, 2010. As a mid-course review, the District adopted the 2006 PM10 Plan, reaffirming the control strategy in the 2003 PM10 Attainment Plan. Due to the adoption of ARB, District, and federal rules in the 2003 PM10 Plan, the Valley's air quality has improved to the point that the District now attains the PM10 standards, ahead of the 2010 attainment deadline.

In October 2006, U.S. EPA determined that the District has attained the PM10 standards, based on 2003-2005 ambient monitoring data. In August 2007 U.S. EPA followed with a proposal to affirm its October 2006 determination of attainment, based on the evaluation of 2006 monitoring data. These U.S. EPA actions, however, do not constitute formal redesignation of the District to attainment, since further Act requirements need to be met. The District prepared the 2007 PM10 Maintenance Plan (Maintenance Plan) to address these requirements and request official redesignation to attainment. The District Governing Board adopted the Maintenance Plan on September 20, 2007.

In addition, during the development of new transportation conformity budgets, the District transportation agencies provided updated transportation activity for use in calculating the conformity budgets. ARB staff determined that the conformity budgets contained in the District Plan did not reflect current information on heavy-heavy duty diesel truck (HHDDT) distribution in the San Joaquin Valley, causing an overestimation of emissions. ARB staff worked with the transportation agencies and the District to correctly reflect HHDDT activity and develop updated conformity budgets. In the Resolution approving the Maintenance Plan, the District recognized that the nature of transportation planning may trigger the need for technical refinements to the conformity budgets after adoption of the Maintenance Plan.

PROPOSED ACTION

ARB staff has reviewed the District's 2007 Maintenance Plan and concluded that it meets applicable federal requirements. ARB staff has also determined that the Maintenance Plan would ensure continued maintenance of the standard through 2020. Staff is recommending that the Board approve the Maintenance Plan, as well as the updated transportation conformity budgets, emissions inventory, and maintenance demonstration as a revision to the California SIP. In addition, ARB staff is recommending that the Board approve the District's redesignation request from nonattainment to attainment for the federal PM10 standards.

AVAILABILITY OF DOCUMENTS

ARB staff will prepare a written Staff Report prior to the meeting. Copies of the Staff Report may be obtained from the Board's Public Information Office, 1001 "I" Street,

1st Floor, Environmental Services Center, Sacramento, California 95814, (916) 322-2990. This notice, the Staff Report, and the District's Maintenance Plan may also be obtained from ARB's internet site at http://www.arb.ca.gov/planning/sip/sjvpm07/sjvpm07.htm.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by email before the meeting. To be considered by the Board, written comment submissions not physically submitted at the meeting must be received **no later than 12:00 noon, October 24, 2007,** and addressed to the following:

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

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

Facsimile submittal: (916) 322-3928

The Board requests, but does not require that 30 copies of any written statement be submitted and that written and email statements be filed at least 10 days prior to the meeting so that ARB staff and Board members have time to fully consider each comment.

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

Further inquiries regarding this matter should be directed to Ms. Sylvia Morrow, Manager of the Particulate Matter Analysis Section, Planning and Technical Support Division, 1001 I Street, Sacramento, California 95814 or by email at smorrow@arb.ca.gov, or Dr. Patricia Velasco, Staff Air Pollution Specialist, Planning and Technical Support Division at (916) 323-7460, 1001 I Street, Sacramento, California 95814 or by email at pvelasco@arb.ca.gov.

CALIFORNIA AIR RESOURCES BOARD

Tom Cackette
Acting Executive Officer

Date: 9-24-07

TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO REGULATIONS REGARDING NEW AFTERMARKET AND USED CATALYTIC CONVERTERS OFFERED FOR SALE AND USE IN CALIFORNIA

The Air Resources Board (the Board or ARB) will conduct a public hearing at the time and place noted below to consider adoption of amendments to California's regulations regarding new aftermarket and used catalytic converters sold, offered for sale, or advertised for use on California motor vehicles, or installed on California motor vehicles.

DATE: October 25, 2007

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, CA 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., October 25, 2007, and may continue at 8:30 a.m., October 26, 2007. This item may not be considered until October 26, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before October 25, 2007, to determine the day on which this item will be considered.

If you have a disability-related accommodation need, please go to http://www.arb.ca.gov/html/ada/ada.htm for assistance or contact the ADA Coordinator at (916) 323-4916. If you are a person who needs assistance in a language other than English, please contact the Bilingual Coordinator at (916) 324-5049. TTY/TDD/Speech-to-Speech users may dial 7-1-1 for the California Relay Service.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to section 2222, title 13, California Code of Regulations, Add-on Parts and Modified Parts, and proposed adoption of the incorporated document, "California Evaluation Procedures for New Aftermarket Catalytic Converters."

Background: California Vehicle Code sections 27156 and 38391 generally prohibit the sale, offer for sale, advertisement, or installation of any device that alters the design or performance of any required motor vehicle pollution control device or system. ARB has the authority to exempt non-original equipment components from this prohibition if it determines that such components will not reduce the effectiveness of any required

pollution control device or would not cause vehicle emissions to exceed applicable standards.

Within this context, ARB has promulgated regulations that allow the sale of new aftermarket catalytic converters and used original equipment converters if they comply with established performance and other criteria. The availability of these aftermarket converters creates a less expensive option for vehicle owners needing a new catalytic converter compared to the cost of purchasing an original equipment manufacturer (OEM) catalytic converter. The performance requirements for these aftermarket converters balance the continued need to control in-use emissions from motor vehicles as they age with the cost of replacing catalytic converters on vehicles that often have a limited remaining lifetime and relatively low market value.

The ARB's current aftermarket converter requirements, adopted in 1988, specify fixed minimum conversion efficiencies that aftermarket converters must meet through 25,000 miles of use. However, with the significant advances in the emission-control performance and durability of motor vehicles that have occurred since 1988, improvements to the performance requirements for non-original equipment aftermarket catalytic converters are needed to keep pace.

Proposed Amendments: Current aftermarket catalyst evaluation procedures require new aftermarket catalytic converters to be at least 70 percent efficient in converting hydrocarbons (HC) and carbon monoxide (CO) emissions in the exhaust stream, and 60 percent efficient for reducing oxides of nitrogen (NOx) pollutants, for a period of 25,000 miles.

The amendments proposed by staff would replace these requirements with performance standards based on reducing engine out emissions to levels allowing in-use vehicles equipped with aftermarket catalysts to comply with certification emission standards for a period of 5 years or 50,000 miles. The proposed requirements would apply to all new aftermarket catalytic converters sold, advertised, or installed on or after January 1, 2009. The amendments would also require manufacturers to demonstrate that their new aftermarket converters are compatible with catalytic converter malfunction detection monitoring that is part of the on-board diagnostic system (OBD II system) on 1996 and newer model year vehicles. Manufacturers would need to demonstrate that new aftermarket catalytic converters would not cause the test vehicle's Malfunction Indicator Light (MIL) to illuminate when the catalyst is functioning properly, and that the test vehicle's OBD II system would detect an aged converter by the time its conversion efficiency decreases to a level causing the vehicle emissions to exceed the manufacturers' limits for malfunction detection by no more than a factor of 50 percent.

Staff is also proposing amendments to extend the current warranty period for new aftermarket converters from 25,000 miles to 5 years or 50,000 miles, establish warranty data reporting requirements, require more informative labeling on the shell of the catalytic converter, and establish requirements for quality control checks on the converter manufacturing process.

The proposed amendments would sunset ARB's existing provisions allowing the sale of used original equipment catalytic converters for California vehicles, effective July 1, 2008 or 30 days after the amendments are filed with the Secretary of State's office, whichever date is later. Current methods used to screen the condition of used catalytic converters before resale are not sophisticated enough to ensure levels of performance necessary for current technology motor vehicles to meet emission standards. The staff believes that adequately improved screening methods would not be economically practical (i.e., screening costs would exceed the value of the used converter itself). Without an economically feasible way to ensure that used converters function at levels appropriate for the vehicle models they would be installed on, benefits to air quality may not be realized.

COMPARABLE FEDERAL REGULATIONS

Aftermarket catalytic converters are legal for sale federally under an enforcement policy established by the United States Environmental Protection Agency (U.S. EPA) in 1986. Under this policy, aftermarket catalytic converters must achieve at least 70 percent conversion efficiency for HC and CO emissions, and 30 percent for NOx emissions. With the exception of the lower NOx efficiency, the federal requirements are very similar to California's existing requirements. Therefore, as described above, the proposed amendments would significantly strengthen California's requirements for new aftermarket catalytic converters compared to U.S. EPA's guidelines in terms of required conversion efficiencies and converter durability.

Current U.S. EPA policy permits the sale of used original equipment catalytic converters if they are screened to ensure they perform at levels generally comparable to those required for new aftermarket converters. ARB is proposing to sunset California's similar provisions because screening methods to ensure that used original equipment converters can perform at levels comparable to staff's proposed requirements for new aftermarket converters are not economically feasible.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The Board staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action, which includes a summary of the economic and environmental impacts of the proposal. The report is entitled: "Public Hearing to Consider Amendments to Regulations Regarding New Aftermarket Catalytic Converters and Used Catalytic Converters Offered for Sale and Use in California."

Copies of the ISOR and the full text of the proposed regulatory language, in underline and strikeout format to allow for comparison with the existing regulations, may be accessed on the ARB's website listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990 at least 45 days prior to the scheduled hearing on October 25, 2007.

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the ARB's website listed below.

Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Allen Lyons, Staff Air Pollution Specialist, at (626) 698-1966 or alyons@arb.ca.gov, or Michael McCarthy, Manager, Advanced Engineering Section, at (626) 771-3614 or mmccarth@arb.ca.gov.

Further, the agency representative and designated back-up contact persons to who nonsubstantive inquiries concerning the proposed administrative action may be directed are Alexa Malik, Manager, Board Administration and Regulatory Coordination Unit, (916) 322-4011, or Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the ISOR and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site for this rulemaking at www.arb.ca.gov/regact/2007/amcat07/amcat07.htm

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulations are presented below.

Pursuant to Government Code section 11346.5(a)(5), the Executive Officer has determined that the proposed amendments would not impose a mandate on local agencies or school districts. The Executive Officer has further determined pursuant to Government Code section 11346.5(a)(6) that the proposed regulatory action would result in some additional costs to ARB and could create negligible costs to all other state agencies that operate fleet vehicles that are 1995 or older model year and undergo a future repair involving replacement of the catalytic converter. In addition, the Executive Officer has determined that the proposed regulatory action would not create costs or savings in federal funding to the state, will not create costs or savings to local agencies or school districts that are required to be reimbursed under Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, and will not result in other nondiscretionary savings to state or local agencies.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons and businesses, and has determined that businesses or individuals that purchase new aftermarket catalytic converters for their motor vehicles would incur additional costs as a result of this regulation. Specifically, retail costs for new aftermarket converters would increase by $200 on average. When

considering the increased durability of the converters meeting ARB staff's proposed requirements, staff estimates the price increase would amount to 10 to 28 cents per 100 miles of vehicle operation.

The proposed amendments to sunset provisions for the sale of used original equipment catalytic converters would limit converter replacement options to the purchase of a new aftermarket catalytic converter or a new original equipment converter. In cases where a new aftermarket converter is not available for a particular vehicle model, private persons and businesses could incur additional costs of $500 or more in purchasing a new original equipment converter compared to the cost of a used catalytic converter (assuming a used converter would have been available absent adoption of the proposed amendments). Staff has determined that such circumstances are likely to be limited to low-volume vehicle models with unique original equipment catalytic converter designs.

The Executive Officer has made an initial determination that the proposed regulatory action would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action could result in the elimination of a small number of jobs within the State of California. The ARB staff's proposal to sunset provisions for the sale of used original equipment catalytic converters would impact three businesses that currently offer these converters for sale in California. Employees that acquire, refurbish, or market used catalytic converters specifically for California vehicles would be impacted. Staff believes that no more than 10 jobs statewide would be eliminated. Overall, the volume of used converters sold in California is relatively small, making up less than 2 percent of the California replacement catalytic converter market. Although businesses that currently offer used catalytic converters for sale in California would be negatively impacted, staff does not believe its proposal would result in their elimination because used catalytic converters would remain legal for sale outside of California, and non-California sales currently make up the majority of their business activity. The Executive Officer has determined that the proposed regulatory action would not result in the creation of new jobs or businesses within the State of California. A detailed assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action would affect small businesses that distribute used catalytic converters for sale in California. As discussed above, staff's proposal to sunset provisions permitting the sale of used converters in California would reduce their nationwide market. Retail providers of replacement catalytic converters would not be significantly impacted because the majority of their business involves the sale of new aftermarket catalytic converters. The small portion of their business that involves the sale of used catalytic converters would likely be replaced by increased new aftermarket converter sales.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the regulation which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the board or that has otherwise been identified and brought to the attention of the board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by email before the meeting. To be considered by the Board, written comment submissions not physically submitted at the meeting must be received **no later than 12:00 noon, October 24, 2007,** and addressed to the following:

Postal mail:	Clerk of the Board, Air Resources Board 1001 I Street, Sacramento, California 95814
Electronic submittal:	http://www.arb.ca.gov/lispub/comm/bclist.php
Facsimile submittal:	(916) 322-3928

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

The Board requests but does not require that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The board encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under that authority granted in Health and Safety Code, sections 39600, 39601, 43000, 43000.5, and 43011, and Vehicle Code sections 27156, 38391 and 38395. This action is proposed to implement, interpret and make specific sections 39002, 39003, 39500, 43000, 43000.5, 43011, 43204, 43205, and 43644, Health and Safety Code, and Sections 27156, 38391, and 38395, Vehicle Code.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action; in such event the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

Tom Cackette
Acting Executive Officer

Date: 8/28/07

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

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR RULEMAKING

PUBLIC HEARING TO CONSIDER AMENDMENTS TO REGULATIONS REGARDING NEW AFTERMARKET CATALYTIC CONVERTERS AND USED CATALYTIC CONVERTERS OFFERED FOR SALE AND USE IN CALIFORNIA

Date of Release: **September 7, 2007**
Scheduled for Consideration: **October 25, 2007**

This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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ATTACHMENT 1: California Evaluation Procedures for New Aftermarket Catalytic Converters (Proposed)

ATTACHMENT 2: Proposed Regulation Order

EXECUTIVE SUMMARY

Staff is proposing amendments to the procedures it uses to evaluate and approve aftermarket catalytic converters designed for use on California passenger cars and trucks. These amendments would establish more stringent emission performance and durability requirements for new aftermarket converters offered for sale in California, consistent with downward trends in vehicle emission levels under ARB's Low Emission Vehicle (LEV) program and technological advances in the design of original equipment catalytic converters on new vehicles. The proposed amendments would also eliminate the current provisions allowing the sale and usage of used catalytic converters in California, effective July 1, 2008 or 30 days after the amendments are filed with the Secretary of State's office, whichever date is later.

ARB's current regulations governing aftermarket catalytic converters, adopted in 1988, require manufacturers to demonstrate that their converters will reduce engine out emissions by at least 60 to 70 percent for 25,000 miles of vehicle use. However, vehicles currently being sold in California can require catalyst conversion efficiencies in excess of 95% in order to comply with the more stringent emission standards that have been adopted since the late 1980s. Further, catalytic converter technology has improved to the point where aftermarket converters can be designed to achieve a significantly higher level of performance in a cost effective manner.

The proposed amendments would replace, beginning January 1, 2009, these existing requirements with performance standards based on reducing engine out emission levels to the point that in-use vehicles equipped with aftermarket catalysts can comply with certification emission standards. The required durability period for these aftermarket converters would be extended from 25,000 miles to 5 years or 50,000 miles of use. The amendments would also require manufacturers to demonstrate that their catalysts are compatible with vehicle on-board diagnostic systems for 1996 and newer vehicles, warrant that the converters are free from defects, and implement quality control procedures to ensure production components perform as expected in-use.

ARB regulations currently permit the practice of reselling used original equipment catalytic converters, provided that businesses implement an ARB approved screening process to ensure that the converters still have a reasonable level of performance. However, staff believes that screening for levels of performance comparable to those being proposed for new aftermarket converters would be prohibitively expensive, costing more per test than the entire value of a used converter. Therefore, staff believes its proposal to sunset the provisions permitting the sale of used converters is more appropriate than establishing a procedure for which compliance would be economically infeasible.

Staff estimates that the proposed requirements would reduce hydrocarbon (HC) and oxides of nitrogen (NOx) emissions from on-road vehicles by approximately 36 tons per day by the year 2012. New aftermarket catalytic converters designed to meet

the proposed requirements would cost up to $200 more per unit on average than those currently available for older vehicles. However, due to the substantially better emissions performance and durability requirements of these converters, staff estimates indicate that the proposed requirements would be highly cost effective at approximately $2 per pound of HC+NOx emission reductions.

I. INTRODUCTION

State law generally prohibits the installation, sale, offer for sale, or advertisement of emission-related parts for motor vehicles that are not functionally identical to those installed by the original equipment manufacturer (OEM). However, ARB regulations allow new aftermarket catalytic converters to be used on older vehicles operating within California provided that they comply with established performance requirements. These performance requirements balance the continued need for controlling emissions from motor vehicles as they age against the cost of replacing catalytic converters on vehicles that often have a limited remaining lifetime and relatively low marketplace value.

Over the past twenty years, the performance and durability of motor vehicle emission controls have significantly improved, and the performance requirements for new aftermarket converters likewise need to be updated. Emission reductions from motor vehicles that require catalytic converter replacements are both necessary and achievable, and the improved performance and durability of new aftermarket catalytic converters meeting staff's proposed regulatory amendments would provide for significant additional benefits from older California vehicles in a cost-effective manner.

II. BACKGROUND

Catalytic converters reduce vehicle exhaust emission levels by chemically converting engine-out emissions before the exhaust gas leaves the tailpipe. A converter contains a substrate that directs exhaust gases through narrow channels coated with precious metals that initiate the conversion of pollutants into primarily carbon dioxide and water vapor.

Since their introduction in the mid-1970's, catalytic converters continue to be the single most important technology for the control of emissions from gasoline powered motor vehicles. Current catalytic converter designs are more than 95% efficient in removing the hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) from engine exhaust before they reach the atmosphere. Improvements in catalytic converter washcoats, precious metal loading, and substrate designs over the years, in combination with better vehicle fuel control systems, are the primary factors that have made compliance with California's very low emission standards possible.

Although original equipment manufacturer (OEM) catalytic converters are designed and certified to last for at least 100,000 to 150,000 miles on newer models, heat, vibration, and poisons can eventually reduce catalytic converter efficiencies to the point that older vehicles will not be able to meet Smog Check emission limits. Such converters need to be replaced; however, OEM replacement converters are typically expensive, costing from $500 to over $1000. Compounding the problem, many vehicles requiring a replacement converter have considerably less than 100,000 miles of expected life remaining, making such large repair costs difficult to justify.

In order to provide for lower cost aftermarket catalytic converters, ARB adopted regulations in 1988 that permit the sale and installation of non-OEM replacement catalytic converters in California vehicles. The requirements specified minimum conversion efficiencies for aftermarket converters through 25,000 miles of use. The conversion efficiencies of 70 percent for HC and CO and 60 percent for NOx were chosen primarily to provide for consistency with federal converter replacement policies. However, the NOx efficiency requirement was adjusted upward from the 30 percent federal specification because of the need for greater NOx reductions in California. ARB testing at the time indicated that 60 percent NOx conversion efficiency was reasonably comparable to the performance of higher mileage, but properly maintained, original equipment converters used on vehicles with emission control technologies of that day.

Since then, emission standards for light- and medium-duty vehicles have decreased dramatically through ARB's low emission vehicle (LEV I and LEV II) requirements. OEM catalyst performance has correspondingly increased substantially due to improved formulations and substrate designs that provide for higher efficiencies and faster warm-up times. Therefore, an update to the requirements for aftermarket catalysts is needed to ensure that the in-use emission performance of current technology vehicles is not adversely compromised by the use of non-OEM replacement catalysts.

Another significant advance that occurred in the 1990's was the implementation of On-Board Diagnostic II (OBD II) systems on light- and medium-duty vehicles. These systems use the vehicle's on-board computer to monitor the performance of its emission control systems, including the catalytic converter. Aftermarket catalytic converters meeting the current converter conversion efficiency requirements are generally not compatible with vehicle OBD II systems because their level of performance, even when relatively new, can fall below the levels at which the OBD II system will indicate a malfunction.

Because some OBD II equipped vehicles are now more than 10 years old, the need already exists in the marketplace for aftermarket catalytic converters that are compatible with these vehicles. As a short term solution, staff has drafted specifications and test procedures for OBD II-compatible aftermarket converters, and most aftermarket catalytic converter manufacturers have agreed to use these procedures to produce aftermarket converters capable of allowing OBD II-equipped vehicles to meet emission standards for a period of 5 years or 50,000 miles. Further, the converters are designed to ensure that vehicle OBD II systems do not falsely indicate a malfunction based on replacement of the OEM converter. The proposed amendments described below for new aftermarket catalytic converters are largely based on the same concepts initially developed in the context of these agreements.

III. COMPARABLE FEDERAL REGULATIONS

The United States Environmental Protection Agency (U.S. EPA) addressed the subject of aftermarket catalytic converters by issuing an interim enforcement policy in 1986. The policy permits the sale of aftermarket converters provided they meet conversion efficiencies of at least 70 percent for HC and CO, and 30 percent for NOx. The federal requirements are therefore similar to California's current conversion efficiency requirements, except that the federal specifications for NOx conversion are only half of California's 60 percent requirement. Some procedural differences also currently exist; for example, ARB's regulation requires converter manufacturers to demonstrate compliance with its requirements before an approval is issued, whereas the federal requirements permit manufacturers to self-determine compliance. Since issuing its enforcement policy, U.S. EPA has thus far decided not to issue regulations specific to aftermarket catalytic converters, and has not announced any plans to do so in the near future.

IV. PROPOSED AMENDMENTS

A. New Aftermarket Converter Performance Requirements

1. Non-OBD II Vehicles

Staff proposes to change the new aftermarket converter performance requirements from standards based on converter efficiency to standards based on vehicle tailpipe emission levels for converters advertised, sold, or installed on or after January 1, 2009. The proposal would require aftermarket converter manufacturers to specify the vehicle and exhaust system categories that each of their catalytic converter models is designed to fit (e.g., passenger cars with a single catalytic converter exhaust design). The ARB would then select a "representative" vehicle model for each category to be used by the manufacturers to demonstrate compliance with the performance requirements. Manufacturers would test the representative vehicle with an aftermarket converter that has been aged the equivalent of 50,000 miles of use. The converter would pass the performance requirement if the vehicle's emissions do not exceed the limits the vehicle was certified to meet.

2. OBD II Equipped Vehicles

The proposed requirements for OBD II equipped vehicles are very similar to those already being met by most aftermarket catalytic converter manufacturers through interim agreements with the ARB. Manufacturers would assemble a list of vehicles that each new aftermarket converter is designed to work with. Staff would then select one or more representative vehicles from the list for the manufacturer's compliance determination. Similar to the proposed requirement for non-OBD II vehicles, the manufacturer would then demonstrate through emission testing of an aged converter that the test vehicles are capable of meeting their emission standards. The proposed requirements for OBD II equipped vehicles would also become effective on January 1, 2009.

The proposed procedures would also require a demonstration of OBD II compatibility. Manufacturers would demonstrate through the emission testing that their new aftermarket catalytic converters would not cause a test vehicle's Malfunction Indicator Light (MIL) to illuminate when the catalyst is functioning properly. The manufacturers would then severely age a prototype converter to demonstrate that the test vehicle's OBD II system will detect the converter as malfunctioning by the time its conversion efficiency deteriorates to the point that vehicle emissions exceed the manufacturers' limits for malfunction detection by no more than a factor of 50 percent.

B. Warranty Requirements

The proposed procedures would require manufacturers to warrant their aftermarket converters for 5 years or 50,000 miles, (compared to a 25,000 mile warranty period in the existing procedures). The warranty would cover failures related to conversion efficiency performance, OBD II compatibility (if applicable), and physical problems such as corrosion or leaks in the outer shell or connecting pipes. If a problem covered under warranty does occur, both the cost of a new component and installation labor would be free of charge to the vehicle owner.

Manufacturers would be required to monitor warranty claims on an ongoing basis and report to ARB when the rate of claims exceed 4 percent, or the total number of claims exceeds 100, for a particular converter design. For confirmed warranty rates above these levels, manufacturers would be required to report the probable cause for the failures and the impact of the failures on vehicle emissions. If ARB determines that the data demonstrates that systematic failure of the converters is occurring, and that the failures significantly impact vehicle emission levels, further sale of the converters can be suspended until the cause of the failures has been corrected.

C. Labeling Requirements

Proper labeling of aftermarket catalytic converters is essential to facilitate verification during a Smog Check that the vehicle is operating with an approved converter. The proposed procedures would require manufacturers to apply a permanent label or stamp to the converter shell that indicates ARB's approval number for the converter design, the part number, the date of manufacture, and an arrow indicating the proper installation direction for the converter.

D. Quality Control Procedures

The proposed amendments would require manufacturers to monitor the aftermarket catalytic converter production process to ensure that production components actually meet the specifications upon which ARB approval is based. Manufacturers would check for adequate precious metal content, base metal content, and washcoat loading. Inspections to ensure proper application of the washcoat, installation of

matting materials, and the absence of leaks in the converters shell would also be required.

Manufacturers must evaluate at least one percent of the converters produced in each lot. If a sampled converter fails one or more of the quality control checks, all converters produced from the time of the last passing sample must be evaluated before they can be released for sale, and all failing converters must be reprocessed or destroyed. The proposed procedures would require manufacturers to report the results of their quality control checks to ARB on a quarterly basis.

E. Application Process

Manufacturers would be required to initiate ARB approval of aftermarket catalytic converters by submitting an application for exemption. The proposed procedures specifically list the information and data that must be included in the application. Staff will issue an exemption for the aftermarket catalytic converters covered by the application only after it determines that all required information has been submitted, and that the information demonstrates that the aftermarket converters comply with the procedures' requirements.

F. Installation Requirements

Ensuring that vehicles are properly fitted with approved aftermarket converters at the point of sale is critical for realizing the full expected benefits of the program. Therefore, the procedures also set forth requirements that apply to individuals and businesses that sell and install aftermarket converters. The proposed procedures would require installers to: 1) ensure that each aftermarket converter has been approved by ARB for installation on the vehicle model in question, 2) verify that each vehicle needing a new aftermarket catalytic converter is outside of the vehicle manufacturer's warranty period for the original equipment converter (typically 7 years or 70,000 miles), 3) establish a legitimate need for an aftermarket converter by first examining the existing converter and exhaust system, and 4) install the aftermarket converter in the same location as the original equipment converter on a one-for-one basis, and without relocating or removing other converters or exhaust oxygen sensors.

G. Used Original Equipment Catalytic Converters

Staff's proposed amendments would eliminate, effective July 1, 2008, or 30 days after the amendments are filed with the Secretary of State's office, whichever date is later, the current provisions allowing the advertising, sale, and installation of used OEM catalytic converters. Staff believes that continued availability of used OEM catalytic converters would only be appropriate if they are individually tested to demonstrate that their emission performance is comparable to the proposed requirements for new aftermarket catalysts. However, staff is not aware of any economically feasible screening test that can reliably demonstrate that a current technology vehicle will operate within its emission standards for 50,000 miles of vehicle operation when a used converter is installed. Further discussion of the

considerations behind staff's proposal for used converters is presented in detail below.

V. ISSUES REGARDING THE PROPOSAL

A. Prohibiting the sale of used OEM catalytic converters

Staff's proposal would eliminate current provisions allowing the advertising, sale, offering for sale, and installation of used OEM catalytic converters. Staff believes this amendment is necessary because no economically feasible screening method exists that can reliably evaluate whether a used converter will perform at levels comparable to those required of new aftermarket converters produced in compliance with staff's proposed amendments. This proposed change will have a significant impact on the three businesses that currently offer used converters for sale in California.

Under current regulations, businesses may apply to ARB for permission to sell used catalytic converters in California if they implement a process by which they screen out overly deteriorated or chemically "poisoned" parts, and determine what vehicle applications each used converter is compatible with. The process is consistent with the U.S. EPA's interim enforcement policy for used converters (51 Fed. Reg. 28114 (August 5, 1986) and 51 Fed. Reg.28132 (August 5, 1986).

When a used catalytic converter is removed from a vehicle for the purposes of reselling it, the emission performance of the converter is unknown, aside from what might be inferred from the age and mileage of the vehicle. The used converter may be able to achieve high conversion efficiencies, or it may have experienced in-use operating conditions that have caused it to be severely deteriorated. Therefore, the process of certifying these converters for resale requires that the condition of each unit be evaluated for its ability to reduce emissions.

Because every used converter must be tested to determine if it performs satisfactorily, the test procedure used for screening must be inexpensive relative to the value of the converters. Otherwise, testing costs will drive up the price of used converters beyond what the market will permit. Used catalyst resellers have been able to achieve this requirement by using test rigs that can evaluate steady-state conversion efficiencies at levels comparable to those that new aftermarket converters are required to achieve under the existing procedures for pre-1996 model year vehicles (i.e., efficiencies above 60 to 70 percent). However, these basic test methods cannot be modified to reliably evaluate whether a used converter is capable of achieving the substantially higher levels of conversion efficiency that all new aftermarket catalytic converters would have to meet under the proposed requirements. Further, the test methods being used cannot evaluate converter performance during transient or cold start vehicle operating conditions (critical elements to a converter's emission reduction performance) without correspondingly greatly increasing the cost of the test. As a point of reference, the type of emission tests that new aftermarket catalytic converter manufacturers would use to ensure

that their converters meet the performance levels proposed by staff typically cost $1500 or more per test.

In discussions with one company that currently resells used original equipment converters, the concept of using vehicle OBD II systems for screening was explored for 1996 and newer vehicles. That is, whether or not a used converter still has adequate life left would be based on whether or not it is detected as malfunctioning by the vehicle it is installed on. Converters that are detected as malfunctioning too soon after installation would be replaced under warranty.

While all 1996 and newer model year vehicles have OBD II diagnostic systems to monitor the health of the converter and alert the driver when it malfunctions, tailpipe emissions are typically 1.5 to 4 times the hydrocarbon (HC) standards when this occurs, and oxides of nitrogen (NOx) emissions may be higher still. These margins above the emission standards were established by the OBD II regulation to ensure that monitored components are not flagged by the OBD II system until their performance has clearly degraded to the point that emission standards are no longer being met. As such, reliance on the OBD II system to evaluate a used converter is not an affirmative determination that a used replacement converter has brought emissions from the vehicle back into compliance with emission standards or that the converter has significant life remaining. Consumer experiences with such a concept would likely be highly variable. Some may experience a long period of time with good emission performance and no malfunction indications while others may immediately need to have the converter replaced again (and could possibly need multiple converter replacements in a short period of time). Staff believes this approach would create confusion and dissatisfaction should newly purchased "legal" parts immediately fail and need to be replaced. Further, the loss of important emission benefits would likely result from replacement parts that, from the time of installation, are inadequate to properly control vehicle emission levels.

In light of these circumstances, staff believes that phasing out the existing provisions allowing the use and sale of used OEM converters is the best available course of action. Leaving the used converter provisions unchanged, or proposing performance requirements that are only somewhat more stringent than the existing used aftermarket catalyst performance requirements because better screening procedures are not reasonably available, would create an inequity between the requirements for used converters as compared to those for new aftermarket converters, potentially undermining the benefits of staff's proposal. Raising the screening requirements to test used converters for comparable levels of performance regardless of costs is a regulatory possibility; however, staff believes the used converter provisions would be economically infeasible. Moreover, merely having such requirements might mislead the public that a used OEM converter business is viable in California.

Used converter resellers have indicated they play a unique role in providing an affordable alternative to an original equipment replacement converter for vehicles when no new aftermarket converter is available. Staff acknowledges that, as with any part, an aftermarket company has to determine that a valid business case exists

for designing and producing a part for low volume vehicle models or for designing and producing a component that might be difficult to manufacture and sell at a cost that is sufficiently lower than for the OEM component. As a result, it is possible that the purchase of a new OEM converter may be the only option in some circumstances should ARB staff's proposal to sunset provisions for the sale of used converters be adopted. However, the ARB staff believes the importance of equitable requirements that provide for significant and cost-effective emission reductions for the vast majority of California vehicles outweighs any negative impact resulting from higher catalytic converter replacement costs that might occur for a relatively few vehicles.

B. Increased prices for new aftermarket catalytic converters

Aftermarket catalytic converters for pre-OBD II vehicles currently cost between approximately $60 and $150 with $100 as a very typical average price. Staff estimates that the average price of an aftermarket converter for pre-OBD II vehicles will initially increase by up to $200 as a result of the proposed amendments. Consumers therefore could see prices increase to up to four times current levels under the proposed amendments. While the expected price increases may initially seem excessive, the new aftermarket converter designs would provide better, more durable performance, and costs would actually remain reasonably consistent with historical costs when considering average increases in vehicle values over time.

New aftermarket converters meeting the proposed requirements would be designed to be twice as durable as those meeting the existing requirements (50,000 versus 25,000 miles). Therefore, consumers would be less likely to need to purchase a second or third catalyst during a vehicle's lifetime. On the basis of cost per mile of use over their lifetime, the increased durability of converters meeting the proposed requirements would cut their cost increase by a factor of two. At the prices indicated above, current aftermarket converters cost between 24 to 60 cents per 100 miles driven over their lifetime. Converters meeting the proposed requirements would cost between approximately 52 to 70 cents per 100 miles driven. Staff believes in the longer term that the incremental cost of aftermarket converters meeting the proposed requirements could drop below $200 on average as production volumes increase and manufacturers gain experience necessary to maximize the number of vehicles models for which compliance with a specific converter design can be achieved. Any price reductions that occur would further reduce the incremental cost impact of the proposed requirements.

When ARB adopted the current performance requirements for new aftermarket catalytic converters in 1988, staff estimated that the average cost of a converter would be $205. Considering that average vehicle values (based on manufacturer suggested retail prices) have essentially doubled since 1987[1], even the high-end estimated cost of $350 would, as a function of vehicle value, be less under the proposed amendments. In general, aftermarket converters today cost considerably

[1] Ethan Abeles, Institute of Transportation Studies, University of California, Davis, "Analysis of Light-Duty Vehicle Price Trends in the U.S.," June 2004.

less than ARB's 1988 estimate because manufacturing improvements over the past two decades, most notably better formulations and catalyst washcoat technologies, have permitted catalyst manufacturers to design and produce products that achieve the same level of emissions performance while using far less precious metals.

VI. AIR QUALITY, ENVIRONMENTAL, AND ECONOMIC IMPACTS

A. Air Quality

Staff developed an emission benefit estimate that applies to the non-OBD II equipped California fleet that is subject to Smog Check. Aftermarket catalytic converters for OBD II equipped vehicles are currently only being approved under interim agreements with the ARB. Because the performance requirements being implemented through the agreements are very similar to the proposed requirements, staff does not believe that a significant emission benefit can be calculated. Notwithstanding this, the Board's adoption of the proposed requirements for OBD II vehicles would formalize the requirements included in the interim agreements and would provide for more minor procedural improvements.

The emission benefit estimate for the statewide non-OBD II fleet is based on vehicle emission data obtained from a previous test program conducted at ARB's Haagen-Smit Laboratory. A total of fourteen procured test vehicles were baseline tested. In order to screen out vehicles with underlying emission-related problems, the test vehicles were required to pass a Smog Check inspection in their as-received condition before being included in the test program. Once included, the vehicles were fitted with an aftermarket catalytic converter. Some of the test vehicles received aftermarket catalysts meeting ARB's current requirements for non-OBD II vehicles, and the remaining vehicles were fitted with catalysts designed to meet the proposed performance requirements. Emissions tests were conducted after the aftermarket converters were installed and the vehicles were then returned to their owners for mileage accumulation. The vehicles were later re-procured and tested again. A summary of the as-received test data is presented in Table 1.

Table 1 – Baseline Test Vehicle Characteristics

Test Vehicles with Converters Meeting:	Sample Size	Average Model Year	Average Mileage	Baseline Emission Levels (g/mile)		
				HC	CO	NOx
Current Requirements	5	1987.0	139,644	0.585	6.129	0.876
Proposed Requirements	9	1989.0	160,700	0.393	4.648	0.747

Table 2 shows the change in emission levels after the converters on the vehicles were replaced with aftermarket converters. The testing occurred while the aftermarket converters were still "green" (i.e., no significant mileage accumulation occurred to stabilize conversion efficiencies).

Table 2 – Emissions with Green Catalytic Converters

Test Vehicles with Converters Meeting:	Emission Levels (g/mile)			Benefits wrt Baseline (g/mile)		
	HC	CO	NOx	HC	CO	NOx
Current Requirements	0.311	2.389	0.493	0.274	3.740	0.382
Proposed Requirements	0.162	1.027	0.342	0.232	3.621	0.406
Difference	**0.149**	**1.362**	**0.152**	**0.042**	**0.119**	**0.023**

Table 3 summarizes the emission levels of the same vehicles after mileage accumulation, and presents the resulting emission "benefits" of the aftermarket converters compared to the baseline values in Table 1. Negative benefit values indicate that emissions from the test vehicles after mileage accumulation were higher on average than the baseline readings taken with the original converters still installed. These negative values likely indicate that the aftermarket converters on average were performing at a lower level than the original catalysts. However, this does not necessarily suggest that the aftermarket converters were failing to perform as expected, keeping in mind that the original converters were likely still in good condition (as evidenced by passing Smog Check results).

Table 3 – Vehicle/Catalyst Emission Performance After Mileage Accumulation

Test Vehicles with Converters Meeting:	Average Mileage Accumulation	Emission Levels (g/mile)			Benefits wrt Baseline (g/mile)		
		HC	CO	NOx	HC	CO	NOx
Current Requirements	8,754	0.605	4.987	1.431	-0.020	1.141	-0.556
Proposed Requirements	7,847	0.253	2.227	0.358	0.141	2.420	0.389
Difference	**908**	**0.352**	**2.760**	**1.073**	**0.160**	**1.279**	**0.945**

Having established the test data to be used for the analysis, staff used three sets of information to calculate the tons-per-day benefit of the proposed amendments:

1. The average difference in emission rates (when using converters meeting the proposed requirements compared to using converters meeting the current requirements).
2. The population of vehicles in California that will be equipped with aftermarket converters, and
3. The average number of miles these vehicles drive per day.

Emission Rates

Determining the average emission rate requires knowledge of how emissions change as a function of mileage accumulation when the aftermarket catalysts are installed. In this case, what is really needed is the change in emissions for the two groups of vehicles relative to each other. Although a linear deterioration rate can be calculated using the emission values obtained with green catalysts and after mileage accumulation, staff believes that the use of the green catalyst data would result in an overestimation of the deterioration rate because green catalysts are generally very efficient initially, but their efficiency quickly declines in a non-linear fashion until the catalyst is stabilized. Without the green-catalyst data, however, deterioration rates

cannot be determined from the single remaining data point after mileage accumulation.

Staff's estimate resolves this problem by assuming that the deterioration rates for the current and proposed aftermarket catalysts are the same. This means that the difference in emission performance between the two types of catalysts observed after mileage accumulation is assumed to be constant throughout the expected lives of the catalysts. In reality, aftermarket catalysts meeting the proposed requirements would likely deteriorate at a slower rate. Staff bases this statement on the fact that the deterioration rate for the current aftermarket catalysts is far greater than for the proposed catalysts when the green catalyst data is considered, and the fact that the proposed catalysts would be required to maintain a higher catalyst efficiency for twice the length of time compared to existing aftermarket catalysts. Therefore, any error introduced with this assumption regarding deterioration rates would only result in a more conservative emission benefit. Without being able to more accurately quantify deterioration rates, staff believes using a more conservative approach is appropriate.

Once it resolved the issue of calculating aftermarket catalyst deterioration rates, staff considered two ways to calculate the difference in performance for the two types of catalysts. The first approach used the difference in tailpipe emission levels after mileage accumulation. The second approach used the difference in emission benefits after mileage accumulation with respect to the baseline emission levels for each set of vehicles. Both values are presented in Table 3 above. Staff believes that comparing the benefits of the aftermarket catalysts with respect to baseline emissions (the second method) is the better approach, because the baseline emissions for the vehicles fitted with current aftermarket catalysts is higher than the baseline emissions of the vehicles fitted with the aftermarket catalysts designed to meet the proposed requirements. A greater absolute emission reduction would therefore be needed for current catalyst equipped vehicles as compared with the vehicles using the proposed aftermarket catalysts to attain the same tailpipe emission level (assuming the higher baseline emission levels are at least in part attributable to higher engine out emission levels). Furthermore, comparing the emission benefits with respect to the baseline level should slightly favor the current aftermarket catalysts, because catalysts of the same efficiency should yield higher absolute emission reductions when exposed to higher feed-gas levels (e.g., a 70% reduction on a vehicle with 2.5 grams per mile engine out is greater than a 70% reduction on a 2 gram per mile vehicle). Consistent with its decision on the approach to estimating deterioration rates, staff elected to use a more conservative approach for estimating the emission benefit of the proposal.

Aftermarket Catalyst Populations

Staff used industry aftermarket converter sales data to estimate the number of vehicles in California in calendar year 2006 that were equipped with aftermarket catalysts. The number of vehicles so equipped in future model years can then be estimated based on the percentage of vehicles equipped with aftermarket catalysts compared to the total fleet for the model year in question.

The sales data indicates that, on average, approximately 880,000 aftermarket converters were sold per year in California over the last five calendar years. For calendar year 2006, approximately 74 percent of sales were for pre-OBD II vehicles.

Staff estimates that current aftermarket catalytic converters for pre-OBD II vehicles last about 3 years on average, after which the vehicles on which they are equipped would again fail a Smog Check inspection. This estimate is based on the assumption that the catalysts will not last long enough on 50 percent of vehicles to enable the vehicles to pass their next biennial Smog Check, and that the remaining 50 percent would not last beyond the second biennial Smog Check after their installation.

A three year average life means that in each year, roughly one third of the fleet equipped with an aftermarket converter will need a replacement. Staff therefore believes that the number of pre-OBD II vehicles equipped with aftermarket catalysts in California can be estimated by multiplying the annual sales figures of aftermarket converters by a factor of three.

As indicated in Table 4 below, the resulting estimate is that over 1.9 million pre-OBD II vehicles were equipped with aftermarket catalytic converters in Calendar Year 2006. This equates to about 30.3% of all 1977 through 1995 model year passenger cars, light-duty trucks, and medium-duty vehicles.

Table 4 – Aftermarket Catalyst Populations in California

	Percent	Number
Annual California Aftermarket Converter Sales		880,000
Portion that are for pre-OBD II vehicles	74%	651,200
Number of pre-OBD II vehicles equipped with aftermarket catalysts in CY2006 (based on 3 yr average life)		1,953,600
Portion of CY 2006 fleet (1977-1995 Model Years)	30.3%	

The proposed revisions to the requirements for pre-OBD II aftermarket catalytic converters would go into effect on January 1, 2009. Therefore, staff chose calendar year 2012 for its benefit analysis. Based on the expected three year life of aftermarket converters meeting current requirements, staff believes that most vehicles using aftermarket catalysts would be equipped with aftermarket converters meeting the proposed requirements by that time.

EMFAC estimates that about 3.5 million 1977 to 1995 gasoline powered passenger cars, light-duty trucks, and medium duty vehicles will be on the road in 2012. By taking the 2006 percentage, which indicates that about 30% of these vehicles operate with aftermarket catalysts, and scaling it up to 35% to reflect the increased use of aftermarket catalysts as the fleet continues to age, staff estimates that the 2012 calendar year population of vehicles equipped with aftermarket catalysts will be about 1.26 million.

Vehicle Miles Traveled

EMFAC 2007 indicates that the average miles traveled per day in 2012 for vehicles between model years 1977 and 1995 is 23.9.

Emission Benefit Estimate Results

Table 5 below presents the emission benefit estimate that results from multiplying the difference in emission rates by the affected vehicle population and its average daily mileage. The results indicate that the statewide 2012 benefit would be 36.61 tons per day for HC + NOx emissions with the bulk of the reductions coming from NOx emissions.

Table 5 – Emission Benefit Estimate Results

		HC	NOx	HC+NOx
Difference in Emission Rates (g/mi)		0.160	0.945	1.105
Population of Vehicles with AM converters		1,258,680		
Average Miles Traveled per Day		23.9		
Daily Benefit (Statewide 2012)	grams/day	4,816,201	28,426,914	33,243,115
	lbs/day	10,608	62,614	73,223
	tons/day	**5.30**	**31.31**	**36.61**

Cost Effectiveness

Staff has estimated the cost effectiveness of the proposed amendments to the requirements for pre-OBD II aftermarket catalytic converters. The methodology and results of the analysis are presented below.

Staff's experience with new aftermarket converters produced and sold under the interim agreements for OBD II equipped vehicles indicates that converters complying with the revised requirements will cost up to $200 more on average than those meeting the current requirements. Staff assumed an average life expectancy of five years, two years longer than that estimated for converters meeting current requirements. As presented in Table 6 below, the resulting cost effectiveness is $1.88 per pound of HC+NOx reduced. Therefore, staff expects the new requirements to be very cost effective.

Table 6 – Cost-Effectiveness Estimate

Ave Difference in Emission Rates (g/mi HC+NOx)		1.105
Yearly Average Benefit per Vehicle (grams HC+NOx)		9,640
Expected Life of Converters (years)		5
Lifetime Benefits (HC + NOx)	grams	48,200
	pounds	106.17
Average Incremental Cost ($)		$200
Cost Effectiveness ($/pound HC + NOx)		$1.88

B. Environmental Justice

The proposed amendments apply to new aftermarket catalytic converters installed in motor vehicles that operate throughout the state. However, to the extent that older vehicles may operate more frequently in communities with lower median-incomes, staff expects that the proposed amendments will provide these communities with a relatively greater emission benefit. Older vehicles are more likely to require aftermarket catalytic converters to replace OEM converters. The proposed amendments will ensure that these aftermarket converters will be better performing and more durable than those currently available, reducing emissions of harmful pollutants. The impact of increased prices for new aftermarket catalytic converters on low income vehicle owners should be minimized or even eliminated under the Bureau of Automotive Repair's (BAR's) Consumer Assistance Program (CAP). This program offers up to $500 in emission-related repairs to help qualified owners' vehicles pass their Smog Check inspection. Motorists whose household incomes are at or below 225% of the federal poverty guidelines can qualify for repair assistance, as can motorists that own vehicles that BAR has directed to a Test-Only station for their Smog Check inspection. The $500 limit should be adequate to cover the purchase and installation of a new aftermarket catalytic converter in virtually all circumstances.

C. Economic Impacts

1. Costs to Consumers

Staff estimates that the proposed amendments to the requirements for aftermarket catalytic converters will result in an increased cost per unit of up to $200 on average. The cost increase would mostly result from the greater quantities of precious metals needed to increase catalytic conversion efficiencies to the levels necessary for compliance. Although this represents a price increase of two to four times the price for aftermarket converters meeting current requirements, the durability of converters meeting the proposed requirements is expected to be twice as long. Therefore, as described in section IV above, the cost impact of the proposed requirements would, on a cost per mile basis, increase by about 50 percent (from 42 cents per 100 miles driven to about 61 cents, on average).

As discussed in section V.A above, one result of staff's proposal to sunset provisions for the sale of used OEM converters may be that some vehicle owners have no option but to purchase a new OEM replacement converter in cases where a new aftermarket converter is not available for the vehicle model in question. Thus, the cost of replacing a converter could be $500 to $1000 or more. Staff believes such circumstances would be generally limited to low-volume vehicle models for which aftermarket converters cannot be sold in volumes sufficient to provide for the recovery of aftermarket catalytic converter manufacturers' development costs.

2. Costs to Aftermarket Converter Manufacturers

Although aftermarket converter manufacturers would incur new research, development, and testing costs under the proposed amendments, staff expects that the costs would be amortized into the market price for the converters. Further, because aftermarket catalytic converters are manufactured and sold in high volumes, staff believes these costs would be negligible on a per piece basis.

3. Impact on Businesses

Although retailers' average price per converter would increase under the proposed amendments, staff does not believe retailer profits would be negatively impacted because the overall need for aftermarket catalytic converters would not be changed. The proposal should not impact the ability of any California business to compete with businesses from other states, because the requirements would apply to all converters sold, offered for sale, installed, or advertised in California, regardless of where they are manufactured.

Businesses that currently resell used original equipment catalytic converters would be impacted by the proposal to eliminate California's provisions allowing the sale of these devices. These businesses would no longer have a California market for their products, but could continue to sell products out-of-state under current federal regulations. As described in Section V.A above, this impact cannot be currently mitigated due to the lack of an economically feasible process that would be adequate to evaluate the condition of used converters prior to their resale.

D. Alternatives Considered

In reviewing ARB's longstanding provisions for the sale of new aftermarket catalytic converters for older California vehicles, the staff determined that apart from its proposal, two alternative courses of action were available for consideration. However, as described below, neither alternative considered by the staff would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective and less burdensome to affected private persons than the proposed requirements.

1. Leaving requirements unchanged

One alternative considered by staff was to leave California's requirements for new aftermarket catalytic converters unchanged. This alternative would have the benefit of keeping aftermarket converter prices at their current low levels. Staff rejected this alternative based on its determination that significant and cost effective emission reductions from in-use vehicles would result from the introduction of better performing aftermarket converters. These reductions are necessary to help California achieve its air quality goals.

2. Requiring replacement catalysts to meet OEM specifications

Staff also considered the alternative of phasing out the provisions for aftermarket catalytic converters in their entirety. This alternative would require all aftermarket catalytic converters sold in California to be functionally identical to original equipment converters in all aspects, including component durability.

Staff determined the primary benefit of this alternative would be the increased durability that OEM-quality converters would provide. They are generally designed to last for 100,000 to 150,000 miles of use, compared to the 50,000 mile durability requirements included in staff's proposed amendments. Staff would not expect OEM-quality converters to provide a significant additional benefit over the first 50,000 miles of use because the staff's proposed amendments would require demonstration that vehicles equipped with aftermarket converters will emit at levels below applicable emission standards for the length of the durability period.

Staff rejected this alternative because many vehicles requiring aftermarket converters are not likely to have 100,000 miles of life remaining. Requiring vehicle owners to purchase OEM equivalent converters that would often be far more durable than necessary to reduce emissions over the vehicle's remaining lifetime would increase costs without providing significant additional emission benefits. OEM quality converters would cost in excess of $500 in most cases, with some converter prices exceeding $1000. Therefore, the cost effectiveness of this approach would be relatively poor in comparison to the staff's proposal.

VII. SUMMARY AND CONCLUSION

The staff's proposal provides needed updates to California's requirements for the sale of aftermarket catalytic converters for motor vehicles. The proposed increases in conversion efficiency and durability would bring new aftermarket converter performance back in-line with levels necessary to ensure that vehicles designed to meet current standards will continue to have low emissions throughout their lifetime. Staff's proposal also includes other necessary amendments, including required quality control checks and improved converter labeling requirements, to further ensure that aftermarket catalytic converters perform as expected and are properly fitted to the vehicle models on which they are designed to function. The proposed revisions would cost-effectively provide for substantial emission reductions from older vehicles operating in California. These reductions are important to California's continued progress towards its air quality goals.

VIII. REFERENCES

1. 51 Federal Register, 28114 (August 5, 1986)
2. Initial Statement of Reasons for Proposed Rulemaking: Public Hearing to Consider Regulations Regarding New and Used Aftermarket Catalytic Converters Offered for Sale and Use in California, October 16, 1987
3. Title 13, California Code of Regulations, Sections 1968.1 and 1968.2

4. Margret M. Schmidt, et al, "New Catalyst Preparation Procedure for OBDII-Monitoring Requirements", Society of Automotive Engineers, Inc. 2001-01-0933
5. Manufacturers of Emission Controls Association, "Aftermarket Converter Figures for 2006," May 18, 2007
6. Eldert Bontekoe, U.S. EPA, "Draft Strawman Durability Proposal" (presentation), January 29, 2003
7. Health and Safety Code Section 27156
8. EMFAC 2007

Attachments

California Evaluation Procedures for New Aftermarket Catalytic Converters (Proposed)

Proposed Regulation Order

California Environmental Protection Agency
AIR RESOURCES BOARD

CALIFORNIA EVALUATION PROCEDURES FOR NEW AFTERMARKET CATALYTIC CONVERTERS

Adopted: [Adoption Date]

Note: This document is incorporated by reference in section 2222, title 13, California Code of Regulations. It contains the criteria the Air Resources Board (ARB) will use to evaluate whether new aftermarket catalytic converters qualify for exemptions from California Vehicle Code sections 27156 and 38391. An ARB exemption is required before any new aftermarket catalytic converter can be advertised, sold, offered for sale, or installed on a motor vehicle operating in California.

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(a) PURPOSE

These procedures specify the emission performance criteria and other requirements applicable to new aftermarket catalytic converters that are installed, sold, offered for sale, or advertised in California on or after January 1, 2009. The Executive Officer will exempt such new aftermarket catalytic converters from the prohibitions of California Vehicle Code sections 27156 and 38391 based on his/her evaluation of whether the converters comply with the emission performance, warranty, labeling, installation restrictions, and other criteria specified in these procedures. No exemption shall be issued pursuant to these procedures for a new aftermarket catalytic converter intended to replace any original equipment manufacturer catalytic converter that has been designed to include additional emission control functions (e.g., catalytic converters with integrated hydrocarbon traps or oxides of nitrogen adsorbers).

(b) APPLICABILITY

These procedures apply to manufacturers and installers of new aftermarket catalytic converters that are designed or intended for use on any passenger car or light- or medium-duty vehicle originally equipped with one or more catalytic converters. Catalytic converters that are in all material respects identical to the original equipment catalytic converters they are replacing are exempt from these requirements.

(c) DEFINITIONS

"Advertise" and "Advertisement" include, but are not limited to, any notice, announcement, information, publication, catalog, listing for sale, or other statement concerning a product or service communicated to the public for the purpose of promoting the awareness or sale of the product or service.

"Catalytic converter" or "converter" is an emission control device or system designed to increase the rate of a chemical reaction to reduce gaseous engine exhaust emissions. It includes one or more substrates, surrounding materials, and an exterior shell.

"Executive Order (EO)" is the document issued by ARB to exempt a catalytic converter design from the prohibitions of California Vehicle Code sections 27156 and 38391 when ARB's Executive Officer has determined that the catalytic converter complies with the criteria specified in these evaluation procedures. An EO is required for new aftermarket catalytic converters to be legally advertised, offered for sale, sold, or installed on emission-controlled vehicles. Each EO contains a unique number to allow for proper identification and verification of applicability.

"Federal Test Procedure (FTP) emission test" refers to the certification tailpipe exhaust emission standards and test procedures applicable to the class to which a vehicle is certified.

"Full useful life" refers to the FTP emission test standard applicable between the point that the vehicle has passed its interim useful life and the point that it reaches the end of its full useful life as defined in the certification requirements and test procedures incorporated by reference in title 13, CCR section 1961(d).

"Interim useful life" refers to the FTP emission test standard applicable up to the point that the vehicle reaches 50,000 miles as defined in the certification requirements and test procedures incorporated by reference in title 13, CCR section 1961(d).

"Independent testing facility" is defined as a laboratory or facility that is not wholly or partially owned, controlled, or operated by the manufacturer seeking a catalytic converter exemption or by any of its suppliers.

"Low Emission Vehicle (LEV) I standard" refers to the LEV vehicle category exhaust emission standards defined in title 13, CCR sections 1956.8(g), 1960.1(g)(1), and 1960.1(h)(1).

"Manufacturer" refers to any party engaged in the business of manufacturing, assembling, or producing aftermarket catalytic converters for use on motor vehicles.

"Medium-duty vehicle" is defined in title 13, CCR section 1900(b).

"Non-OBD II vehicle" is defined as a vehicle designed and certified prior to the applicability of the on-board diagnostic requirements of title 13, CCR section 1968.1 and 1968.2.

"OBD II vehicle" is defined as a vehicle designed and certified to the on-board diagnostic system requirements of title 13, CCR section 1968.1 or 1968.2.

"Original Equipment Manufacturer (OEM)" is defined as a manufacturer of a new vehicle or a manufacturer of any part or component that is originally installed in a new vehicle's certified emission control system.

"Part number" is defined as a number or coding system used by a catalytic converter manufacturer to uniquely identify a converter including converter model/series, inlet and outlet pipe configuration and sizes, converter shape and size, and oxygen sensor locations or bosses.

"Passenger car" means a motor vehicle certified as either a passenger car as defined by title 13, CCR section 1900 or a light-duty truck (LDT) with a test weight of 3,750 pounds or less (LDT1) as specified in the applicable exhaust emission standards of title 13, CCR Division 3, Chapter 1.

"Truck" means a motor vehicle certified as either a light-duty truck with a test weight of greater then 3,750 pounds (LDT2) or a medium-duty vehicle (MDV1 through MDV4) as

specified in the applicable exhaust emission standards of title 13, CCR Division 3, Chapter 1.

(d) REQUIREMENTS FOR EXEMPTION

A manufacturer seeking an exemption from the prohibitions of California Vehicle Code sections 27156 and 38391 for its new aftermarket catalytic converter must submit information demonstrating that the converter complies with the emission performance, durability, and other requirements as set forth below. [1]

(e) EMISSION TESTING REQUIREMENTS

(1) Selection of Test Vehicles

Prior to submitting an application for exemption of a catalytic converter as required under section (g), a manufacturer shall submit a vehicle application list to ARB identifying the intended vehicle coverage for the catalytic converter. ARB shall then select, in accordance with the criteria specified below, one or more test vehicles that the manufacturer shall use for the emission testing of the catalytic converter.

(A) Non-OBD II Vehicles

For non-OBD II vehicles, the vehicle application list shall identify the vehicle categories below for which the exemption of the catalytic converter is sought. ARB shall select one test vehicle for each category chosen by the manufacturer. The test vehicle shall be a representative worst case vehicle (as determined by ARB) certified to the LEV I emission standard. ARB shall, to the extent practical and at its sole discretion, designate the same worst case vehicle model for all manufacturers to use. However, ARB may change the designated worst case vehicle based on other considerations including, but not limited to, vehicle availability. The categories shall be defined as:

(PC-1): Passenger car single configuration
(T-1): Truck single configuration
(PC-2): Passenger car dual configuration
(T-2): Truck dual configuration

For the categories listed above, "single configuration" shall refer to vehicles with an OEM catalytic converter configuration consisting of a single catalytic converter (per engine or per bank) and "dual configuration" shall refer to vehicles with an OEM catalytic converter configuration with two or more catalytic converters in series (per engine or per bank).

(B) OBD II Vehicles

[1] Unless otherwise noted, all section references refer to this document, "California Evaluation Procedures for New Aftermarket Catalytic Converters."

1. For OBD II vehicles, the manufacturer shall submit a vehicle application list to ARB, which shall identify the vehicle make, vehicle model, vehicle model year, vehicle engine family (or test group), engine size, and emission standard for each vehicle application for which the exemption of the catalytic converter is sought.
2. Upon receipt, ARB shall select one or more representative test vehicles from the vehicle application list. The number of test vehicles selected depends upon considerations such as: breadth of catalytic converter application, differences in emission control systems and/or OBD II systems, projected demand for the catalytic converter, and applicable certification emission standards.
3. The catalytic converter design for which an exemption is sought shall not provide for mid-converter air injection on OBD II vehicles unless all vehicle models in the vehicle application list were originally equipped with mid-converter air injection systems by the manufacturer(s).
4. Regardless of the test vehicle(s) selected by ARB for emission testing, the manufacturer shall ensure its catalytic converter complies with the criteria of this Evaluation Procedure for all vehicle applications listed in the manufacturer's vehicle application list.

(2) Vehicles With Multiple Catalysts of the Same Design

If the new aftermarket catalytic converter is intended to replace any of multiple OEM catalysts of the same design on vehicles so equipped (e.g., on vehicles with dual or Y exhaust systems that use catalysts of the same design in each bank), all OEM catalysts of the same design shall be replaced for purposes of emissions and OBD II compatibility testing.

(3) Aging of Catalytic Converters for Testing

New aftermarket catalytic converters shall be designed by the manufacturer to meet the performance criteria of these procedures for a minimum of 5 years or 50,000 miles. The manufacturer shall demonstrate that the catalytic converter design meets this durability criteria through emission testing conducted after the catalytic converter has been aged to the equivalent of 50,000 miles in accordance with this section.

(A) Aging Procedure

Manufacturers shall use the ARB-modified Rapid Aging Test A bench aging cycle described in Appendix A of this Evaluation Procedure to represent 50,000 miles of on-road usage. Manufacturers' methods for carrying out the aging process must satisfy the following criteria:

1. Catalytic converters intended for passenger car applications shall be aged for 75 hours; catalytic converters intended for truck applications shall be aged for 100 hours.

2. All catalytic converters and OEM oxygen sensors shall be placed and aged consistent with the test vehicle OEM catalytic converter configuration (i.e., such that the relative distance between catalytic converter(s) and oxygen sensor(s) is maintained). Notwithstanding the above, aging with the downstream catalytic converter(s) located closer to the upstream converter(s) than in their OEM configured positions (i.e., in a hotter environment) is also acceptable to the ARB.

3. Manufacturers may conduct aging using engines different than those in the test vehicles (i.e., "slave" engines may be used for aging).

4. OEM catalytic converters required for testing as specified in section (e)(4)(B) (i.e., for multi-catalytic converter systems) shall be aged for 150 hours for passenger car applications and 200 hours for truck applications.

5. Unleaded fuels commercially available in the United States shall be used during the aging. No maintenance or repairs to the catalytic converter shall be allowed during the aging process or prior to or during the emission testing required in section (e)(4).

(B) Aging Facility

Aging shall be performed by an independent testing facility or by a supplier to the manufacturer. Manufacturers shall notify and obtain ARB's approval regarding the proposed aging facility, test equipment set-up, and test protocols before commencing aging. ARB approval of the facility selected to perform aging shall be granted if ARB determines, based on information submitted by the facility, that the facility has the equipment, resources, and staff expertise needed to perform aging in accordance with the aging procedures specified in these Evaluation Procedures and Appendix A. At a minimum, information submitted by the aging facility shall include: (i) the physical layout of the laboratory, (ii) make, model and serial numbers of equipment and instrumentation necessary to perform the bench aging procedures specified in this document, and (iii) summary of experience and qualifications of laboratory personnel. All approved aging facilities shall submit updates to the above information every six months from the date of ARB approval if any of the information has changed from the time it was last reported to ARB.

(C) Recordkeeping Requirements

Aging facilities approved under section (e)(3)(B) above shall generate records during the bench aging procedure. At a minimum, such records must include time-based logs of exhaust and catalytic converter temperatures, air-to-fuel ratios,

carbon monoxide (CO) and oxygen (O2) concentration levels, and exhaust flowrates. The aging facility shall provide a copy of these records to the manufacturer of tested catalytic converters for recordkeeping. Upon request by ARB, the manufacturer shall submit these records to ARB for review. The records shall be maintained by the manufacturer for a period of no less than four years from the date of exemption for the catalytic converter.

(D) Custody of Aged Catalytic Converters

After aging the catalytic converter(s) in accordance with the durability demonstration procedures specified in section (e)(3), the facility conducting the aging shall directly transfer the catalytic converter(s) to the test facility (if different from the aging facility). The manufacturer shall not have custody of any aged catalytic converter until all required emission testing has been completed.

(4) Emission Performance Testing

Exhaust emissions shall be measured in accordance with this section for each test vehicle selected by the ARB with the aged catalytic converter(s) installed. All emission tests specified in this procedure shall be performed by an independent testing facility that is properly equipped and staffed with personnel with the requisite expertise to conduct the required emission tests in compliance with official procedures. The testing facility does not need to be the same testing facility used to conduct catalytic converter aging pursuant to section (e)(3)(B) above.

(A) Required Test Vehicle Criteria

1. Minimum Mileage

Test vehicles shall have accumulated a minimum of 4,000 miles prior to conducting the baseline emission testing. Test vehicles that have less than 4,000 miles shall accumulate necessary additional mileage prior to testing using typical urban driving patterns.

2. Allowable Maintenance

Allowable maintenance may be performed on test vehicles as specified in Table 1. below prior to baseline FTP emission testing. Allowable scheduled maintenance shall be conducted according to the maintenance allowed in ARB's certification procedures for new vehicles referenced in title 13, CCR section 1961(d) and applicable to the test vehicle. Records of all vehicle and engine maintenance must be maintained and submitted with the test results. Unscheduled maintenance must first be approved by ARB and will only be approved if ARB determines the maintenance will not affect the vehicle's emissions. Repairs needed to correct detected OBD II malfunctions, except

oxygen sensor or catalyst malfunctions, are allowed for all test vehicles prior to baseline emission testing and do not require ARB approval. Any oxygen sensor or catalytic converter repairs require prior ARB approval, and any oxygen sensor or catalytic converter replacement parts approved by ARB for installation must be aged to at least the equivalent of the mileage of the vehicle.

3. Baseline Emission Testing

Test vehicles shall be tested to determine baseline exhaust emission levels in accordance with the applicable FTP emission test procedures (i.e., the procedures applicable to the model year and classification of the test vehicle). To qualify as an acceptable test vehicle, the vehicle's baseline FTP emission test levels may not exceed the levels specified in Table 1 below.

For purposes of determining compliance with the hydrocarbon exhaust emission standard, a manufacturer shall either directly measure non-methane organic gas (NMOG) emission levels or alternatively measure non-methane hydrocarbon (NMHC) emission levels multiplied by a factor of 1.04. Compliance is achieved if the measured emission levels are at or below the applicable NMOG standard for the test vehicle. Commercially available California unleaded fuels and oils of the grade and quality specified in the owner's manual of the test vehicle(s) shall be used.

Table 1. Emissions and Maintenance Criteria

Test Vehicle odometer mileage	Baseline Emissions	Allowable Maintenance
Less than 50,000 miles	Must comply with interim useful life certification standards	Only scheduled maintenance allowed.
Over 50,000 but less than full useful life miles	Must comply with full useful life certification standards	Only scheduled maintenance allowed.
Over full useful life miles	Must comply with full useful life certification standards	Scheduled maintenance and any reconditioning or repairs needed to return the vehicle to OEM specifications.

(B) Catalytic Converter Installation and Vehicle Stabilization

1. Installation

The test facility shall install the catalytic converter(s) in test vehicles in accordance with the new aftermarket catalytic converter manufacturer's

instructions and the installation requirements specified in section (h)(1)(E) through (h)(1)(G). Catalytic converters designed to replace only a portion of the catalyst system in multi-catalytic converter systems shall be tested in combination with all OEM catalytic converters that are not replaced by the catalytic converter. OEM catalytic converters on the test vehicle that are not replaced by aftermarket catalytic converters must be aged in accordance with section (e)(3).

2. Stabilization on Test Vehicle

After catalytic converter installation, OBD II system fault codes and readiness status shall be reset using a compatible diagnostic scan tool. The following procedure shall then be performed:

a. At least 50 miles of on-road preconditioning shall be accumulated on the test vehicle using a driving schedule consisting substantially of both city and highway driving. Mileage accumulation on a chassis dynamometer is also acceptable provided transient driving cycles are used that are representative of on-road city and highway driving (e.g., Unified, FTP, or HWFET cycles).

b. OBD II system readiness status shall be checked for completion at the end of initial preconditioning. If any of the monitors (except the evaporative system monitor) indicate a readiness status of "not complete" or "not ready", preconditioning shall be continued until the readiness status for each monitor (except the evaporative system monitor) indicates "complete" or "ready."

(C) Emissions Performance Measurement and Evaluation

The emission performance of the test vehicle with the catalytic converter installed shall be measured and evaluated as follows:

1. Two consecutive FTP emission tests shall be performed in accordance with the applicable test procedures (i.e., the procedures applicable to the model year and classification of the test vehicle) referenced in title 13, CCR sections 1960.1(k).

2. If both FTP emission test results meet the applicable full useful life new vehicle exhaust emission certification standard, the catalytic converter shall be determined to satisfy the requirements of section (e)(4).

3. If both FTP emission test results exceed the applicable full useful life new vehicle exhaust emission certification standard, the catalytic converter shall be determined to be noncompliant with the requirements of section (e)(4).

4. If one of the FTP emission test results exceeds the applicable full useful life exhaust emission certification standard, a third FTP emission test shall be performed. If the results from the third FTP emission test meet the applicable useful life exhaust emission certification standard, the catalytic converter shall be determined to satisfy the requirements of section (e)(4). If the results from the third FTP emission test exceed the applicable useful life new vehicle exhaust emission certification standard, the catalytic converter shall be determined to be noncompliant with the requirements of section (e)(4).

(5) Demonstration of OBD II System Compatibility

The manufacturer shall demonstrate for each OBD II test vehicle selected that the catalytic converter design is compatible with the test vehicle's OBD II system such that: (a) its use will not cause the OBD II system to falsely detect a catalyst or other emission-related malfunction; and (b) its use will not hinder the OBD II system from properly detecting a malfunctioning catalyst or other emission-related component or system. The tests specified in section (e)(5)(A) shall be performed by an independent testing facility. The tests specified in section (e)(5)(B) may be performed by an independent testing facility or by the manufacturer.

For new aftermarket catalytic converter designs originally exempted prior to January 1, 2009 under a Memorandum of Understanding (MOU) with the ARB, manufacturers may conduct testing necessary to demonstrate compliance pursuant to this subsection over a three year period. The phase-in shall be based on projected sales volume for all catalytic converters produced by the manufacturer under one or more MOUs. Compliance with the requirements of this subsection shall be achieved on no less than 30 percent of the manufacturers projected sales by January 1, 2010, no less than 60 percent by January 1, 2011, and on all catalytic converter designs previously approved through an MOU by January 1, 2012.

(A) Demonstration that the Malfunction Indicator Light (MIL) Will Not Falsely Illuminate

For the sole purpose of granting an exemption from California Vehicle Code sections 27156 and 38391 at the time of application, ARB shall conclude that the new aftermarket catalytic converter(s) will not falsely cause the MIL to illuminate if the catalytic converter does not cause the test vehicle's OBD II system to detect a catalyst or other emission-related system malfunction during the testing required in section (e)(4)(C). If the catalytic converter(s) causes the test vehicle's OBD II system to detect a malfunction within the catalytic converter system or any other emission-related component or system during the testing required in section (e)(4)(C), the catalytic converter(s) shall be determined to be noncompliant.

(B) Proper MIL Illumination Demonstration

For the purposes of approval of an exemption at the time of application, the new aftermarket catalytic converter(s) shall be evaluated using the procedures and criteria specified below to determine if the requirements for proper MIL illumination demonstration are satisfied.

1. Incremental Aging of the Catalytic Converter

The manufacturer or independent test facility shall utilize the procedures specified in either Appendix B or Appendix C of these procedures to incrementally age the catalytic converter to the point of MIL illumination on the test vehicle. The catalytic converter(s) aged for MIL illumination demonstration purposes may not be the same converter(s) used for the emission performance evaluation. A catalyst aged to the point of MIL illumination is required for each monitored location in the test vehicle's exhaust system at which an aftermarket catalytic converter was installed for the emission performance evaluation. Manufacturers may request Executive Officer approval to employ alternate time-and-temperature based methods to age catalytic converters for the purpose of demonstrating compliance with MIL illumination requirements. The Executive Officer shall approve an alternate method if the manufacturer submits data and/or engineering evaluations adequate to demonstrate that the aging process is representative of real world catalytic converter deterioration and/or provides for aging comparable to ARB approved methods.

2. Emission Testing of the Deteriorated Catalytic Converter

After incremental aging of the catalytic converter(s) to the point of MIL illumination, the converter(s) shall be installed on the test vehicle, and the test vehicle shall be FTP emission-tested to determine its emission level with the deteriorated catalytic converter(s) installed. The catalytic converter shall satisfy the requirements for proper MIL illumination if the test vehicle's emission level does not exceed 1.5 times the OBD tailpipe emissions malfunction criteria to which the test vehicle is certified for any required pollutant (e.g., if the vehicle is certified to an OBD malfunction criteria of 1.75 times the NMOG standard, emissions need to be less than 2.63 (1.5 times 1.75) times the NMOG standard). If the test vehicle's emission level exceeds 1.5 times the OBD tailpipe emissions malfunction criteria to which the test vehicle is certified (for any required pollutant), the catalytic converter shall be determined to be noncompliant with the requirements for proper MIL illumination.

3. Finding of Non-Compliance for Proper MIL Illumination

If the test vehicle's emissions are not below the level specified for any required pollutant when the MIL illuminates, the catalytic converter(s) shall be considered non-compliant. Notwithstanding this, prior to January 1, 2012, a catalytic converter failing to meet the requirements of (e)(5)(B)2 shall still qualify

for an exemption for up to two calendar years provided all other criteria in these procedures are successfully met. To obtain an exemption for the catalytic converter subsequent to those two calendar years, the manufacturer must redesign the catalytic converter to meet the requirements for proper MIL illumination and submit a new application for exemption for the redesigned catalytic converter. If a catalytic converter that is found to be noncompliant with the requirements of section (e)(5)(B)2 has previously been granted an exemption, the previously granted exemption shall expire two years from the date of the determination of noncompliance.

(C) Record Keeping Requirements

The independent test facility shall record OBD II system status during the OBD II compatibility demonstration procedure. At a minimum, the records must include OBD II system readiness status, MIL status, stored fault codes, pending fault codes and, as specified below, catalyst monitoring test results after each of the following conditions: baseline emission testing (section (e)(4)(A)3.); stabilization on the test vehicle (section (e)(4)(B)2); and each FTP emission test (section (e)(4)(C)). The manufacturer shall maintain a copy of these records and shall submit a copy to ARB as part of the application for exemption (see section (g)). Catalyst monitoring test results ("test results" accessible via Service/Mode $06 of SAE J1979 as required by title 13, CCR sections 1968.1 or 1968.2) from the test vehicle's OBD II system must be recorded immediately prior to and after each FTP emission test required in sections (e)(4)(A)3 and (e)(4)(C), and immediately before and after each emission test conducted during the incremental aging procedure required in section (e)(5)(B)1.

(6) Confirmatory Testing

ARB or its designee may perform confirmatory tests to verify emission performance or OBD II compatibility data submitted by the manufacturer in its application for exemption. Upon request by ARB, the manufacturer shall make available all catalytic converters and oxygen sensors used for testing as necessary to duplicate the manufacturer's testing. ARB shall make any confirmatory testing requests within thirty calendar days after the complete test information is received by ARB. If ARB confirmatory test results demonstrate that a catalytic converter does not comply with the criteria in this Evaluation Procedure, ARB may reject the pending application for exemption or rescind any exemption granted pursuant to this Evaluation Procedure for the catalytic converter.

(f) ADDITIONAL REQUIREMENTS FOR EXEMPTION

(1) Label Requirements

A manufacturer shall label each new aftermarket catalytic converter with a permanent, non-destructible label or stamp identifying the EO number issued by ARB, the catalytic

converter part number, the date (month and year) of manufacture, and a directional flow arrow. The label information must be presented according to the following format:

D-XXX-XX
YYYYYY
ZZZZ

D-XXX-XX - EO number issued by ARB.

YYYYYY - part number (designated by the manufacturer).

ZZZZ - month and year of the manufacture (i.e., "0105" represents January 2005).

- the directional flow arrow

The directional flow arrow shall indicate the direction exhaust is designed to flow through the new aftermarket catalytic converter when properly installed. The arrow may be bi-directional for catalytic converters designed to be properly installed with exhaust gas flow in either direction. The manufacturer shall explain the purpose and meaning of the arrow in its instructions to installers contained in the vehicle application catalog (VAC) as required under section (f)(4).

The label or stamp must be affixed to the new aftermarket catalytic converter in a location that is likely the most easily visible after installation of the catalytic converter pursuant to the manufacturer's instructions. For catalytic converters that can be installed in multiple axial orientations (e.g., weld-in "universal" converters), the manufacturer shall affix two labels (on opposite sides of the converter) to ensure likely visibility after installation. Letters and numbers on the label shall be at least one-half inch in height with spacing and thickness sufficient to make the label easily readable from a distance of at least 5 feet.

(2) Warranty Requirements

(A) Warranty Terms

A manufacturer shall warrant that its new aftermarket catalytic converter is free from any defects in materials or workmanship that would cause the converter to fail to conform to the emission testing and OBD II system compatibility criteria specified in sections (e)(4) and (e)(5). The warranty shall be valid for a period of 5 years or 50,000 miles, whichever occurs first, from the date of installation. The

manufacturer shall also warrant the catalytic converter external shell, including end pipes, against corrosion and defective welding for 5 years or 50,000 miles from the date of installation, whichever occurs first. The manufacturer shall replace under warranty catalytic converters that are detected as malfunctioning by the OBD II system, or are otherwise determined to be malfunctioning within the 5 year or 50,000 mile warranty period. The warranty must cover the full replacement cost, including parts and labor.

(B) Warranty Card

The manufacturer shall provide a warranty card with each new aftermarket catalytic converter intended for California sale or use. The warranty card shall include:

1. The general terms and conditions of the catalytic converter warranty;
2. A statement that the catalytic converter has been designed and manufactured to meet the warranty requirements;
3. A place for the customer's signature in acknowledgement of the catalytic converter warranty;
4. The catalytic converter part number;
5. The vehicle year, make, model, VIN, and odometer reading on which the catalytic converter was installed;
6. The date of installation; and
7. The name of the installation shop or facility.

The warranty card shall be supplied and filled out in triplicate; the original for the customer, one copy for the installer to keep, and one copy to be sent back to the manufacturer. The copy to be returned to the manufacturer shall have pre-paid postage and be of sufficient size to allow for mailing without the use of a separate envelope.

(C) Semi-Annual Manufacturer Warranty Reporting

1. Manufacturers shall review warranty claim records for new aftermarket catalytic converters covered under each Executive Order on a production year basis for a period of five years following the production year and shall submit a warranty information report semi-annually to ARB during the five year period. The warranty information report shall contain the following information: the manufacturer's name, a description of each class or category of California-certified new aftermarket catalytic converters including model year and catalytic converter series, the cumulative number and percentage of catalytic converters covered by the Executive Order for which a warranty replacement or other warranty work was identified, and the number of each type of catalytic converter produced for sale in California.
2. If, after screening out improper claims, the cumulative number of warranty claims exceed four percent or 100 claims (whichever is greater) for catalytic converters produced for sale in California under any individual Executive Order, the manufacturer shall include in the report a description of the type(s) of failure that have occurred, the probable causes of failure, and data

or an engineering evaluation of the impact of the failures on vehicle emissions.

3. For confirmed warranty rates greater than four percent, the Executive Officer may suspend or rescind the Executive Order if it is determined that the catalytic converters are systematically failing in a way that significantly impacts emissions from the vehicles on which they are installed.
4. Emission warranty information reports and updates shall be submitted to the Chief, Mobile Source Operations Division, 9480 Telstar Avenue, Suite 4, El Monte, CA 91731.

(3) Safety Statement

The catalytic converter manufacturer shall provide a written statement that its catalytic converters will not, in their operation, function, or malfunction, result in any unsafe condition endangering the motor vehicle, its occupants, or persons or property in close proximity to the vehicle.

(4) Vehicle Application Catalog (VAC)

The manufacturer shall develop and submit for ARB review a VAC that specifies, for each vehicle model, the new aftermarket catalytic converter that is approved for use in California. The VAC must be specific for California and may not include catalytic converters not approved for use in California. A manufacturer may not materially alter, edit, or supplement a VAC without first obtaining ARB's approval pursuant to this Evaluation Procedure.

(A) Vehicle Specific Application Listing

The VAC shall be organized to allow look-up of the appropriate new aftermarket catalytic converter by specific vehicle application(s). The VAC shall be categorized to identify the appropriate catalytic converter by looking up the specific vehicle application in the following order: vehicle make, vehicle model year, vehicle model, vehicle engine displacement, and vehicle engine family/test group or emission standard (if necessary to distinguish between applications for which a catalytic converter is approved). For vehicles with multiple OEM catalytic converters in series, the VAC shall further identify which catalytic converter should be used for each of the OEM catalytic converters.

(B) VAC User Instructions

Prior to any listing of vehicle applications or catalytic converters in the VAC, the VAC must include instructions to users of the VAC on how to use it to identify the appropriate new aftermarket catalytic converter. The instructions shall require the VAC user to identify the correct converter by looking up the specific vehicle application in the VAC. The instructions shall also include text that informs the user that it is illegal to install a catalytic converter that is not approved for the

specific vehicle application and it is illegal to select a catalytic converter for installation based solely on vehicle weight and engine size or based upon catalytic converter physical shape, size, configuration, or pipe diameters.

(C) Additional Listings in VAC

If the manufacturer elects to include additional new aftermarket catalytic converter listings in the VAC beyond the required vehicle specific application list (e.g., organized by catalytic converter part number, series number, physical dimensions of shape, size, configuration, pipe diameter), the listings shall be located in the VAC after the required vehicle specific application list. The additional listings shall include text in the heading or the start of the listing informing the user that it is illegal to install a catalytic converter that is not approved for the specific vehicle application and it is illegal to select a catalytic converter for installation based solely on vehicle weight and engine size or based upon catalytic converter physical shape, size, configuration, or pipe diameters.

(5) Quality Control Procedures

The new aftermarket catalytic converter manufacturer shall implement, utilize, and document quality control (QC) procedures to ensure that production new aftermarket catalytic converters conform to the specifications of the exempted new aftermarket catalytic converter within acceptable production tolerances.

(A) Requirements for Quality Control Process

1. The QC procedures shall, at a minimum, provide for the monitoring of:
   a. Average per piece precious metal content of coated substrates for each precious metal constituent that is applied.
   b. Average relative per piece total base metal content that is applied to each substrate
   c. Average per piece total washcoat loading applied to each substrate
   d. Proper coating of substrates through a visual inspection
   e. Proper placement of matting materials around the substrate
   f. Leaks from the shell or welds after the canning process

2. No less than one percent of production parts within a production lot shall be evaluated.

3. Parts selected for evaluation shall be randomly distributed over the production lot

4. The manufacturer shall submit its quality control procedures for ARB approval, and shall obtain written approval from the ARB prior to implementation of the procedures. The procedures shall include a production flow chart covering the entire manufacturing process from receipt

of raw materials to shipment of the final product. The production flow chart shall identify each quality control check that is performed and at what point in the process it is performed. The submitted procedures shall also contain a detailed description of the methods used to measure the properties listed in 1.a through 1.d above, along with all other quality control checks that are performed. Manufacturers may omit confidential information from submitted written procedures provided the confidential details are presented to ARB staff upon request. With concurrence from the manufacturer, relevant portions of the documentation required in this section may be sent directly to the ARB by the manufacturer's catalyst substrate supplier(s).

5. If a manufacturer or its suppliers fail to adhere to the ARB-approved QC procedures, ARB may rescind any exemption granted pursuant to this Evaluation Procedure for the catalytic converter.

(B) Evaluation Criteria

1. Precious metal content, base metal content, and washcoat loadings must be within 20% of the nominal specification upon which the exemption was granted
2. Substrates must be free from excessive cell plugs or other physical defects that would impact emission performance or durability
3. Matting material must provide for a secure fit of the substrate within the shell.
4. The catalyst's shell and welds must be free of excessive leakage in accordance with manufacturers' specifications.

(C) Corrective Action

1. If any sample fails to pass all elements of the quality control test, all parts produced from the time the last sample that passed quality control was produced shall be quarantined by the manufacturer.
2. Only quarantined parts that individually pass the manufacturer's quality control test may be released for sale.
3. All other parts must be reprocessed to fall within the evaluation criteria prior to being released for sale.

(D) Documentation Requirements

1. Manufacturers shall report on a quarterly basis for each exempted catalytic converter design the following information for each production lot produced within the quarter:
   a. The average per piece precious metal content of the coated substrates, reported in absolute grams per cubic foot, for each precious metal constituent contained on the catalyst (e.g. platinum, palladium, and/or rhodium), along with the minimum acceptable loading specification.

b. The average per piece total base metal content of the coated substrate, reported in relative grams per cubic foot, along with the minimum acceptable base metal loading specification
c. The average per piece total washcoat loading of the coated substrates reported on either a weight basis (e.g., grams per part or grams per unit volume) or a total surface area basis (e.g., square meters per part, square meters per unit volume, or square meters per unit weight of coated part) along with the minimum acceptable loading specification.
d. Results of the manufacturer's visual inspection findings for the substrate, applied mattings, and the integrity of the shell and welding, including minimum acceptable specifications for each inspection.

2. Reports shall be sent to the Chief, Mobile Source Operations Division, Air Resources Board, 9480 Telstar Avenue, Suite 4, El Monte, CA 91731.
3. With concurrence from the manufacturer, relevant portions of the information required by this section may be sent directly to the ARB by the manufacturer's catalyst substrate supplier(s).

(g) APPLICATION FOR EXEMPTION

The manufacturer must complete the requirements for selection of test vehicles pursuant to section (e)(1) above prior to submitting an application to the ARB. No catalytic converter shall be sold, offered for sale, advertised, or installed on California vehicles until a complete application has been submitted, and an exemption for the catalytic converter based on the application has been issued by ARB. A manufacturer shall supply to ARB the following information in the application for each new aftermarket catalytic converter for which it is seeking an exemption:

(1) Major supplier name and address (including substrate and washcoat suppliers).
(2) Number of substrates used per catalytic converter.
(3) Substrate specifications for each substrate- configuration construction technique (e.g., extruded, laid-up, formed, Dravo disk), composition, size and volume, supplier and address, and composition of active constituents in substrate. For monolithic substrates, number of cells per square inch of frontal area with the design tolerances, and nominal cell wall thickness. For pelleted substrates, pellet shape and dimensions, pellet bulk density, and, if applicable, usage of more than one type of pellet (e.g., Rh or Pt/Pd), the geometrical distribution of pellets, and the mean impregnation depth of active materials with the production tolerances.
(4) Washcoat – name/designation of washcoat formulation and supplier, composition of active constituents, and total active material loading in washcoat for each substrate.
(5) Active material - composition of active constituents, loading of each active material including design tolerances, and total active material loading including design tolerances for each substrate.
(6) Container - dimensions, volume, materials used for shell and end pipes, technique for containment and restraint, method for constructing container, canner

company/name, mat material and supplier, and insulation and shielding (catalytic converter and/or vehicle).

(7) Physical description - dimensions (e.g., length, width, height), weight, volume including design tolerances, active surface area, and total active surface area including design tolerances.

(8) Emission test results and maintenance records as specified in section (e)(4).

(9) Records of the OBDII system status generated during the OBD II compatibility demonstration procedure (detailed in section (e)(5)(C)).

(10) Samples of the labels, stamps affixed to the catalytic converter as required by section (f)(1).

(11) Copies of the warranty card and safety statement specified in sections (f)(2) and (f)(3).

(12) The VAC specified in section (f)(4) in a format representative of the final hardcopy print edition that will be used by catalytic converter installers.

(13) Documentation of the QC procedures used to comply with section (f)(5).

(h) INSTALLATION REQUIREMENTS

(1) Installers of exempted new aftermarket catalytic converters shall adhere to the following requirements for proper installation. The manufacturer shall make these installation requirements available to installers of its products through its normal means for communicating with installers including, but not limited to, the VAC, the manufacturer's website, requests via phone or email for technical help from installers, and other documentation distributed to installers. Installers may not install a new aftermarket catalytic converter in a vehicle unless all of the following conditions are met:

(A) The vehicle is specifically included in the vehicle application list for which the new aftermarket catalytic converter has been exempted;

(B) The vehicle is more than 7 years old or has more than 70,000 miles on its odometer;

(C) The vehicle is beyond the coverage of the OEM catalyst warranty period (which can vary from 7 years or 70,000 miles to as high as 15 years or 150,000 miles).[2] Installers may reference the vehicle owner's manual/warranty booklet or contact the vehicle manufacturer or its representative to verify the applicable OEM catalyst warranty;

(D) The vehicle has a legitimate need for replacement of the existing converter that has been established and documented by the installer on the repair

[2] The actual manufacturer's catalyst warranty period for an individual vehicle is listed in the vehicle's owner's manual and/or warranty booklet. Examples of current warranty periods include seven years and 70,000 miles, eight years and 80,000 miles, and 15 years and 150,000 miles, depending on the vehicle.

invoice. If the OEM converter is present, the installer must make a determination that it is not functioning properly before acting to replace it;

(E) The exempted new aftermarket catalytic converter is installed in the same location as the OEM catalytic converter it is designed to replace. The front face of the installed catalytic converter shall be no more than three inches further upstream or downstream in the exhaust from where the front face of the OEM catalytic converter was located. The installation may not alter the location, position, or orientation of oxygen sensors upstream and downstream of the catalytic converter(s);

(F) The exempted new aftermarket catalytic converter is installed on a one-for-one catalytic converter (not substrate) basis;

(G) The exempted new aftermarket catalytic converter is installed with all other required catalytic converters (no consolidation of catalytic converters, nor addition of extra catalytic converters is allowed); and

(H) A warranty card has been filled out by the installer, signed by the customer, attached to the repair invoice, and a copy returned to the manufacturer.

(2) Installers shall keep documentation regarding the installation of the new aftermarket catalytic converters including all of the above information. This documentation shall be made available to ARB or its representative as provided for in title 13, section 2222(b)(8). All such records shall be maintained for four years from the date of sale or installation of the catalytic converter.

(i) AUDIT TESTING

The ARB reserves the right to inspect facilities and records and may select production units for audit testing. The ARB may select up to five new aftermarket catalytic converters per manufacturer each year for audit testing. At the manufacturer's expense, catalytic converters selected by ARB shall be sent to an ARB-approved independent test facility for aging to 50,000 miles in accordance with section (e)(3). The aged catalytic converters shall then be returned to ARB or its designee for installation in an applicable test vehicle and FTP emission testing. If one or more of the aged converters fails to meet the applicable FTP emission standards in an applicable test vehicle, ARB may rescind a previously granted exemption for the failed catalytic converter, request further analysis and data from the manufacturer, or require, at the manufacturer's expense, additional catalytic converters (from the same catalytic converter model as the failed parts) to be procured and sent for aging at an ARB-approved independent test facility. Such additional aging shall be limited to no more than five catalytic converters from the same Executive Order as the failed part.

(j) APPROVAL

ARB shall issue an EO exempting a new aftermarket catalytic converter from the prohibitions of Vehicle Code sections 27156 and 38391 if it determines that the submitted information under section (g) sufficiently indicates that the catalytic converter satisfies the criteria of this Evaluation Procedure. The EO for a new aftermarket catalytic converter is only valid for the catalytic converter as described in the application for exemption. Any changes or deviations from the submitted information (e.g., catalytic converter materials, precious metal loadings, physical specifications) shall be submitted to ARB for review and approval in a new or revised application for exemption for the catalytic converter prior to manufacture. New aftermarket catalytic converters exempted by ARB may be marketed, sold, and used in California, but only for the vehicle applications listed by the manufacturer in the application for exemption for that catalytic converter. A manufacturer may not use the EO as an endorsement by ARB

APPENDIX A

Rapid Aging Test-A Test Procedure

Mode No.	Description	Parameter	Specification
1	Stoichiometric Fuel-Air Ratio (Closed-Loop)	Inlet Temperature	825°C±20°C
		Exhaust Flowrate	80 SCFM[3] per catalytic converter
		Time Duration	40 seconds
		CO concentration	≤1.0%
		O_2 concentration	≤1.0%
2	Fuel-Rich Operation (Power Enrichment) (Open-Loop)	Time Duration	6 seconds
		CO concentration set for	3.0%±0.3%
3	Fuel-Rich Operation with Air Injection	Time Duration	10 seconds
		Amount of Enrichment	same as used in Mode No. 2
		Air Injection Flow Rate	same as used in Mode No. 4
4	Stoichiometric Operation with Air Injection (Closed-Loop)	Time Duration	4 seconds
		O_2 concentration	3.0%±0.3%

Set-up Directions:

i. Adjust parameters until stoichiometric operation is achieved with inlet temperature, exhaust flowrate, CO concentration, and O_2 concentrations specified in Mode No. 1.
ii. Add enrichment until CO concentration specification of Mode No. 2 is achieved to determine enrichment amount to be used for Mode Nos. 2 and 3.
iii. Remove enrichment and return to stoichiometric operation at Mode No. 1 specifications.
iv. Add air injection until O_2 concentration of Mode No. 4 is achieved to determine air injection flow rate to be used for Mode Nos. 3 and 4.

Perform aging cycling through Mode Nos. 1-4.

[3] "SCFM" refers to standard cubic feet per minute.

APPENDIX B

Misfire-based Incremental Aging Procedure for MIL Illumination Demonstration

Set-up

The manufacturer shall install the new aftermarket catalytic converter(s) on the test vehicle in the same configuration as used for FTP emission testing in section . (e)(4)(B)1.

To age the catalytic converter, the manufacturer shall implant a spark-related misfire malfunction into the test vehicle's ignition system. The vehicle shall then be operated on a chassis dynamometer to raise the temperature of the catalytic converter(s). The manufacturer shall adjust the induced misfire rate, vehicle engine speed and load, and chassis dynamometer loading until a stabilized catalyst damaging temperature of 1050 degrees Celsius is achieved approximately one inch into the front face of the furthest upstream catalytic converter. If necessary, manufacturers may equip the test vehicle with thermocouples to verify that this temperature is achieved.

The manufacturer may request the use of an alternate temperature as the catalyst-damaging temperature. ARB will approve the request upon submittal and review of data by the manufacturer if the data adequately indicate that the alternate temperature will achieve equivalent deterioration necessary to properly perform the incremental aging procedure.

Incremental Aging

The manufacturer shall operate the vehicle for a maximum of five hours of continuous operation at the catalyst-damaging temperature. The manufacturer shall then allow the catalytic converter to cool down to ambient temperature before operating the test vehicle again. The test vehicle shall then be operated (without the implanted misfire) to exercise the catalyst monitor of the OBD II system. If the catalyst monitor detects a fault and illuminates the MIL, the incremental aging is done. If the catalyst monitor does not detect a fault and illuminate the MIL, the catalyst monitor test results should be recorded and then the incremental aging shall be resumed. The manufacturer shall operate the vehicle at the catalyst-damaging temperature for a period of no less than one hour and no more than three hours before allowing the catalytic converter to cool down to ambient temperature and re-exercising the catalyst monitor of the OBD II system. This process shall be repeated until the catalyst monitor detects a fault. The manufacturer may utilize the information from the catalyst monitoring test results reported from the OBD II system to determine subsequent time intervals for aging. The manufacturer may request ARB approval to re-can the incrementally aged catalytic converter if the matting material was damaged due to the rapid high temperature aging. ARB will grant approval upon the manufacturer demonstrating that the substrates will be re-used and the changes to the can and/or mat material will not affect the performance of the catalytic converter.

APPENDIX C

Furnace-based Incremental Aging Procedure for MIL Illumination Demonstration

Setup

1. The furnace to be used for catalyst aging shall have its temperature controls calibrated to ensure accuracy. Following calibration, the hot zones (i.e., the portions of the furnace interior that reach the intended temperature) shall be mapped using a temperature sensor and shall be noted.

Aging Procedure

1. Catalyst bricks for all catalytic converters required for testing on the test vehicle shall be placed in the furnace, and arranged so that all bricks are located in hot zones.

2. Furnace heat shall be increased at a rate of 10°C per minute (or at the furnace's maximum practical rate of heating, if lower) until the furnace reaches a final temperature of 1100 to 1300°C.

3. The catalyst bricks shall be heated at the final temperature in either a dry air or steam environment for a period of 4 to 25 hrs.

4. The furnace shall be cooled to a temperature of less than 100°C after the heating period.

5. The catalyst bricks shall be installed into metal shells in a manner which is representative of the manufacturer's intended production process.

6. The catalytic converter assemblies shall then be installed on the test vehicle.

7. The test vehicle shall then be preconditioned. Preconditioning may be accomplished by operating the vehicle on the road for at least 200 miles at speeds greater than 50 miles per hour, or by conducting back-to-back US06 driving cycles on a chassis dynamometer until at least 200 miles of vehicle operation has occurred. Other preconditioning cycles may be used, subject to Executive Officer approval, provided the manufacturer or its suppliers adequately demonstrates that the preconditioning cycle will stabilize the performance of the catalytic converter (including removal of precious metal oxidation) prior to demonstration of OBD II system fault detection and emission testing.

8. OBD II system fault codes and readiness indicators shall be reset using a OBD II compatible scan tool.

9. The test vehicle shall be driven on the road or on a chassis dynamometer under operating conditions that will permit monitoring of the catalytic converter(s) to occur.

    a. If by the end of vehicle operation the MIL has illuminated and fault codes have been set that confirm that each of the test converters has been detected as malfunctioning, the vehicle may be emission tested and evaluated according to section (e)(5)(B)(2) of the procedures.
    b. If the readiness indicators show that monitoring has occurred, but all converters have not been detected as malfunctioning by the OBD II system, the catalysts that were not detected as malfunctioning may be incrementally aged further, or new catalysts may be aged according to this procedure at either a higher final temperature, for a longer period of time, or a combination of the a two.

10. Upon completion of any additional aging, the manufacturer shall repeat steps 7 through 9 above.

PROPOSED REGULATION ORDER

Division 3. Air Resources Board
Chapter 4. Criteria for the Evaluation of Motor Vehicle Pollution Control Devices and Fuel Additives
Article 2. Aftermarket Parts

Note: This document is printed in a style to indicate changes from the existing provisions in title 13, California Code of Regulations, section 2222. All existing language is indicated by plain type. All proposed additions to the language are indicated by underlined text. All proposed deletions are indicated by ~~strikeout.~~

§ 2222. Add-on Parts and Modified Parts.

(a) As used in this section, the terms "advertise" and "advertisement" include, but are not limited to, any notice, announcement, information, publication, catalog, listing for sale, or other statement concerning a product or service communicated to the public for the purpose of furthering the sale of the product or service.

(b)(1) Except for publishers as provided in subsection 3, no person or company doing business solely in California or advertising only in California shall advertise any device, apparatus, or mechanism which alters or modifies the original design or performance of any required motor vehicle pollution control device or system unless such part, apparatus, or mechanism has been exempted from Vehicle Code section 27156, and the limitations of the exemption, if any, are contained within the advertisement in type size to give reasonable notice of such limitations.

(2) Except for publishers as provided in subsection 3, no person or company doing business in interstate commerce shall advertise in California any device, apparatus, or mechanism which alters or modifies the original design or performance of any required motor vehicle pollution control device or system and not exempted from Vehicle Code section 27156 unless each advertisement contains a legally adequate disclaimer in type size adequate to give reasonable notice of any limitation on the sale or use of the device, apparatus, or mechanism.

(3) No publisher, after receipt of notice from the state board or after otherwise being placed on notice that the advertised part is subject to and has not been exempted from the provisions of Vehicle Code section 27156, shall make or disseminate or cause to be made or disseminated before the public in this state any advertisement for add-on or modified parts subject to the provisions of this article, which have not been exempted from Vehicle Code section 27156, unless such advertisement clearly and accurately states the legal conditions, if any, on sale and use of the parts in California.

(4) The staff of the state board shall provide, upon request, model language which satisfies these requirements.

(c) No person shall advertise, offer for sale, or install a part as a motor vehicle pollution control device or as an approved or certified device, when in fact such part is not a motor vehicle pollution control device or is not approved or certified by the state board.

(d) No person shall advertise, offer for sale, sell, or install an add-on or modified part as a replacement part.

(e) The ~~e~~Executive ~~o~~Officer may exempt add-on and modified parts based on an evaluation conducted in accordance with the "Procedures for Exemption of Add-on and Modified Parts," adopted by the state board on November 4, 1977, as amended June 1, 1990.

(f) Each person engaged in the business of retail sale or installation of an add-on or modified part which has not been exempted from Vehicle Code section 27156 shall maintain records of such activity which indicate date of sale, purchaser name and address, vehicle model and work performed if applicable. Such records shall be open for reasonable inspection by the ~~e~~Executive ~~o~~Officer or his/her representative. All such records shall be maintained for four years from the date of sale or installation.

(g) A violation of any of the prohibitions set forth in this section shall be grounds for the ~~e~~Executive ~~o~~Officer to invoke the provisions of section 2225.

(h)(1) Prior to January 1, 2009, the Executive Officer shall exempt new aftermarket ~~non-original equipment~~ catalytic converters from the prohibitions of California Vehicle Code sections 27156 and 38391 based on an evaluation conducted in accordance with the "California Evaluation Procedures for New Aftermarket Non-Original Equipment Catalytic Converters" as adopted by the state board on August 19, 1988.

(2) On or after January 1, 2009, the Executive Officer shall exempt new aftermarket catalytic converters from the prohibitions of California Vehicle Code sections 27156 and 38391 based on an evaluation conducted in accordance with the "California Evaluation Procedures for New Aftermarket Catalytic Converters" as adopted by the state board on [adoption date].

~~(2)~~(3) No person shall install, sell, offer for sale or advertise, any new ~~non-original equipment~~ aftermarket catalytic converter in California ~~after 180 days from the date of filing of this subsection with the Secretary of State~~ unless ~~they have~~ it has been exempted pursuant to the procedures as provided in this subsection.

~~(3)~~(4) For the purposes of this regulation, a new aftermarket ~~non-original equipment~~ catalytic converter is a catalytic converter which is constructed of all new materials, ~~and~~ is not a replacement part as defined in Title 13, California Code of Regulations, section 1900, and is not an original equipment catalytic converter. A catalytic converter ~~or~~ which includes any new material or construction ~~which is~~ not equivalent to the materials or construction of the original equipment catalytic converter (e.g., an original equipment catalytic

converter can with a new non-original equipment substrate) shall also be considered a new aftermarket catalytic converter.

(i)(1) On or after July 1, 2008, or after 30 days from the date of filing of this subsection with the Secretary of State, whichever is later, no person shall install, sell, offer for sale, or advertise any used, recycled, or salvaged catalytic converter in California.

~~(1)~~(2) ~~Except as provided in Subsection (i)(2) below,~~ Prior to July 1, 2008, or 30 days from the date of filing of this subsection with the Secretary of State, whichever is later, no person shall install, sell, offer for sale or advertise, any used, recycled, or salvaged catalytic converter in California unless the catalytic converter has been exempted pursuant to the "~~Criteria for Evaluation~~ Procedures for Exemption of Add-On Parts and Modified Parts," adopted by the state board on November 4, 1977, as amended ~~May 19, 1981~~June 1, 1990.

~~(2) The Executive Officer shall exempt used original equipment oxidation catalytic converters which comply with the U.S. Environmental Protection Agency interim enforcement policy for used converters (published at 51 Federal Register (FR) 28114 (August 5, 1986) and 51 FR 28132 (August 5, 1986)) from the prohibitions of California Vehicle Code sections 27156 and 38391 for the vehicle applications indicated by the federal label and installation instructions.~~

~~(3) No person shall install, sell, offer for sale or advertise, any recycled or salvaged used catalytic converter in California more than 30 days after the date of filing of this subsection with the Secretary of State unless they have been exempted from the prohibitions of California Vehicle Code sections 27156 and 38391 pursuant to the procedures provided in this subsection.~~

~~(4)~~(3) For the purposes of this regulation, a "used catalytic converter" is a catalytic converter which is not a new aftermarket ~~non-original equipment~~ catalytic converter as defined in Subsection (h)~~(3)~~(4), or a replacement part as defined in section 1900~~; and "oxidation catalytic converter" is a catalytic converter designed for the control of only hydrocarbon and carbon monoxide emissions~~.

NOTE: Authority cited: Sections 39600, 39601, 43000, 43000.5 and 43011, Health and Safety Code. Sections 27156, 38391 and 38395, Vehicle Code. Reference: Sections 39002, 39003, 39500, 43000, 43000.5, 43011, 43204, 43205, and 43644, Health and Safety Code; and Sections 27156, 38391 and 38395, Vehicle Code.

TITLES 13 AND 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER THE ADOPTION OF PROPOSED REGULATIONS TO REDUCE EMISSIONS FROM DIESEL ENGINES ON COMMERCIAL HARBOR CRAFT OPERATED WITHIN CALIFORNIA WATERS AND 24 NAUTICAL MILES OF THE CALIFORNIA BASELINE

The Air Resources Board (the Board or ARB) will conduct a public hearing at the time and place noted below to consider adoption of regulations to reduce emissions of diesel particulate matter (PM) and oxides of nitrogen (NOx) from the use of diesel engines on commercial harbor craft operating in any California port, roadstead or terminal facility or within all California inland waters; all California estuarine waters; and within 24 nautical miles, except as otherwise specified in this proposal, of the California baseline (collectively referred to hereinafter as "Regulated California Waters"). Any person who sells, supplies, offers for sale, purchases, owns, operates, leases, charters, or rents any commercial harbor craft that operates in any of the Regulated California Waters would be subject to and have responsibilities under these regulations. This notice summarizes the proposed regulations. The Staff Report and Technical Support Document present the regulations and information supporting the adoption of the regulations in greater detail.

DATE: October 25, 2007

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, CA 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., October 25, 2007, and may continue at 8:30 a.m., October 26, 2007. This item may not be considered until October 26, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before October 25, 2007, to determine the day on which this item will be considered.

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

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed adoption of new section 2299.5, title 13, California Code of Regulations (CCR) and new section 93118.5, title 17, CCR. The following documents would be incorporated in the regulations by reference: (1) International Standard ISO 8178-4(E):1996, "Reciprocating Internal Combustion Engines – Exhaust Emission Measurement – Part 4: Test Cycles for Different Engine Applications"; (2) 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;" (3) U.S. Environmental Protection Agency (U.S. EPA) Marine Engine standards, Tier 1 and Tier 2, as set forth in 40 Code of Federal Regulation (CFR) Part 94; (4) U.S. EPA proposed Marine Engine standards, Tier 3 and Tier 4, as set forth in "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder" (72 Federal Register 15937 et seq. (April 3, 2007)); (5) the following National Oceanic and Atmospheric Administration (NOAA) Nautical Charts, as authored by the NOAA Office of Coast Survey: (A) Chart 18600, Trinidad Head to Cape Blanco (January 2002), (B) Chart 18620, Point Arena to Trinidad Head (June 2002), (C) Chart 18640, San Francisco to Point Arena (August 2005), (D) Chart 18680, Point Sur to San Francisco (June 2005), (E) Chart 18700, Point Conception to Point Sur (July 2003), (F) Chart 18720, Point Dume to Purisima Point (January 2005), and (G) Chart 18740, San Diego to Santa Rosa Island (April 2005); (6) ASTM D975-81, "Standard Specification for Diesel Fuel Oils" (as modified in May 1982); (7) "Control of Emissions of Air Pollution from New Marine Compression Ignition Engines At or Above 37 KW" (64 FR 73299 et seq., December 29, 1999); and (8) "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines," 13 CCR 2700 et seq.

Background: Over 90 percent of Californians breathe unhealthful air at times. To improve air quality and human health, ARB establishes requirements to reduce emissions from new and in-use on-road and off-road vehicles, engines, and other sources. To reduce emissions from off-road sources, such as marine vessels, ARB has adopted a series of regulations since 2004 that: (1) require diesel fuel sold for use in harbor craft comply with CARB diesel specifications[1] and, (2) require ocean-going vessels with diesel auxiliary engines to comply with specified diesel fuel and other requirements while operating in Regulated California Waters.[2] Although those regulations are reducing air pollution from marine vessels, significant opportunities exist to further reduce emissions from the thousands of commercial harbor craft vessels that operate within the State and in Regulated California Waters.

[1] ARB's fuel standards for harbor craft are codified at title 13, CCR, section 2299.
[2] ARB's fuel standards and other requirements for diesel auxiliary engines on ocean-going vessels are codified at title 13, CCR, section 2299.1 and title 17, CCR, section 93118.

Control of Criteria Air Pollutants

Health and Safety Code (HSC) sections 43013 and 43018 direct ARB to adopt standards and regulations that the Board has found to be necessary, cost-effective, and technologically feasible for various mobile source categories, including off-road diesel engines and equipment such as marine vessels, through the setting of emission control requirements. Specifically, HSC section 43013(b) directs ARB to adopt such standards and regulations for marine vessels to the extent permitted by federal law.

Control of Toxic Air Contaminants

The California Toxic Air Contaminant Identification and Control Program (Air Toxics Program), established under California law by Assembly Bill 1807 (Stats. 1983, ch. 1047) and set forth in HSC sections 39650 through 39675, requires ARB to identify and control air toxicants in California. The identification phase of the Air Toxics Program requires ARB, with participation of other state agencies such as the Office of Environmental Health Hazard Assessment, to evaluate the health impacts of, and exposure to substances, and to identify those substances that pose the greatest health threat as toxic air contaminants (TACs). The ARB's evaluation is made available to the public and is formally reviewed by the Scientific Review Panel (SRP) established under HSC section 39670. Following ARB's evaluation and the SRP's review, the Board may formally identify a TAC at a public hearing. Following identification, HSC sections 39658, 39665, and 39666 require ARB, with participation of the air pollution control and air quality management districts (districts), and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance (a "needs assessment") and to adopt airborne toxic control measures (ATCMs).

In 1998, the Board identified diesel PM as a TAC with no Board-specified threshold exposure level. A needs assessment for diesel PM was conducted between 1998 and 2000, which resulted in ARB staff developing and the Board approving a Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel RRP) in 2000. The Diesel RRP presented information that identified the available options for reducing diesel PM and recommended control measures to achieve further reductions. The scope of the Diesel RRP was broad, addressing all categories of engines, both mobile and stationary, and included control measures for private and public fleets of off-road diesel engines, such as those covered by the proposed regulations. The ultimate goal of the Diesel RRP is to reduce California's diesel PM emissions and associated cancer risks from 2000 baseline levels by 85 percent by 2020.

The purpose of this proposed regulatory action is to reduce emissions of diesel PM and NOx. Diesel PM emission reductions are needed to reduce the potential cancer risk and other adverse effects from PM exposure to people who live in the vicinity of California's major ports, harbors, and shipping lanes. Reductions in diesel PM and NOx (which forms "secondary" nitrate PM in the atmosphere) will also contribute to regional

PM reductions that will assist in California's progress toward achieving State and federal air quality standards. Reductions in NOx, an ingredient in the formation of ozone pollution, will also help reduce regional ozone levels.

Diesel engines on commercial harbor craft vessels are a significant source of diesel PM and NOx emissions in California. A recent ARB exposure study for the ports of Los Angeles and Long Beach showed commercial harbor craft to be the third highest source for elevated cancer risk at the ports. The United States Environmental Protection Agency (U.S. EPA) has proposed "Tier 3" standards for new marine engines, such as those used in commercial harbor craft, beginning in 2009 and more stringent "Tier 4" standards for new engines beginning in 2014.[3] However, the U.S. EPA proposed standards, even if promulgated, apply only to new marine engines and would not affect in-use engines. Thus, significant opportunities exist to further reduce emissions from the approximately 1900 diesel engines on in-use ferries, excursion vessels, tugboats, and towboats that currently operate in the State.

Attainment of Ambient Air Quality Standards

The federal Clean Air Act (CAA) requires U.S. EPA to establish National Ambient Air Quality Standards (Standards) for pollutants considered harmful to public health, including fine particulate matter (PM2.5) and ozone. Set to protect public health, the Standards are adopted based on a review of health studies by experts and a public process. Ambient PM2.5 is associated with premature mortality, aggravation of respiratory and cardiovascular disease, asthma exacerbation, chronic and acute bronchitis and reductions in lung function. Ozone is a powerful oxidant. Exposure to ozone can result in reduced lung function, increased respiratory symptoms, increased airway hyper-reactivity, and increased airway inflammation. Exposure to ozone is also associated with premature death, hospitalization for cardiopulmonary causes, and emergency room visits for asthma.

Areas in the State that exceed the Standards are required by federal law to develop State Implementation Plans (SIPs) describing how they will attain the standards by certain deadlines. The NOx emission reductions are needed because NOx leads to formation in the atmosphere of both ozone and PM2.5; diesel PM emission reductions are needed because diesel PM contributes to ambient concentrations of PM2.5. At this time, the South Coast and San Joaquin Valley air basins are both required to attain the PM2.5 standard by 2015. The U.S. EPA further requires that all necessary emission reductions be achieved one calendar year sooner – by 2014 – in recognition of the annual average form of the standard. By contrast, San Joaquin Valley and South Coast air basins are expected to have until 2023 to attain the federal ozone standard, by invoking the "bump-up" provision in the CAA.

The ARB and the districts are working to complete the ozone and PM2.5 SIPs and expect to submit them to the U.S. EPA by this fall and April 2008, respectively. Air

[3] See *Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder* (72 Fed.Reg. 15937 et seq. (Apr. 3, 2007)).

quality modeling indicates that significant reductions of NOx are crucial to help meet both these standards. At this time, staff estimates that a 60 percent reduction in NOx emissions from 2006 levels (i.e., a total reduction of hundreds of tons per day) and a 12 percent reduction in direct PM2.5 emissions will be necessary for attainment of the PM2.5 standards in the South Coast Air Basin. Emission reduction targets have not yet been set for achieving the PM2.5 standard in the San Joaquin Valley Air Basin, but are expected to be significantly lower. While all sources of NOx emissions are important contributors to PM2.5, marine vessels, which include commercial harbor craft engines, constitute one of the key categories that will determine whether California is able to meet the 2014 deadline for PM2.5 attainment in the South Coast Air Basin.

Control of Emissions from Goods Movement-related Activities

In January 2005, a Goods Movement Cabinet Workgroup, created by Governor Schwarzenegger and led by the California Environmental Protection Agency and the Business, Transportation and Housing Agency, established a policy for goods movement and ports to improve and expand California's goods movement industry and infrastructure while improving air quality and protecting public health. The workgroup worked collaboratively with the logistics industry, local and regional governments, neighboring communities, business, labor, environmental groups, and other interested stakeholders to create a two-phased Goods Movement Action Plan (GMAP), which outlines a comprehensive strategy to address the economic and environmental issues associated with moving goods via the state's highways, railways, and ports. In a related activity, the Board adopted the Goods Movement Emission Reduction Plan (GMERP) in April 2006. The GMERP identified a variety of measures to be investigated by ARB for reducing goods movement-related emissions, including regulations for commercial harbor craft. The final phase of the GMAP was completed in January 2007 and includes a framework for action, which identifies projects needed to reduce emissions from goods movement-related sources, including those from commercial harbor craft engines.

The California Global Warming Solutions Act of 2006

The California Global Warming Solutions Act of 2006 established the first-in-the-world comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of greenhouse gases (GHG).[4,5] The legislation gave ARB responsibility for monitoring and reducing GHG emissions. The statute requires ARB to adopt regulations and other requirements that would reduce by 2020 statewide greenhouse gas emissions to the equivalent of 1990 levels.

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[4] Established under California law by Assembly Bill 32 (Stats. 2006, ch. 488) and set forth in HSC § 38500 et seq.

[5] Greenhouse gases are those that tend to increase average global temperatures through absorption of infrared radiation or other mechanisms. These include, but are not limited to, carbon dioxide (CO2) and methane (CH4).

Some actions required by the proposed regulations may result in slightly increased carbon dioxide (CO2) for some applications. This may occur, for example, if vessel operators choose to comply with the regulations by using exhaust treatment technologies that use vessel power (e.g., scrubbers, selective catalytic reduction), increase the weight of the vessel, or require a larger engine to be installed on the vessel. However, other actions required by the rule will likely offset this effect. For instance, the accelerated phase in of newer engines, which employ modern, less polluting technologies, should reduce GHG emissions from each new engine relative to the older, in-use engines. In addition, the proposed regulations will reduce emissions of black carbon (a component of diesel PM and a likely contributor to global warming), which will further offset the minor increases in CO2 emissions that may occur in some applications. Thus, staff expects the proposed regulations to have an overall negligible effect on global warming.

Authority

The ARB has authority under California law to adopt the proposed regulations. Health and Safety Code sections 43013(b) and 43018 provide broad authority for ARB to adopt emission standards and other regulations to reduce emissions from new and in-use vehicular, nonvehicular and other mobile sources. Under HSC sections 43013(b) and 43018, ARB is directly authorized to adopt emission standards and other regulations for marine vessels, as expeditiously as possible and to the extent permitted by federal law, to meet state ambient air quality standards. The ARB is further mandated by California law under HSC section 39666 to adopt ATCMs for new and in-use nonvehicular sources, including marine vessels such as commercial harbor craft, for identified TACs such as diesel PM.

Emission Reductions and Public Health Benefits Projected

The proposed regulations are expected to significantly reduce emissions of diesel PM from in-use commercial harbor craft engines. Diesel PM emission reductions are needed to reduce premature mortality, cancer risk, and other adverse impacts from exposure to this TAC. The proposal would help achieve the 2020 goal set forth in the 2000 Diesel RRP of reducing diesel PM by 85 percent from 2000 baseline levels and the 2015 and 2020 goals of the GMAP. Staff projects that, by 2020, the proposed regulations, in conjunction with U.S. EPA cleaner marine new engine standards, use of low sulfur fuel in harbor craft, port clean air plans, engine replacement incentive programs, and a negative growth factor for California's fishing fleet, would reduce in-use commercial harbor craft diesel PM emissions about 70 percent and NOx emissions about 60 percent relative to the 2004 baseline. These emission reductions will occur in areas along waterways and near ports where environmental justice concerns are especially prevalent, as well as further inland.

The proposed regulations would also reduce diesel PM and NOx emissions that contribute to exceedances throughout the State of ambient air quality standards for both

PM2.5 and ozone. These reductions will assist California in its goal of achieving state and federal air quality standards.

The diesel PM and NOx emission reductions from the proposal, along with the other efforts and factors mentioned above, are expected to reduce the number of people exposed to a cancer risk of 10 in a million within the 20 square miles surrounding the Los Angeles/Long Beach Ports from 1.7 million in 2004, to 940,000 in 2015, and 630,000 in 2020. Statewide, the emission reductions due specifically to the regulations would be expected to prevent 310 premature deaths and 8,100 cases of asthma-related and other lower respiratory symptoms by the year 2025, as well as other health benefits. The economic benefit for these avoided premature deaths and health costs is estimated to be $1.3 to $2.0 billion.

In contrast to the diesel PM and NOx reductions, we are not projecting significant reductions in oxides of sulfur (SOx) from the proposed action. Currently, all diesel fuel sold to harbor craft is required to meet ARB's on-road diesel specifications (CARB diesel). These specifications help reduce SOx emissions, among other pollutants. However, the existing regulation (title 13, CCR section 2299) only prohibits the sale of noncomplying diesel to harbor craft operators; it does not actually require the use of CARB diesel by operators while their vessels are operating in Regulated California Waters. Thus, to supplement the existing diesel fuel regulation, the proposed action will require harbor craft operators to fuel their diesel engines only with CARB diesel or equivalent fuel, as specified in the proposal.

Staff Report and Further Information

As described in more detail below, ARB staff has prepared two documents as part of this rulemaking, a Staff Report: Initial Statement of Reasons (Staff Report) and a Technical Support Document. Together with the needs assessment (i.e., the Diesel RRP), these two documents serve as the report on the need and appropriate degree of regulation for new and in-use commercial harbor craft in Regulated California Waters.

Description of the Proposed Regulatory Action

Under the approach proposed by staff, the Board would adopt a regulation, pursuant to its authority under HSC sections 43013 and 43018, which would apply to the emissions from diesel engines on commercial harbor craft operating within any of the Regulated California Waters (as defined in the proposal). The Board would also approve adoption of essentially identical provisions as an ATCM, pursuant to its authority under HSC section 39666, which would complement the regulation and provide maximum notice to the regulated community of the regulatory requirements on commercial harbor craft. These measures will hereinafter sometimes be referred to collectively as "the proposed regulations."

Applicability

The proposed regulations apply to any person who owns or operates a commercial harbor craft operating within any of the Regulated California Waters, which include all California inland waters, all California estuarine waters, and all waters within a zone 24 nautical miles seaward of the California coastline, except for specified areas along the Southern California coastline. Regulated California Waters also include all ports, roadsteads, and terminal facilities in California. In general, commercial harbor craft include a variety of vessel types such as ferries, excursion vessels, tugboats, ocean-going tugboats, tow boats, crew vessels, work boats, fishing boats, barges, and others. Industries that use these vessels, such as those providing ferry services, offshore platform suppliers, commercial fishing, touring and excursion services, and many others would be subject to these regulations. Government agencies that own or operate diesel powered harbor craft, such as those engaged in fire protection, dam inspections and repair, marine research and education, and ferry services operated by local municipalities would also be affected.

The proposed regulations include language explicitly stating and clarifying that the proposal does not change or supersede any existing United States Coast Guard (U.S.CG) regulations and that vessel owners and operators are responsible for ensuring that they meet all applicable U.S.CG regulations, as well as the proposed regulations.

Exemptions

The proposed regulations include a number of exemptions. First, the proposal does not apply to vessels that travel within the 24 nautical mile boundary off California's coastline without stopping or anchoring. This exemption includes vessels that stop or anchor within 24 nautical miles only under limited situations, such as when the vessel is in distress or must stop to comply with U.S.CG regulations. Also, the following vessel types are exempted from this proposal in its entirety: temporary emergency rescue/recovery vessels, recreational vessels, ocean-going vessels that are not ocean-going tugboats (i.e., ocean-going tugboats and tow boats are subject to the proposal), vessel engines registered with the ARB Portable Engine Registration Program at the time the proposed regulation is approved by the Office of Administrative Law, military tactical support vessels, and all U.S. Coast Guard vessels. Further, temporary replacement vessels and registered historic vessels are exempt from the proposed engine standards and compliance schedule but are otherwise subject to all other requirements. Similarly, low use engines (i.e., those used less than 300 hours per year) would not be subject to the proposed engine standards and compliance schedule but are otherwise subject to all other requirements.

Emission Limits

A regulated diesel engine generally would be limited to the U.S. EPA marine engine standards in effect at the time the engine is due to be brought into compliance with the proposal's requirements. The proposal specifies the compliance schedule for regulated

engines. The proposal's requirements involving U.S. EPA's proposed Tier 3 and Tier 4 standards would come into effect only if U.S. EPA finalizes and promulgates those standards as they were specified in 72 Fed.Reg. 15937 et seq. (Apr. 3, 2007). If U.S. EPA promulgates different Tier 3 and Tier 4 standards, a separate rulemaking will be needed to incorporate those Tier 3 and Tier 4 standards.

Newly Acquired Engines and Vessels

The proposed regulations include requirements for newly acquired commercial harbor craft vessels and those engines acquired for use on a vessel after the vessel's initial purchase. These requirements cover both the acquisition of diesel engines for use in harbor craft and the acquisition of new and in-use harbor craft vessels. These requirements are included to ensure that California's commercial harbor craft fleet becomes cleaner as vessels are added to the California fleet and engines are replaced. The proposed regulations require that only engines meeting the applicable U.S. EPA marine engine standards on the date of engine acquisition (e.g., date when a contract for the purchase of the engine by the vessel owner was executed) be sold for installation on in-use commercial harbor craft. A limited sell-through provision is included in the regulation. The engines on new harbor craft would be required to meet the standards in effect on the date of vessel acquisition (e.g., date when a contract to buy the vessel was executed). The sale of in-use vessels would be subject to the engine compliance schedule but would not be otherwise restricted. The propulsion engines on new ferries would have additional requirements for NOx or PM emissions to be cleaner than the U.S. EPA marine engine standards in effect on the date of vessel acquisition.

In-Use Vessels

In addition to the above, the proposed regulations would require that currently unregulated (a.k.a. "Tier 0") and Tier 1 in-use propulsion and auxiliary marine engines on ferries, excursion vessels, tugboats, and towboats meet emission limits equal to or cleaner than the U.S. EPA marine engine standards in effect for the year that in-use engine compliance is required under this proposal. In other words, engines that are not currently subject to any emission standards (Tier 0) will eventually be brought into compliance with standards specified in the proposal. A compliance schedule, designed to clean up the oldest dirtiest high use engines first, would be based on the in-use engine model year and hours of operation. The proposed regulations include an accelerated compliance schedule for harbor craft with homeports in the South Coast Air Quality Management District to provide early benefits for the South Coast Air Basin, which is in non-attainment for both ozone and PM2.5.

While there are other options available in the proposal, ARB staff believes that most owners and operators of regulated harbor craft will choose to replace their existing engine with a new Tier 2 or Tier 3 engine. However, some operators may choose one of the other compliance options, such as demonstrating that the current engine meets the applicable emission limits. Options are also provided to extend the compliance

date, such as implementing an emission control strategy and demonstrating that the engine was previously rebuilt to a cleaner standard. The proposed regulations also include a provision governing the failure of a diesel emission control strategy employed through an elected compliance option.

Compliance Extensions

The proposed regulations provide for owners and operators to apply to ARB for an extension of the compliance date in certain cases. These circumstances are specified in the proposal and include situations when a vessel is near retirement, there is a change in operation or ownership, there is no suitable replacement engine available, difficulties occur in obtaining or installing a replacement engine, and owners with multiple vessels would need to comply in the same year for all the vessels.

Recordkeeping

Starting on January 1, 2009, owners or operators of commercial harbor craft operating within the Regulated California Waters will be required to maintain specified records for a minimum of three years.

Monitoring, Reporting, and Recordkeeping

The proposed regulations would require that diesel engines on all commercial harbor craft have a properly operating, non-resettable hour meter installed so that hours of operation can be monitored.

The recording and maintenance of specified information would begin on January 1, 2009. All owners or operators of commercial harbor craft would be required to submit an initial report containing specified information, including a plan for compliance with the regulation if applicable, by February 28, 2009. An additional report would be required upon compliance with the required engine emission limits, upon changes in engine or vessel operation, or if there are changes in ownership or use. This required reporting will provide staff with more complete up-to-date information on commercial harbor craft vessels to be used in developing the emission inventory and for the consideration of further regulatory measures. Owners or operators of commercial harbor craft would also need to supply additional information as requested that may be necessary to determine compliance with the proposed regulations. The specified information that owners or operators will be required to record and maintain would have to be supplied to an agent or employee of ARB upon request. Finally, for enforcement purposes, owners or operators would have to provide vessel access to ARB employees or officers or the local air districts.

Alternative Control of Emissions

The proposed regulations contain an alternative control of emissions (ACE) option, which would allow an owner or operator to submit for approval by the Executive Officer

an alternative compliance approach. Under the ACE, owners or operators would be required to achieve and demonstrate equivalent or greater emission reductions than that which would have been achieved with direct compliance with the emission limits. Alternative emission control strategies may include any feasible and enforceable strategy not otherwise required by law, regulation, or statute. The detailed application process is specified and includes substantial public participation.

Fuel Requirement

The proposed regulations would require that commercial harbor craft engines be fueled with diesel fuel meeting ARB's on-road diesel fuel standards (CARB diesel), an alternative diesel fuel, a diesel fuel meeting ARB's Verification Procedure requirements, a CARB diesel used with fuel additives that meets the requirements of the Verification Procedure, or any combination of the above.

Test Methods and Other Incorporated Documents

The proposal would incorporate by reference Parts 2 and 4 of International Standard ISO 8178, as revised in 1996 by the International Organization for Standardization (ISO). This standard includes test methods for reciprocating internal combustion engines. The proposal would also incorporate by reference the U.S. EPA marine engine standards, Tiers 1 and 2, as set forth in 40 Code of Federal Regulation (CFR) Part 94, and the proposed U.S. EPA Marine Engine standards, Tiers 3 and 4, as set forth in 72 Feg. Reg. 15937 et seq. (April 3, 2007).

Violations

The proposal specifies that any violation of the requirements or other provisions would subject the person who committed the violation to the penalties, injunctive relief, and other remedies available under Health and Safety Code section 42400 et seq., other applicable sections of the Health and Safety Code, and other applicable provisions of California law for each violation. The proposal further specifies that each failure to meet a requirement, criteria, or provision of the regulations would constitute a single, separate violation for each hour that a person operates the commercial harbor craft within Regulated California Waters until the provision, criteria, or requirement has been met.

Severability

This proposed regulation states that if any part of the regulation is held to be invalid, the remainder of the regulation shall continue to be effective.

At the hearing, the Board may consider other elements that may provide additional flexibility to affected owners and operators.

COMPARABLE FEDERAL REGULATIONS

As noted above, U.S. EPA has already promulgated Tier 1 and Tier 2 standards for new marine engines. And U.S. EPA has recently proposed Tier 3 and Tier 4 standards for new marine engines to become effective beginning in 2009 and 2014, respectively. However, no federal standards have been promulgated addressing emission reductions from in-use commercial harbor craft engines. Under federal Clean Air Act (CAA) section 213, U.S. EPA is without authority to adopt in-use standards for nonroad engines, including marine engines.[6]

California is the only governmental entity in the United States authorized by the CAA, in the first instance, to adopt emission requirements for in-use off-road engines.[7] Section 209(e)(1) of the CAA conclusively preempts states, including California, from adopting requirements for new off-road engines less than 175 horsepower that are used in farm or construction equipment. However, the proposed regulations address off-road engines used in marine vessels, rather than those used in farm or construction equipment. Under section 209(e)(2), California may adopt and enforce emission standards and other requirements for off-road engines and equipment not conclusively preempted by section 209(e)(1), so long as California applies for and receives authorization from the Administrator of U.S. EPA. To obtain authorization, the Board must make a finding that the California adopted standards will be, in the aggregate, at least as protective of public health and welfare as applicable federal standards.[8] The Administrator must grant a request for authorization from California unless he finds that ARB's protectiveness finding is arbitrary and capricious, that California does not need the standards to meet compelling and extraordinary conditions, or that the standards and accompanying enforcement procedures are not consistent with CAA section 209.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

As noted above, the Board staff has prepared two documents for the proposed regulatory action: a Staff Report, which includes a summary of the economic and environmental impacts of the proposal, and a Technical Support Document, which describes the basis of the proposed action in more detail. The Staff Report is entitled, "Staff Report: Initial Statement of Reasons for the Proposed Rulemaking – Regulations to Reduce Emissions from Diesel Engines on Commercial Harbor Craft Operated Within California Waters and 24 Nautical Miles of the California Baseline." The Technical Support Document is entitled, "Technical Support Document: Technical Support for the Proposed Rulemaking – Regulations to Reduce Emissions from Diesel Engines on Commercial Harbor Craft Operated Within California Waters and 24 Nautical Miles of the California Baseline."

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[6] The California term "off-road" and the federal term "nonroad" refer to the same sources and are used interchangeably.

[7] See *Engine Manufacturers Association v. U.S. EPA* (D.C. Cir. 1996) 88 F.3d 1075, 1089-1091.

[8] CAA section 209(e)(2)(A). Other states may subsequently opt into the California program, but their regulations must be identical to California's requirements. CAA section 209(e)(2)(B).

Copies of the Staff Report with the full text of the proposed regulatory language and the Technical Support Document may be accessed on the ARB's web site listed below, or may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990 at least 45 days prior to the scheduled hearing on October 25, 2007.

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the ARB's web site listed below.

Inquiries concerning the substance of the proposed regulation may be directed to the designated agency contact persons, Cherie Rainforth, Manager of the Control Strategies Section, at (916) 327-7213, or by email at crainfor@arb.ca.gov, or Todd Sterling, Air Pollution Specialist, at (916) 445-1034, or by email at tsterlin@arb.ca.gov.

Further, the agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Alexa Malik, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-4011, and Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

This notice, the Staff Report, Technical Support Document, and all subsequent regulatory documents, including the FSOR, when completed, are also available on the ARB Internet site for this rulemaking at www.arb.ca.gov/regact/2007/chc07/chc07

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

Costs to Businesses and Private Individuals

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulations are presented below.

The total cost of regulation compliance is expected to be about $140 million in 2006 expenditure-equivalent dollars (2006 dollars). This represents the total cost of the regulation if all money required to comply with the proposed regulation were spent in 2006. The total regulation cost is based on costs associated with early retirement or replacement of engines, the addition of diesel exhaust control systems (DECS) to new ferry propulsion engines, and reporting and recordkeeping. The costs associated with engine early retirement include the residual value of the replaced engine; any recent major engine maintenance costs, also referred to as engine rebuild; and the time-value-of-money to pay for an early engine repower. The costs associated with the addition of DECS to new ferry propulsion engines include the purchase and installation of the

control systems and costs for recurring control technology maintenance. These costs would be spread over the years 2009 to 2022. On an annual basis, the cost would vary between $2.5 million and $26 million per year, averaging about $10 million per year. Approximately 70 percent of the compliance costs will be incurred by the ferry and excursion fleets and 30 percent by the tugboat and tow boat fleets.

No costs were included for additional fuel use for the new ferry vessels with added control technology. This was balanced by the fact that no fuel savings were included for replacing old engines with more efficient new Tier 2 or Tier 3 engines. For vessels that are repowered (i.e., the engines are replaced with a new engine), no costs were included for vessel out-of-service time to install the engine due to the difficulty in assigning a value to this cost (i.e., the down time and installation costs are highly variable and case-dependent).

New equipment and reporting and recordkeeping costs for owners or operators of commercial harbor craft, which would include purchasing and installing new engines in existing vessels, installing DECS in new ferries, and reporting and recordkeeping, are approximately $460 million. This cost would be spread over the years 2009 to 2022, with an average annual cost of about $33 million. These costs are the estimated out-of-pocket costs to vessel owners and operators, which include costs that are normal and customary costs of doing business with or without the proposed regulations in place. Specifically, a portion of these costs – the new equipment costs for purchasing and installing a new engine – are costs that the vessel owner would eventually pay, but the proposed regulation requires this service to be performed earlier than normal. In contrast, the total regulation cost of $140 million (2006 dollars) includes those costs related to performing this service early, but not the normal and customary costs of doing business.

Staff estimates the cost-effectiveness of the proposed regulation in terms of dollars per pound of PM emission reduction to be $29 per pound if all the total annualized cost is attributed solely to the PM reduction. Since the proposal would also result in NOx emission reductions, staff also evaluated cost-effectiveness by attributing half the total annualized cost to the PM emission reductions and half to the NOx emission reductions. The resulting cost-effectiveness values using the latter method are $14 per pound of PM and $1,800 per ton of NOx. These values are based on the cost of regulatory compliance.

California businesses are affected by the proposed annual cost of the regulation to the extent that the implementation of the proposed regulation reduces their profitability. Overall, most affected businesses will be able to absorb the costs of the proposed regulation with no significant adverse impacts on their profitability. This finding is based on the staff's analysis of the estimated change in "return on owner's equity" (ROE). Dun and Bradstreet financial data were used for the analysis, when available, to determine the change in ROE for typical businesses from each industry category. The staff found that the overall change in ROE ranges average from negligible to a four percent decline. The decline in ROE was highest for ferries and excursion fleets and lowest for tugboat

fleets. This range in ROE reduction is not considered to represent a significant impact on profitability. Because the proposed regulation would not alter significantly the profitability of most businesses, we do not expect a noticeable change in employment, business creation, elimination, or expansion, and business competitiveness in California for these industries. The change in ROE is expected to be larger for a small business.

The Executive Officer has made an initial determination that the proposed regulatory action will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons based on the estimated change in ROE. A number of businesses are integrally linked to California ports. However, we do not believe that the added costs of the proposed regulations are high enough for harbor craft operators to consider alternate ports outside of California. The ARB staff has considered proposed alternatives that would lessen any adverse economic impact on businesses and invites you to submit proposals. Submissions may include the following approaches for consideration:

(i) Establishment of differing compliance or reporting requirements or timetables that take into account the resources available to businesses.
(ii) Consolidation or simplification of compliance and reporting requirements for businesses.
(iii) Use of performance standards rather than prescriptive standards.
(iv) Exemption or partial exemption from the regulatory requirements for businesses.

Alternatives that staff considered are described in more detail in the Staff Report.

In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action may affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California. Some businesses that provide vessel repower services could expand due to the volume of business created by the regulatory requirements.

The Executive Officer has also determined, pursuant to title 1, CCR, section 4, that the proposed regulatory action would affect small businesses.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer has found that the reporting requirements of the regulations which apply to businesses are necessary for the health, safety, and welfare of the people of the State of California.

In accordance with Health and Safety Code sections 43013(a) and (b), the Executive Officer has determined that the standards and other requirements in the proposed

regulations are necessary, cost-effective, and technologically feasible for diesel engines on commercial harbor craft operated within Regulated California Waters.

Before taking final action on the proposed regulatory action, the Board must determine that no reasonable alternative considered by the Board or that has otherwise been identified and brought to the attention of the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action.

Costs to Local and State Government Agencies

Pursuant to Government Code sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action would create costs to some State and local agencies. Most State and local agencies will incur only reporting costs. Staff has estimated these one-time reporting costs to range from about $100 to $3,000 depending on the number of vessels operated by the agency. Agencies operating ferries, excursion vessels, tugboats, or towboats with diesel engines would also incur engine replacement costs ranging from a total compliance cost of $100,000 to $10 million. These agencies include the City of Vallejo, which operates the Baylink Ferry; the Golden Gate Bridge and Highway Transportation District; the Port of Los Angeles; and the California Department of Transportation.

A detailed assessment of the economic impacts of the proposed regulatory action can be found in the Staff Report.

SUBMITTAL OF COMMENTS

Interested members of the public may also present comments orally or in writing at the meeting, and in writing or by e-mail before the meeting. To be considered by the Board, written comments submissions not physically submitted at the meeting must be received **no later than 12:00 noon, Pacific Standard Time, October 24, 2007,** and addressed to the following:

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

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

Facsimile submittal: (916) 322-3928

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

The Board requests but does not require that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The Board encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under the authority granted to ARB in Health and Safety Code sections 39600, 39601, 39650, 39658, 39659, 39666, 41511, 43013, and 43018. This action is proposed to implement, interpret, or make specific Health and Safety Code sections 39000, 39001, 39515, 39516, 39650, 39658, 39659, 39666, 41510, 41511, 43013, 43016, and 43018; and *Western Oil and Gas Ass'n v. Orange County Air Pollution Control District*, 14 Cal.3rd 411, 121 Cal.Rptr. 249 (1975).

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code.

Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with non-substantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

Tom Cackette
Acting Executive Officer

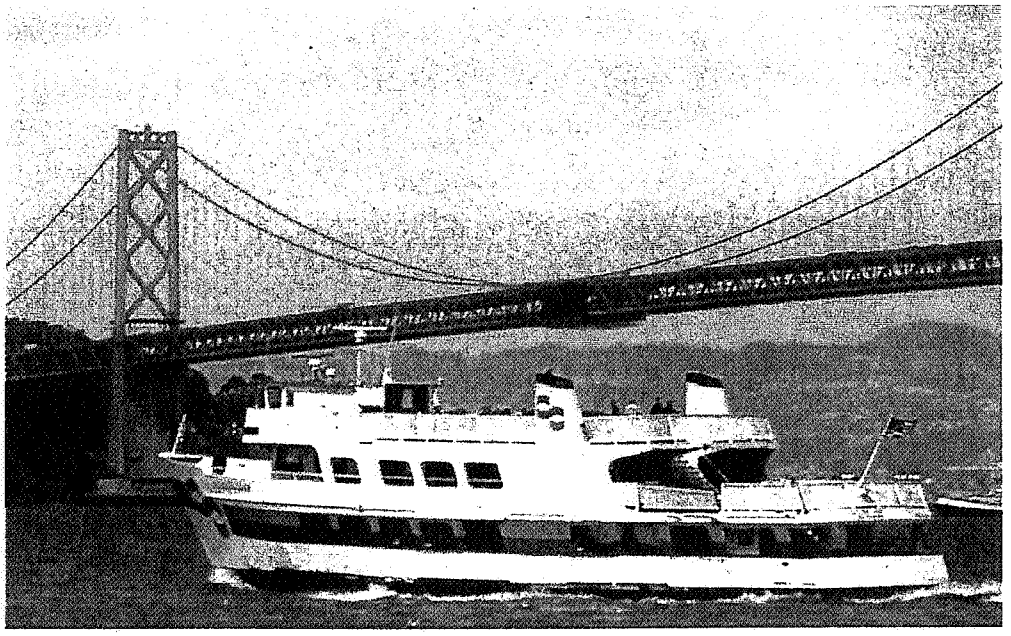
Date: August 28, 2007

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

California Environmental Protection Agency

AIR RESOURCES BOARD

STAFF REPORT:
INITIAL STATEMENT OF REASONS FOR
PROPOSED Rulemaking



PROPOSED REGULATION FOR COMMERCIAL HARBOR CRAFT

Stationary Source Division
Emissions Assessment Branch

September 2007

State of California
AIR RESOURCES BOARD

STAFF REPORT:
INITIAL STATEMENT OF REASONS
FOR THE PROPOSED RULEMAKING

Public Hearing to Consider

REGULATIONS TO REDUCE EMISSIONS FROM DIESEL ENGINES ON COMMERCIAL HARBOR CRAFT OPERATED WITHIN CALIFORNIA WATERS AND 24 NAUTICAL MILES OF THE CALIFORNIA BASELINE

To be considered by the Air Resources Board on October 25 and 26, 2007, at:

California Environmental Protection Agency
Headquarters Building
Byron Sher Auditorium
1001 I Street
Sacramento, California

Stationary Source Division
Robert Fletcher, Chief
Robert Barham, Ph.D., Assistant Chief
Emissions Assessment Branch
Daniel E. Donohoue, Chief
Health and Exposure Assessment Branch (RD)
Linda Smith, Ph.D., Chief
Control Strategies Section
Cherie Rainforth, Manager
Regulatory Support Section
Todd Sax, Ph.D., Manager

This report has been prepared by the staff of the Air Resources Board. Publication does not signify that the contents reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

State of California
AIR RESOURCES BOARD

REGULATIONS TO REDUCE EMISSIONS FROM DIESEL ENGINES ON COMMERCIAL HARBOR CRAFT OPERATED WITHIN CALIFORNIA WATERS AND 24 NAUTICAL MILES OF THE CALIFORNIA BASELINE

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EXECUTIVE SUMMARY

The California Air Resources Board (ARB or Board) staff is proposing two essentially identical regulations to reduce diesel particulate matter (PM) and oxides of nitrogen (NOx) emissions from commercial harbor craft in California. For the remainder of this report, the regulations will collectively be referred to as "the regulation." The proposed Harbor Craft Regulation (regulation) is part of ARB's ongoing effort to reduce PM and NOx emissions from diesel-fueled engines and vehicles and improve air quality associated with goods movement. A copy of the proposed regulation is provided in Appendix A of this report.

Commercial harbor craft include a variety of vessel types including ferries, excursion vessels, tugboats, towboats, crew vessels, work boats, commercial and charter fishing boats, and other types of harbor craft. Staff estimates that there are about 4,200 harbor craft vessels and 8,300 harbor craft engines currently in use in California. Of these, there are nearly 600 ferries, excursion vessels, tugboats, and towboats equipped with about 1,900 propulsion and auxiliary engines that would be subject to the in-use engine requirements of this regulation. Approximately 80 percent of all harbor craft engines are unregulated diesel engines. These unregulated engines are also referred to as Tier 0 (or "pre-Tier 1") engines. Currently, about 3.3 tons per day (tpd) of diesel PM and 73 tpd of NOx are emitted from diesel engines on commercial harbor craft operating in California.

Diesel PM was identified as a toxic air contaminant in 1998. Long-term exposures to diesel PM increase the risk of developing lung cancer. Non-cancer impacts, including premature death and respiratory disease, are associated with exposure to directly emitted diesel PM and secondary diesel PM formed when NOx emissions from diesel engines react in the atmosphere to form nitrates. A recent ARB exposure study at the ports of Los Angeles and Long Beach found harbor craft to be the third highest source of diesel PM emissions contributing to the cancer risk from port activity. The study found that over 1.5 million people were exposed to potential cancer risk levels of greater than 10 in a million. Staff estimates that direct and secondary diesel PM from harbor craft are currently responsible for about 90 premature deaths per year.

The proposed regulation includes requirements for both new and in-use (existing) engines used on commercial harbor craft operating in Regulated California Waters. "Regulated California Waters" include all California internal waters; estuarine waters, ports, and coastal waters within 24 nautical miles of the California coastline. The proposal would establish in-use emission limits for both auxiliary and propulsion diesel engines on ferries, excursion vessels, tugboats, and towboats consistent with the United States Environmental Protection Agency (U.S. EPA) marine engine standards. All new harbor craft engines and replacement engines purchased for in-use harbor craft would have to meet emission limits equal to, or more stringent than, the U.S. EPA

marine engine standards in effect at the time the new vessel or engine is purchased. The propulsion engines on new ferries would also have to install the best available aftertreatment technology. All commercial harbor craft vessels would also be subject to monitoring (must have non-resettable hour meters on engines), recordkeeping, and reporting requirements.

The compliance schedule would require that the oldest and highest-use engines on in-use ferries, excursion vessels, tugboats, and towboats comply first, beginning in December 2009. For harbor craft with homeports in the South Coast Air Quality Management District (SCAQMD), the compliance schedule also begins in 2009, but is accelerated by two years for future compliance deadlines. This would provide early benefits for the South Coast Air Basin, which is in non-attainment for the federal annual PM2.5 and PM10 ambient air quality standards and 8-hour ozone standard.

The proposed regulation emphasizes engine replacement (repower), rather than retrofits with diesel emission control strategies, because applying retrofits to marine engines presents multiple challenges. While there are several projects underway demonstrating retrofit strategies on marine applications, there are currently no verified strategies for marine engines. Marine applications present challenges due to the uniqueness of each application, the harsh marine operating environment, and safety concerns. In addition, the relatively small size of the marine retrofit market provides fewer incentives for investment by emission control system manufacturers. Safety concerns, including the impact of the additional weight of the emission control equipment, line of sight concerns, and the need for high engine reliability will be important considerations in the design of aftertreatment systems. The requirement for multiple agency review and approval whenever marine vessels are modified, particularly from the U.S. Coast Guard, adds another level of complexity. While staff believes that development of retrofit strategies for marine applications is likely, the market is not sufficiently mature at this time to require retrofits. With that said, the proposal allows for the use of appropriate retrofit technologies as a viable option for those vessel owners and operators that choose to retrofit their engines to comply with the regulation.

Staff estimates that about 80 percent of the diesel engines on commercial harbor craft are Tier 0 engines, based on a 2004 engine inventory conducted by ARB staff. Replacing these Tier 0 engines with lower-emission Tier 2 engines (currently available) would provide a 60 to 65 percent reduction in both PM and NOx. Replacing Tier 0 engines with Tier 3 engines (available starting 2009 through 2014) would provide a 70 to 80 percent reduction in both PM and NOx. In 2025, after full implementation of the regulation, the diesel PM emissions from commercial harbor craft would be reduced from baseline 2004 levels by nearly 2.5 tpd (75 percent reduction), and NOx emissions would be reduced by 45 tpd (60 percent reduction).

The emission reductions from the proposed regulation would result in lower ambient PM levels and reduced exposure to diesel PM. Staff estimates that approximately 310 premature deaths statewide would be avoided by year 2025 from implementation of the proposed regulation. The estimated cost benefit of the avoided premature deaths

and other health benefits due to the emission reductions are estimated to range from $1.3 to $2.0 billion.

The reduction in potential cancer risk was assessed based on the overall projected reduction in harbor craft emissions between 2004 and 2020. It was estimated that the population impacted by a risk of 10 in a million would be reduced by over 60 percent due to these emission reductions.

Staff estimates that the regulatory costs for complying with the proposed regulation would be approximately $140 million (2006 dollars), or about $10 million annually over the 2009 through 2022 compliance time period for in-use engines. The regulatory costs are the incremental costs of regulation compliance and include those costs associated with the early replacement of engines (the residual value of the engine being replaced, the residual value of the most recent engine rebuild work, and the time value of money associated with the early engine replacement), aftertreatment costs for new ferries, and recordkeeping and reporting costs.

Staff also estimated the total out-of-pocket costs, or new equipment costs, that will occur over the 2009 through 2022 time period related to early engine replacement, aftertreatment costs for new ferries, and recordkeeping and reporting. These costs include both the regulatory costs, such as reporting and recordkeeping and after-treatment costs for new ferries, and normal and routine business costs such as replacing an engine at the end of its service life. The new equipment costs are estimated to be approximately $460 million (2006 dollars) over the 2009 to 2022 time period.

Staff evaluated the economic impact of complying with the in-use engine requirements on the affected ferry, excursion, tugboat, and towboat vessel businesses by evaluating the impact of the regulatory cost on typical business's "return on owner's equity" (ROE). We found that the overall change in ROE ranges from a negligible decline of about 0.5 percent for a typical tow company, to a decline of about 3.5 percent for a ferry or tug company. A decrease in ROE within this range is not considered to represent a significant impact on profitability.

Staff has determined that multiple federal, State, and local agencies would be impacted by the proposed regulation. The majority of the agencies would not be affected by the in-use compliance requirements and would only be subject to the reporting requirement, resulting in costs of approximately $100 per engine. One State agency, the California Department of Transportation (Caltrans), and three local agencies operating passenger ferries would be impacted by the in-use engine requirements. The affected local agencies include the City of Vallejo, which operates the Baylink Ferry; the Golden Gate Bridge and Highway Transportation District; and the Port of Los Angeles. Regulatory costs to these local agencies and Caltrans range from about $2,000 to $2 million over the life of the regulation.

The cost-effectiveness of the regulation is estimated, based on the regulatory costs, to be about $29 per pound of diesel PM reduced if all the cost is attributed to diesel PM reductions. The cost effectiveness for this regulation is consistent with those of other recent regulations, such as the Cargo Handling Equipment regulation at $41 per pound of PM and the Solid Waste Collection Vehicle Regulation at $28 per pound. If the costs are split evenly between diesel PM and NOx, the cost effectiveness is estimated at about $14 per pound for diesel PM and $1,800 per ton of NOx. If the costs are attributed to the combined PM and NOx reductions, cost effectiveness would be about $1.70 per pound.

1. INTRODUCTION

This Initial Statement of Reasons (Staff Report) presents an evaluation of the need for emission reductions from commercial harbor craft including the corresponding health impacts, a summary of the proposed regulation (two essentially identical regulations collectively referred to hereinafter in the singular), and the projected emissions reductions along with the associated reduction in health risk. The estimated costs for regulation compliance are presented, for both industry and State and local governments, along with the alternative proposals considered. A copy of the proposed regulation is provided in Appendix A. The Technical Support Document, an addendum to the Staff Report, provides more detailed analyses of these subjects and supporting documentation for the proposal. The Technical Support Document is provided under separate cover.

The California Air Resources Board's (ARB or Board) mission is to protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants, while recognizing and considering the effects on the economy of the State. The ARB's vision is that all individuals in California, especially children and the elderly, can live, work, and play in a healthful environment – free from harmful exposure to air pollution. To help achieve this, ARB has adopted numerous regulations to control emissions from many different sources, including diesel engines. Diesel engine exhaust is a significant health concern because it is a source of unhealthful air pollutants including gaseous and particulate-phase toxic air contaminants (TAC), particulate matter (PM), oxides of nitrogen (NOx), carbon monoxide, and hydrocarbons.

In 1998, the Board identified diesel PM as a TAC with no Board-specified threshold exposure level, pursuant to Health and Safety Code (HSC) sections 39650 through 39675. A needs assessment for diesel PM was conducted between 1998 and 2000 pursuant to HSC sections 39658, 39665, and 39666. This resulted in ARB staff developing and the Board approving 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 the proposed regulation. The ultimate goal of the Diesel RRP is to reduce, by 2020, California's diesel PM emissions and associated cancer risks by 85 percent from the 2000 levels.

In January 2005, the Goods Movement Cabinet Workgroup – created by Governor Schwarzenegger and led by the California Environmental Protection Agency and the Business, Transportation and Housing Agency – established a policy for goods movement and ports to improve and expand California's goods movement industry and infrastructure while improving air quality and protecting public health. The workgroup worked collaboratively with the logistics industry, local and regional governments, neighboring communities, business, labor, environmental groups, and other interested

stakeholders to create a two-phased Goods Movement Action Plan (Action Plan), which outlines a comprehensive strategy to address the economic and environmental issues associated with moving goods via the state's highways, railways, and ports. In April 2006, the Board approved the Emissions Reduction Plan for Ports and Goods Movement in California as part of the Action Plan. The final phase of the Action Plan was completed in January 2007 and includes a framework that identifies the key contributors to goods movement-related emissions. The Action Plan emission reduction goals for existing harbor craft engines are 25 percent reductions for both diesel PM and NOx compared to baseline 2001 levels by 2010, 30 percent reductions compared to 2001 baseline levels by 2015, and 40 percent reduction by 2020.

The federal Clean Air Act (CAA) requires U.S. EPA to establish National Ambient Air Quality Standards (standards) for pollutants considered harmful to public health, including fine particulate matter (PM2.5) and ozone. The South Coast and San Joaquin Valley Air Basins are the two areas in the State that exceed the annual PM2.5 standards. These areas are required by federal law to develop State Implementation Plans (SIPs) describing how they will attain the standards by 2015. The U.S. EPA further requires that all necessary emission reductions be achieved one calendar year sooner – by 2014 – in recognition of the annual average form of the standard. Reductions of NOx emissions are needed because NOx contributes to the formation in the atmosphere of both ozone and PM2.5; diesel PM emission reductions are needed because diesel PM contributes to ambient concentrations of PM2.5. The San Joaquin Valley and South Coast air basins are also in non-attainment for the federal ozone standard. However, they are expected to have until 2023 to attain the federal ozone standard, by invoking the "bump-up" provision in the CAA. The ARB and the districts are working to complete the PM2.5 and ozone SIPs and expect to submit them to the U.S EPA by April 2008 and this fall, respectively.

While all sources of NOx emissions are important, marine vessels play an especially significant role in California's efforts to reach attainment. Emissions from marine vessels, which include commercial harbor craft engines, collectively represent one of several key contributors to ambient PM2.5 levels, the successful control of which will determine whether California is able to meet the 2014 deadline for PM2.5 attainment in the South Coast Air Basin.

Staff is proposing a regulation to reduce diesel PM and NOx emissions from harbor craft vessel engines. Such vessels include but are not limited to, ferries, excursion vessels, tugboats, towboats, crew vessels, work boats, commercial and charter fishing boats, and other types of harbor craft.

The regulation is expected to significantly reduce emissions of diesel PM from in-use harbor craft engines. Diesel PM emission reductions are needed to reduce premature mortality, cancer risk, and other adverse impacts from exposure to this TAC. The regulation would achieve the 2015 and 2020 goals for harbor craft in the Goods Movement Action Plan. By 2020, staff projects that in-use harbor craft diesel PM emissions would be reduced about 70 percent and NOx emissions about 60 percent

from the 2004 baseline. These emission reductions would occur in areas along waterways, near ports, and in those communities surrounding these areas, as well as further inland.

The regulation would also reduce diesel PM and NOx emissions that contribute to exceedances throughout the State of ambient air quality standards for both PM2.5 and ozone. These reductions would assist California in its goal of achieving state and federal air quality standards.

2. EMISSIONS INVENTORY

Approximately 8,300 marine engines currently operate on about 4,200 harbor craft in California. These vessels are located mostly along the California coastline, with some on inland waterways. Harbor craft emit approximately 3.3 tpd of diesel PM and 73 tpd of NOx statewide. A summary of the estimated number of vessels and engines in each category and the emissions contributed are provided in Table 1 and Table 2 below.

Table 1: Commercial Harbor Craft Vessels and Engines (2004)

Vessel Category	Number of Vessels	Number of Engines
Commercial Fishing	2,727	4,308
Charter Fishing	563	1,419
Ferries/Excursion	416	1,348
Tug	128	450
Tow	35	115
Crew and Supply	64	230
Pilot	27	50
Workboats	89	158
Other	136	214
Total	4,185	8,291

Table 2: Commercial Harbor Craft Vessels Emissions Inventory (2004)

Vessel Category	2004 Pollutant Emissions, Tons/Day			
	PM	NOx	HC	CO
Commercial Fishing	0.8	17.4	1.3	4.8
Charter Fishing	0.6	12.7	0.9	3.3
Ferries/Excursion	0.9	21.0	1.4	5.6
Tug	0.6	15.3	1.0	3.8
Tow	0.1	3.0	0.2	0.7
Crew and Supply	0.1	1.4	0.1	0.4
Pilot	0	0.4	0	0.1
Workboats	0	0.5	0	0.1
Other	0.1	1.5	0.1	0.4
Total	3.3	73.2	5.0	19.2

The vessel categories targeted for engine emission reductions are ferries, excursion vessels, tugboats, and towboats. These vessels comprise about 23 percent of the engine inventory, yet generate about 50 percent of the emissions from all harbor craft. These vessels also work within the harbor and generally close to shore, as shown in Figure 1 below.

Figure 1: 2004 Vessel-Specific Diesel PM Emissions by Proximity to Shore

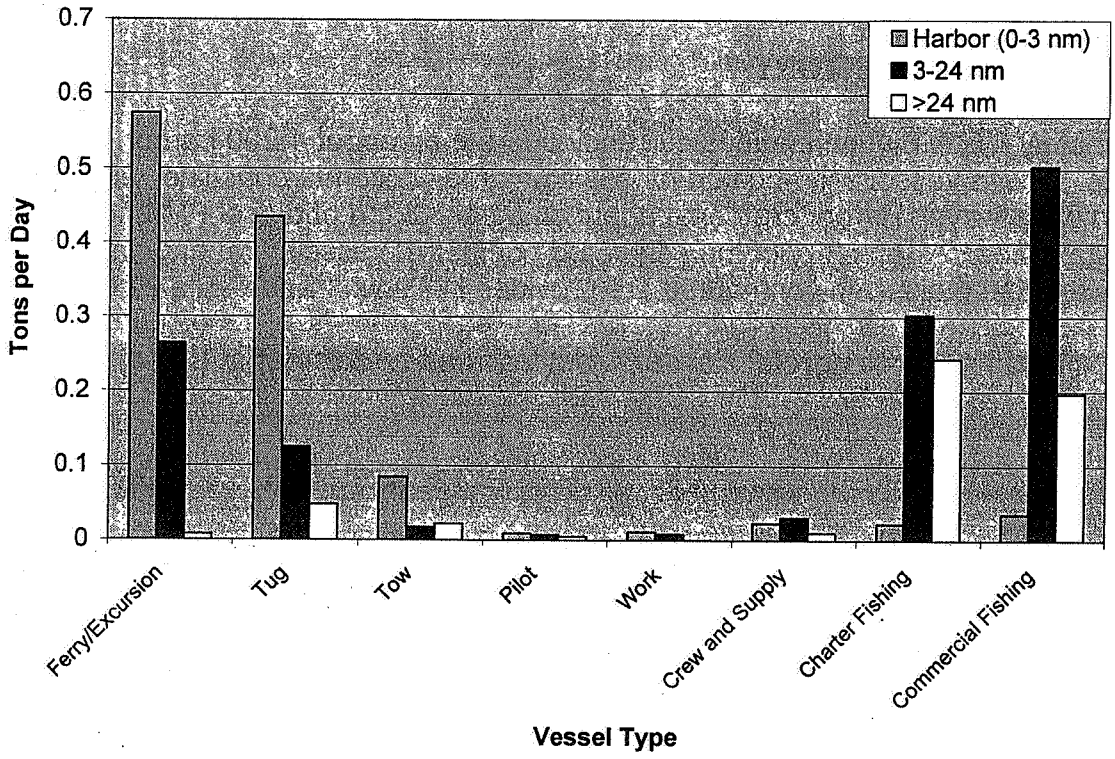


Figure 1 shows that about 70 percent of harbor craft diesel engines are on fishing vessels. However, they generate only about 40 percent of the harbor craft emissions. It is also important to note from Figure 1 that a large portion of the fishing vessel emissions occur more than 24 nautical miles off shore. Emissions released far offshore present a lesser health risk than near-shore emissions. In addition, the commercial fishing industry has been in decline for the last decade. Available data show that the number of working fishing vessels and tonnage of fish landings are declining about six percent per year. Reduced catch and increased competition from foreign markets make the fishing industry less able to bear the costs of regulatory compliance than other commercial harbor craft industries. Because of the lower health risk from the fishing vessels' offshore emissions, as compared to the near-shore emissions of the targeted industries, and the steady decline in the commercial fishing industry, staff is not proposing to require emission reductions from in-use engines on fishing vessels in the current proposal.

From ARB surveys and local district and port inventory data, we estimate that about 35 percent of harbor craft emissions are in the Bay Area Air Quality Management District (BAAQMD), 25 percent are in the SCAQMD, and just over 10 percent in the San Diego County Air Pollution Control District. The remaining 30 percent are distributed over other coastal districts and districts with major inland waterways.

As described in the Technical Support Document, staff projected the commercial harbor craft population for the current and future years using air districts' fleet growth rates adjusted as appropriate by other available information. Staff assumed tugboat growth rate to be flat since these vessels are generally over-powered and are capable of handling larger vessels. The six percent per year decline in commercial fishing vessels was assumed to continue through 2009. From 2010 on, the growth was assumed flat.

Engine population for current and future years was estimated based on the projected vessel population, the assumption that vessels in future years would have the same number of engines per vessel and the same average size as the base year and an engine attrition rate based on ARB's OFFROAD model.

3. HEALTH RISK

A. Cancer Risk

To estimate potential cancer risks from harbor craft, ARB staff conducted a risk assessment for the Ports of Los Angeles and Long Beach (POLA/LB). The POLA/LB health risk assessment estimated that commercial harbor craft are responsible for the third highest impact on cancer risk from port activities. Based on a 2002 POLA/LB inventory, over 1.5 million people are exposed to a cancer risk of greater than 10 in a million due to harbor craft diesel PM emissions in the Los Angeles/Long Beach area. Staff adjusted the potential cancer risk for the 2002 inventory to reflect the ARB 2004 inventory for the SCAQMD. This potential risk based on the 2004 inventory provides a consistent baseline with which to compare the estimated risk using the projected controlled emissions. The adjustment to the 2004 baseline inventory increased the number of people exposed to a 10 in a million risk from 1.5 million to 1.7 million.

Estimates of potential cancer risks from harbor craft activity at these two ports would represent the upper range of cancer risks, given the magnitude of harbor craft emissions in the San Pedro Bay area and the proximity of the emissions to highly urbanized areas. Qualitative estimates of the relative impact of harbor craft emissions for other areas can be made based on a comparison of the relative magnitude of emissions and the proximity of the emissions to urbanized areas. For example, one would expect that the potential cancer risk estimate associated with harbor craft activity in the Bay Area would be similar to the estimate for the POLA/LB, while the cancer risk estimates for San Diego would be about 50 percent lower.

B. Non-Cancer Risk

Staff estimates that exposures to direct and secondary diesel PM emissions from harbor craft can be associated with about 90 premature deaths per year. Approximately half of these premature deaths are due to direct diesel PM and half from secondary diesel PM. All of these estimates are rounded to the tens digit.

Using the 2004 statewide estimate of directly emitted diesel PM emissions (3.3 tpd) and the association between ambient PM exposure and mortality derived from Pope et al. (2002), we estimate approximately 50 premature deaths (a range of 10 to 80, with a 95 percent confidence interval (95% CI), for ages 30 and older) per year statewide can be associated with uncontrolled, directly emitted diesel PM from harbor craft.

These estimates were developed using basin-specific factors relating the non-cancer health impacts to direct diesel PM emissions from harbor craft for the year 2000. After adjusting for population changes between 2000 and 2004 and adjusting for lower on-shore impacts from emissions released off-shore, staff estimates that the public was exposed to about 590 tons of direct diesel PM emissions from harbor craft in 2004. We estimate that approximately 50 annual premature deaths (10 to 80, 95% CI) are associated with this exposure.[1] Estimates of other health impacts, such as hospitalizations and asthma symptoms, were calculated using basin-specific factors developed from other health studies. Details on the methodology used to calculate these estimates, including the adjustment for off-shore PM emissions in the 3 to 24 nautical mile domain, can be found in Appendix A of the Emission Reduction Plan for Ports and Goods Movement in California (ARB, 2006).

In addition to directly emitted PM, diesel exhaust contains NOx, which is a precursor to nitrates, a secondary diesel-related PM formed in the atmosphere. Lloyd and Cackette (2001) estimated that secondary diesel PM2.5 exposures from NOx emissions can lead to additional health impacts beyond those associated with directly emitted diesel PM2.5. (Lloyd and Cackette, 2001) To quantify such impacts, staff developed population-weighted nitrate concentrations for each air basin, as described in the Technical Support Document, Chapter IV.

Using the 2004 statewide estimate of NOx emissions from harbor craft and the relationship of NOx/nitrate to PM-mortality discussed below, we estimated approximately an additional 50 (10 to 80, 95% CI) premature deaths (for ages 30 and older) per year statewide can be associated with uncontrolled, secondary diesel PM from harbor craft.

[1] To account for the differing impact of diesel PM emission from off-shore sources, CARB staff developed a South Coast and a statewide diesel PM emissions impact adjustment factor. For the South Coast, the adjustment factor for ship diesel PM emissions released off-shore was estimated to be 0.1, based on dispersion modeling. For the rest of the state, the adjustment factor was estimated to be 0.25.

In addition to PM-mortality, we estimate that the 2004 estimated emissions (directly emitted and secondary sources) from harbor craft will result in the following statewide non-cancer health impacts:

- 20 hospital admissions due to respiratory causes (10 to 30, 95% CI)
- 40 hospital admissions due to cardiovascular causes (20 to 60, 95% CI)
- 2,400 cases of asthma-related and other lower respiratory symptoms (940 to 3,900, 95% CI)
- 200 cases of acute bronchitis (0 to 430, 95% CI)
- 16,000 work loss days (13,000 to 18,000, 95% CI)
- 90,000 minor restricted activity days (74,000 to 110,000, 95% CI)

4. SUMMARY OF THE PROPOSED REGULATION

Staff is proposing the Board approve adoption of a regulation, pursuant to its authority under HSC sections 43013 and 43018, which would apply to the emissions from diesel engines on commercial harbor craft operating within any of the Regulated California Waters. As a companion to the proposed regulation, staff is proposing that the Board also approve adoption of identical provisions as an airborne toxic control measure (ATCM), pursuant to its authority under HSC section 39666, which would complement the regulation and provide maximum notice to the regulated community of the regulatory requirements on commercial harbor craft. The regulation and ATCM are hereinafter collectively referred to in the singular. The following sections provide more details about the proposed regulation.

A. Emission Standards for Marine Engines

Under the staff's proposal, the emissions of diesel PM and NOx from a regulated diesel engine (both new and in-use) would be identical to those specified by the U.S. EPA marine engine standards for new engines in effect at the time compliance is required. The U.S. EPA marine engine emission standards have phased effective dates and emission levels dependent on the engine size.

The U.S. EPA classifies marine engines as either Category 1, 2, or 3, depending on engine size or cylinder displacement, with the engine size increasing with the higher category number. All of the engines used in California's commercial harbor craft are Category 1 or 2 engines, with about 90 percent of the engines being Category 1 engines. The engine size and approximate maximum horsepower (hp) rating for Category 1 and 2 engines are provided in Table 3. Category 1 engines are rated at less than 5.0 liters per cylinder and can range as high as 2,500 hp. Category 2 engines range in size from 5.0 liters per cylinder to 30 liters per cylinder and can range from about 750 to 5,000 hp. Most propulsion engines used in harbor craft operating in California are Category 1 engines. Auxiliary engines are exclusively Category 1 engines. Harbor craft Category 2 engines are generally used in tugboat, towboat, and some ferry applications.

Table 3: U.S. EPA Marine Engine Categories Used in Harbor Craft

Category	Liters per Engine Cylinder	Approximate Horsepower
Category 1	< 5.0[A]	50[B] to <~2500 hp
Category 2	5.0 to 30[A]	≥750 to <5000 hp

[A] The U.S. EPA has proposed Tier 3 and Tier 4 standards, which, if adopted, will update Category 1 to < 7.0 L/cyl. and Category 2 to 7.0 to 30 L/cyl.
[B] The proposed Category 1 Tier 3 standards include engines rated less than 50 hp.

The emission limits for Category 1 and 2 engines used in commercial harbor craft are summarized in Table 4.

Table 4: U.S. EPA Marine Engine Standards Effective Dates and Emission Limits for Category 1 and Category 2 Engines Used in Harbor Craft

Category	Tier Level	Adoption Date	Effective Date	PM (g/bhp-hr)	NOx (g/bhp-hr)
1	1	IMO 1997 U.S EPA 2003	2000 2004	N/A	7.3 – 12.7[B]
	2	U.S. EPA 1999	2004-2007	0.15-0.3	5.4-5.6[C]
	3	U.S. EPA proposed 2007	2009-2114	0.08-0.3	3.5-5.6[C]
	4[A]	U.S. EPA proposed 2007	2017	0.03	1.3
2	1	IMO 1997 U.S EPA 2003	2000 2004	N/A	7.3 – 12.7[B]
	2	U.S. EPA 1999	2007	0.2	5.8[C]
	3	U.S. EPA proposed 2007	2013	0.1	4.6[C]
	4[A]	U.S. EPA proposed 2007	2016-2017	0.03	1.3

(40 CFR Part 94)
[A] Applies only to engines with maximum horsepower rating of 800 hp (600 kW) or more.
[B] Standard is a function of engine speed, revolutions per minute (rpm). Standard=12.7 for engines with engine speed ≥ 2000 rpm. Standard=7.3 for engines with engine speed ≤130 rpm. For engines between 130 and 2000 rpm, standard = $33.57 \times rpm^{-0.2}$.
[C] NOx is NOx + total HC.

The U.S. EPA has proposed but not finalized its rulemaking for establishing Tier 3 and Tier 4 marine engine standards. The limits and effective dates shown in Table 3 are based on the proposal set forth in their April 3, 2007, Draft Locomotive and Marine Notice of Proposed Rule Making (U.S. EPA, 2007). The U.S. EPA proposal would initiate Tier 3 standards between 2009 and 2014 for most commercial harbor craft engines. The Tier 3 standards are expected to be achievable without after-treatment; however, the Tier 4 standards will require after-treatment technology. The U.S. EPA has proposed Tier 4 standards only for engines over about 800 horsepower (hp) starting

in 2016 for the largest commercial harbor craft engines and a year later, 2017, for 800 to 1,880 hp engines.

The U.S. EPA is expected to finalize their Tier 3 and Tier 4 marine engine standards by the end of 2007. These proposed standards are incorporated by reference in the proposed commercial harbor craft regulatory language. If these standards are not adopted as proposed, it will be necessary for staff to return to the Board to amend the regulatory language such that the standards incorporated by reference are consistent with those in the U.S. EPA's final rulemaking.

B. In-Use Requirements

Compliance Options

Staff is proposing that in-use Tier 0 (pre-Tier 1) and Tier 1 marine engines on ferries; excursion vessels, tugboats, and towboats meet emission limits equal to or cleaner than the U.S. EPA marine engine Tier 2 or Tier 3 emission standards applicable on the compliance date. The proposed regulation does not require compliance with Tier 4 (after-treatment based) standards for in-use engines due to issues with the additional weight and space requirements associated with applying after-treatment technologies to existing vessels.

While we expect the primary method for compliance with the proposal is the replacement of in-use engines with certified Tier 2 or Tier 3 engines, the proposed regulation includes other options for compliance. These options include:

- demonstrating that the current engine meets the applicable U.S. EPA marine engine standards;
- demonstrating that the current engine has not been operating 300 hours or more per calendar year and will continue to operate at this low usage rate in the future.

If the engine is replaced with a Tier 2 or 3 engine or can be shown to meet the applicable standards, all compliance requirements for that engine will have been met.

The ARB staff anticipates that, in most cases, engine replacement will be the option chosen by vessel owners and operators to meet the proposed emission standards for vessels. Ferries, excursion vessels, tugboats, and towboats are good candidates for repowering because these vessel types have an extensive history of being repowered. Almost 50 ferries, excursion vessels, tugboats, and towboats statewide have been repowered over the last six years through the Carl Moyer Program.

Compliance Schedule

The compliance schedules in the proposed regulation are shown in Table 5 and Table 6. Compliance dates are based on the model year of the engine and the hours of operation.

The engine model year would be determined by one of three methods. In most cases, the engine's actual model year of manufacture would be used to determine the required compliance date. However, if certain steps have been taken to reduce the emissions of the engine, an "effective model year" may be calculated based on the following:

- implementing an emission control strategy that obtains at least a 25 percent reduction in either PM or NOx, would extend the engine model year by five years. This is referred to as the "Engine's Model Year + 5" method. The date at which the engine must meet the U.S. EPA marine engine standards would be based on the engine model year plus five years;
- demonstrating that the engine has been rebuilt to Tier 1 standards or cleaner prior to January 1, 2008 would allow the date of rebuild to be used as the engine's model year for determining when the engine must meet the U.S. EPA marine engine standards. This is referred to as the "Engine's Tier 1 Rebuild Model Year."

Table 5 shows the statewide schedule for compliance. This compliance schedule applies to all ferries, excursion vessels, tugboats, and towboats operating in regulated California waters, except those with homeports in SCAQMD. The compliance schedule for vessels with homeports in SCAQMD is shown in Table 6.

Table 5: Compliance Dates for Vessels with Homeports outside SCAQMD

Engine Model Year	Total Annual Hours of Operation	Compliance Year
1975 and earlier	≥ 1500	12/31/2009
1975 and earlier	≥ 300 and < 1500	12/31/2010
1976 - 1985	≥1500	12/31/2011
1976 - 1985	≥ 300 and < 1500	12/31/2012
1986 - 1995	≥ 1500	12/31/2013
1986 - 1995	≥ 300 and < 1500	12/31/2014
1996 - 2000	≥1500	12/31/2015
1996 - 2000	≥ 300 and < 1500	12/31/2016
2001 - 2002	≥ 300	12/31/2017
2003	≥ 300	12/31/2018
2004	≥ 300	12/31/2019
2005	≥ 300	12/31/2020
2006	≥ 300	12/31/2021
2007	≥ 300	12/31/2022

[Note: For example, if a 1982-model year diesel engine on a tugboat operating in Regulated California Waters is used for 750 hours in 2011, the owner or operator must bring the engine into compliance with the emission standards by December 31, 2012.]

Table 6: Compliance Dates for Vessels with Homeports in SCAQMD

Engine Model Year	Total Annual Hours of Operation	Compliance Date
1979 and earlier	≥ 300	12/31/2009
1980 – 1985	≥ 300	12/31/2010
1986 – 1990	≥ 300	12/31/2011
1991 – 1995	≥ 300	12/31/2012
1996 – 2000	≥ 300	12/31/2013
2001	≥ 300	13/31/2014
2002	≥ 300	12/31/2015
2003	≥ 300	12/31/2016
2004	≥ 300	12/31/2017
2005	≥ 300	12/31/2018
2006	≥ 300	12/31/2019
2007	≥ 300	12/31/2020

[Note: For example, if a 1982-model year diesel engine on a tugboat operating in Regulated California Waters is used for 300 or more hours in 2009, the owner or operator must bring the engine into compliance with the emission standards by December 31, 2010.]

Early compliance dates for the SCAQMD are proposed in order to provide emission reduction commitments for harbor craft, as contained in the 2003 Statewide Strategy of the California State Implementation Plan (SIP), and to assist the SCAQMD in meeting its attainment goals. The South Coast Air Basin is non-attainment for the federal annual PM2.5 and PM10 ambient air quality standards and 8-hour ozone standard.

For harbor craft with homeports in the SCAQMD, the compliance schedule begins December 31, 2009, similar to the statewide schedule, but it is accelerated by two years for future compliance deadlines. Engines brought into compliance the first year also include a wider range of model years, through 1979, than the statewide schedule. Accelerating the compliance schedule for SCAQMD would provide early benefits for the South Coast Air Basin to assist in meeting their air quality attainment goals.

C. Newly Acquired and New Harbor Craft Engines and Vessels – All Harbor Craft

The proposed regulation includes requirements regarding newly acquired and new harbor craft and engines that apply to all harbor craft vessel types.

Acquisition of Engines for All In-Use Harbor Craft

A newly acquired engine for any in-use harbor craft would be required to meet the U.S. EPA marine engine emission standards in effect on the date that the vessel owner acquires the engine. This provision ensures that retired engines are replaced with the cleanest engines available.

Acquisition of In–Use Harbor Craft

The acquisition of in-use harbor craft is unrestricted; however, engine compliance, monitoring, reporting, and recordkeeping requirements apply.

Acquisition of New Harbor Craft

The engines on all new harbor craft vessels would be required to meet the U.S. EPA marine engine standard in effect at the time of vessel acquisition. The propulsion engines on new ferries would be subject to additional requirements. The propulsion engines on all new ferries, with the capacity of more than 75 passengers and built after January 1, 2009, would be required to meet the U.S. EPA marine engine standard in effect at the time of vessel acquisition and would also be required to be equipped with the best available control technology (BACT) for the engine and application. New build ferries would be required to submit a plan to the ARB defining the emission reduction technology and expected emission reductions for the ferry to be built. The ARB Executive Officer would make a case-by-case determination as to whether the planned control technology meets the BACT requirement.

D. In-Use Requirements for All Harbor Craft

There are additional in-use requirements in the regulation that apply to all harbor craft. These include a requirement for harbor craft to use clean fuel, as discussed in the next section, and mandatory monitoring, reporting, and recordkeeping requirements.

Fuel Use Requirement

This proposal would require that harbor craft diesel engine be fueled with CARB diesel or an approved alternative diesel fuel. Examples of alternative fuels that could be used are biodiesel, biodiesel blends, Fischer-Tropsch fuel, emulsions of water in diesel fuel, and fuels with an additive. This provision would also allow alternative diesel fuels and CARB diesel fuel used with a fuel additive that meet the requirements of the ARB Verification Procedure.

Monitoring, Reporting, and Recordkeeping

Owners and operators of harbor craft operating in Regulated California Waters would be required to keep records for each vessel and install a non-resettable hour meter on each engine. Vessel owners/operators would also need to keep a copy of the initial reporting form and the yearly records on the vessel or in a central dockside location to be made available upon request of the ARB enforcement staff. Initial reporting would be required for all vessels starting February 28, 2009. The initial reporting would provide ARB staff with information including contact information, and vessel and engine information. Compliance reporting would be required for ferries, excursion vessels, tugboats, and towboats in the commercial harbor craft fleet. Ferry, excursion vessel, tugboat, and towboat operators would specify how they plan to comply with the

proposed regulation in the initial report, and how they have complied in the final reporting.

Historically, harbor craft engines have not been subject to statewide or local air district permitting or registration programs. As a result, limited data on the marine engines used aboard harbor craft are available from district permitting programs. The mandatory reporting required by the proposed regulation would provide more complete information on California's harbor craft fleet for both implementing the current regulation and developing any further regulatory requirements.

E. Compliance Extensions

The proposed regulation includes a provision by which the ARB Executive Officer may grant a vessel owner or operator a compliance extension beyond the deadlines specified in the regulation. The reasons included in the proposed regulation for granting an extension are:

- change in hours of operation of vessel during the year prior to the anticipated engine compliance date such that the effective compliance date would be accelerated by one year;
- no suitable engine replacement for a particular engine;
- delay in engine delivery due to the engine manufacturer;
- installation difficulties; and,
- owner with multiple vessels whose engines would need to comply in the same year.

If an extension is required because there is no suitable engine replacement for a particular engine, the owner or operator is required to apply for this extension at least six months prior to the engine regulatory compliance date. The approval process for this extension includes a public review and comment period.

F. Exemptions

The proposed regulation includes a low-use exemption from the engine compliance requirements for ferries, excursion vessels, tugboats, and towboats for engines that are not operated more than 300 hours per year within Regulated California Waters. These low-use engines would be subject to the other requirements of the proposed regulation, including the clean fuel use, a mandatory non-resettable hour meter, and reporting and recordkeeping. Increased operation of a low-use engine on a ferry, excursion vessel, tugboat, or towboat would make the engine subject to the engine compliance requirements.

Vessels traveling through Regulated California Waters without entering California internal or estuarine water or calling at a port are provided an exemption from the requirements of the proposed regulation.

Temporary replacement vessels and registered historic vessels are also exempt from the engine compliance requirements. A temporary replacement vessel must be a vessel whose homeport is not within California and is brought into California to be used for no longer than 12 months to perform the work of a California vessel that has been temporarily taken out of service. A California vessel with a homeport outside the SCAQMD may also be brought into the SCAQMD as a temporary replacement vessel to perform the work of an out of service vessel for a limited term and remain subject to the statewide schedule rather than the SCAQMD accelerated schedule.

Vessel types that are exempt from the regulation in its entirety include:

- recreation vessels;
- ocean-going vessels, except ocean-going tugboats or towboats;
- military tactical support vessels;
- all Coast Guard vessels; and,
- temporary emergency rescue/recovery vessels.

A temporary emergency rescue/recovery vessel is defined as a vessel whose homeport is outside California and is brought into California for the immediate use of emergency rescue or recovery and returns to its homeport outside of California at the conclusion of its rescue/recovery mission.

Engines that are exempt from the regulation either in portion or in entirety include:

- vessel engines with a maximum horsepower rating of less than 50 hp - exempt from the in-use engine compliance requirements,
- vessel engines currently registered with the ARB's Portable Engine Registration Program (sections 2450 through 2465, title 13, CCR) - exempt from the regulation in its entirety, and
- vessel engines on a vessel that is to be retired within one year of the engines' compliance date are exempt from the in-use engine compliance requirements.

Low horsepower engines are being exempted for administrative reasons and their minimal contribution to the emission inventory.

5. EMISSION REDUCTIONS

The ARB staff has estimated that by requiring early engine replacement for these vessel types and implementing an accelerated schedule for the SCAQMD, the reductions necessary for meeting the Goods Movement Action Plan goals for harbor craft can be met and significant early benefits for the South Coast can be achieved. As shown in Figure 2 and Figure 3, in 2025, after full implementation of the proposed regulation, the statewide diesel PM emissions from commercial harbor craft would be reduced from the 2004 baseline by nearly 2.5 tpd and NOx emissions would be reduced by about 45 tpd.

Figure 2: Projected Statewide PM Emissions for Harbor Craft Diesel Engines

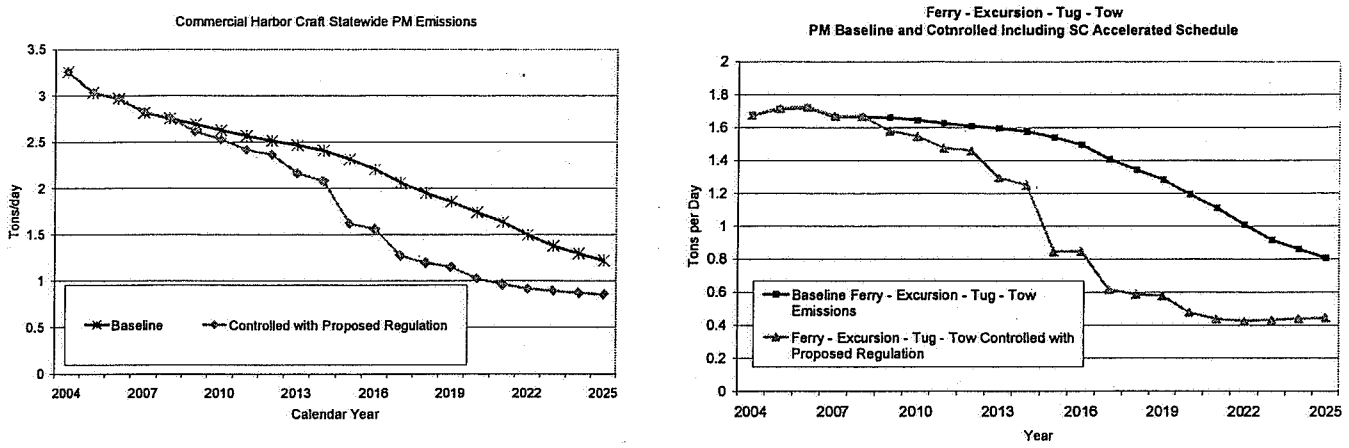
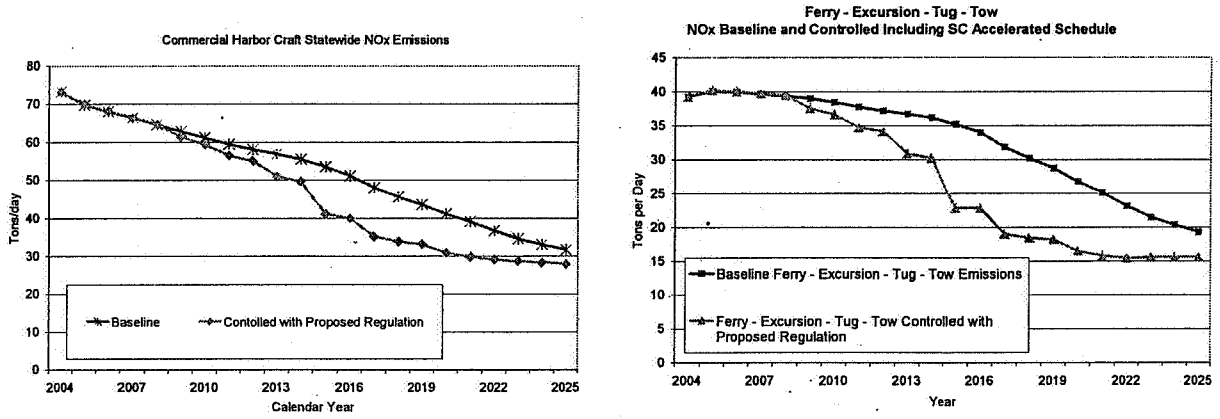


Figure 3: Projected Statewide NOx Emissions Harbor Craft Diesel Engines



Both the overall harbor craft fleet projected emission and those generated specifically from the vessel engines subject to the in-use engine compliance schedule are shown in the figures above. The baseline projected emissions decrease over time due to the following efforts and factors:

- U.S. EPA cleaner marine new engine standards;
- California's requirement for the sale of ultra low sulfur diesel fuel for harbor craft;
- port clean air plans;
- engine replacement incentive programs; and,
- a negative growth factor for California's fishing fleet.

ARB staff estimates that the proposed measure, in conjunction with these other efforts and factors, would reduce diesel PM emissions from harbor craft diesel engines by

about 50 percent by 2015 and nearly 70 percent by 2020. The ARB staff also estimates that NOx emissions would be reduced by about 45 percent by 2015 and nearly 60 percent by 2020. Both the baseline and controlled projected emissions include the benefit of the U.S. EPA proposed Tier 3 and Tier 4 marine engine standards for new engines. The U.S. EPA is expected to finalize these standards by the end of 2007. The projected reduction in both the baseline and controlled emissions are dependent on the U.S. EPA adopting standards at least as stringent as those they proposed in April 2007.

Although both PM and NOx uncontrolled emissions are projected to drop through 2025, the proposed regulation would accelerate the anticipated emission reductions. For example, without the proposed regulation, we would not achieve the 50 percent drop (relative to 2004) in PM emissions projected for the 2015 inventory until about 2021 (see Table 7 below). The reductions from all actions, including the proposed regulation, are summarized in Table 7 and Table 8 below.

Table 7: Projected Statewide PM Benefits for Harbor Craft from All Actions[A]

Year	PM without Regulation (tons/day)	PM with Regulation (tons/day)	Emission Reductions from 2004 (tons/day)	% Emission Reductions from 2004
2004	3.3	3.3	0.0	0%
2010	2.6	2.5	0.7	22%
2015	2.3	1.6	1.6	50%
2020	1.7	1.0	2.2	68%
2025	1.2	0.9	2.4	74%

[A] All actions include the proposed regulation, U.S. EPA marine new engine standards, low sulfur fuel requirement, port clean air plans, incentive programs, and negative growth factor for fishing fleet.

Table 8: Projected Statewide NOx Benefits for Harbor Craft from All Actions[A]

Year	NOx without Regulation (tons/day)	NOx with Regulation (tons/day)	Emission Reductions from 2004 (tons/day)	% Emission Reductions from 2004
2004	73	73	0	0%
2010	61	59	14	19%
2015	54	41	32	44%
2020	41	31	42	58%
2025	32	28	45	62%

[A] All actions include the proposed regulation, U.S. EPA marine new engine standards, low sulfur fuel requirement, port clean air plans, incentive programs, and negative growth factor for fishing fleet.

The SCAQMD accelerated schedule would provide early NOx and PM benefits, with an estimated 35 percent reduction in PM emissions and 25 percent reduction in NOx emissions, due to the proposed regulation, in 2014. These projections are shown in Table 9.

Table 9: Projected SCAQMD NOx and PM Benefits for Harbor Craft in 2014

South Coast NOx and PM Emissions in 2014 (tons/day)		
Pollutant	PM	NOx
Year	2014	2014
Without regulation	0.63	14.4
With regulation	0.40	10.4
Benefits of regulation	0.2	3.9
Percent reduction due to regulation	36%	27%

Note: Numbers may not add up due to rounding

The regulation benefits in 2014 would be significantly less if the SCAQMD in-use engine compliance schedule were not accelerated and aligned with the statewide schedule. This is illustrated by Figure 4 and Figure 5, below.

Figure 4: South Coast AQMD PM Benefits with Accelerated and Statewide In-Use Harbor Craft Engine Compliance Schedules

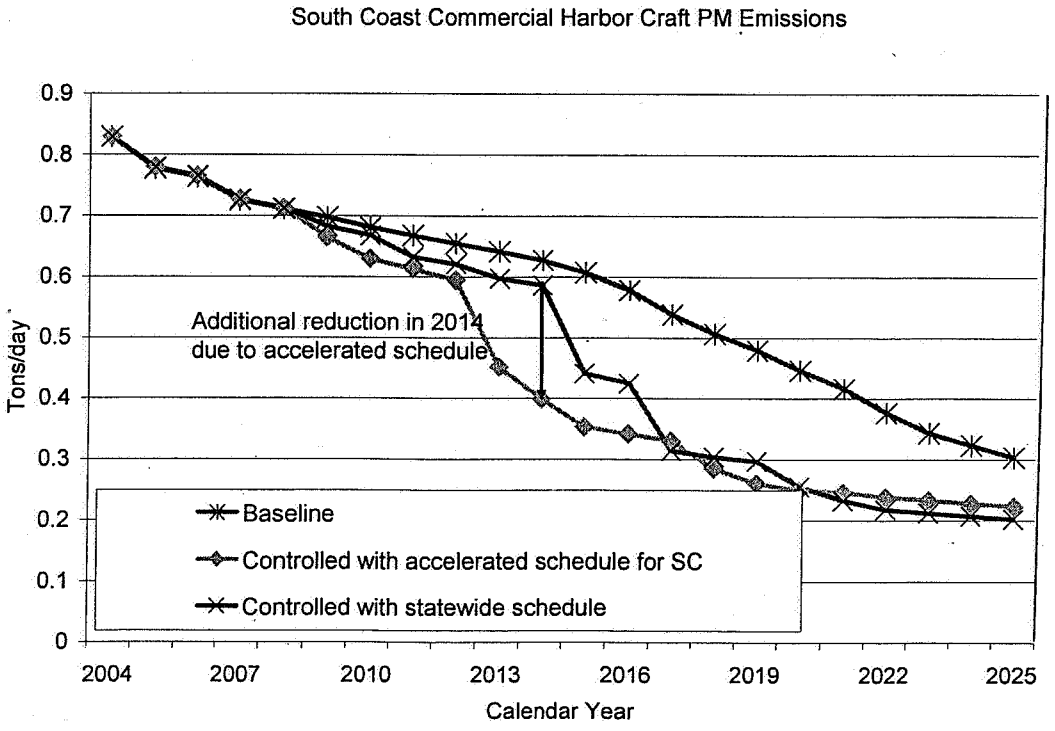
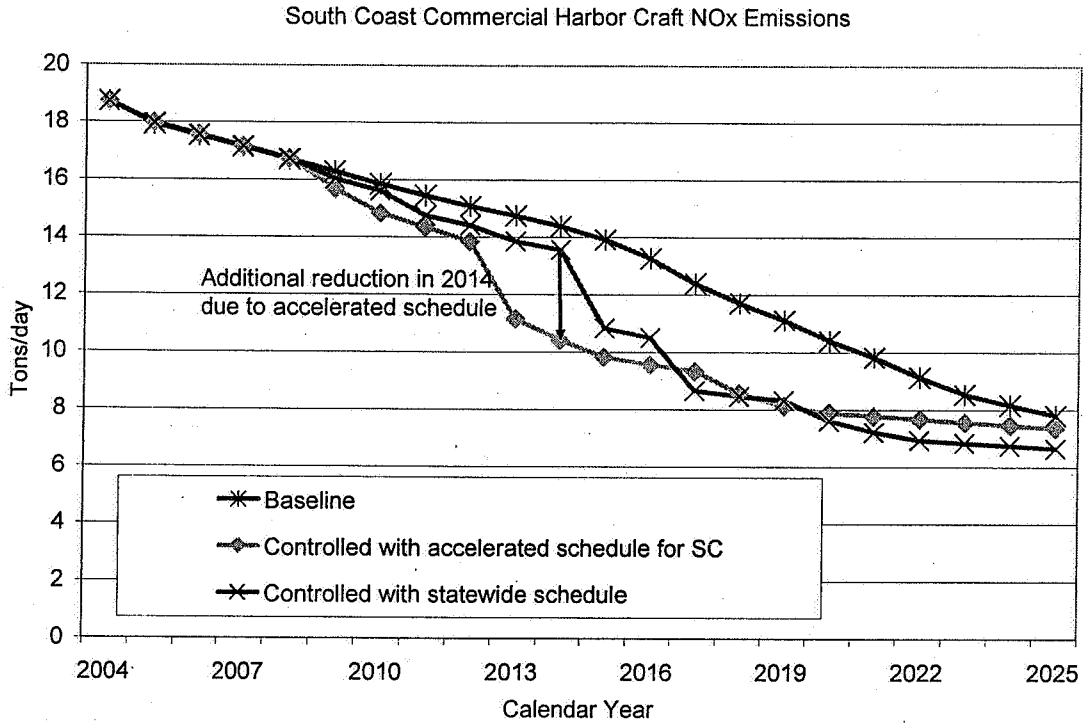


Figure 5: South Coast AQMD NOx Benefits with Accelerated and Statewide In-Use Harbor Craft Engine Compliance Schedules

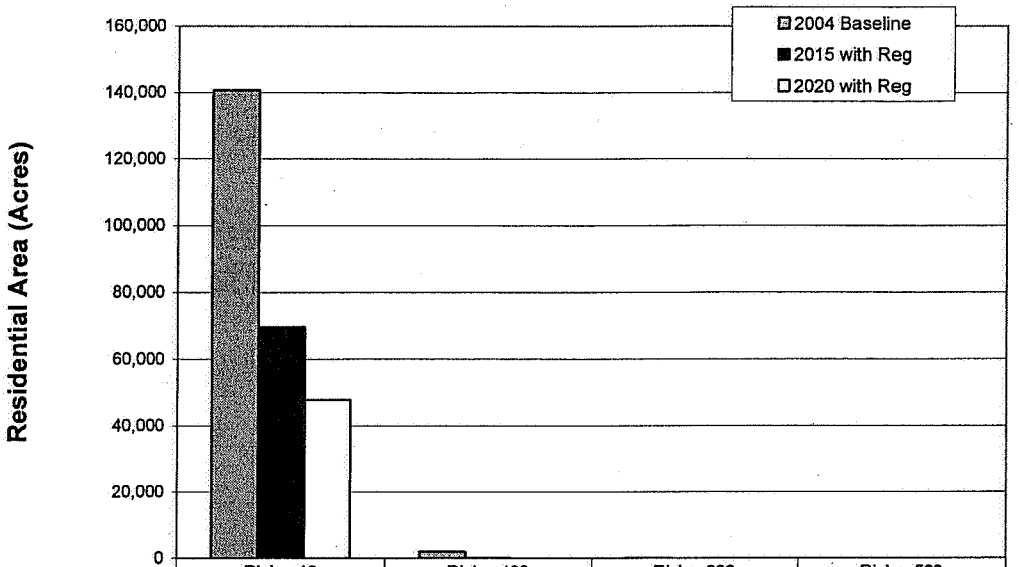


6. RISK REDUCTION

A. Cancer Risk

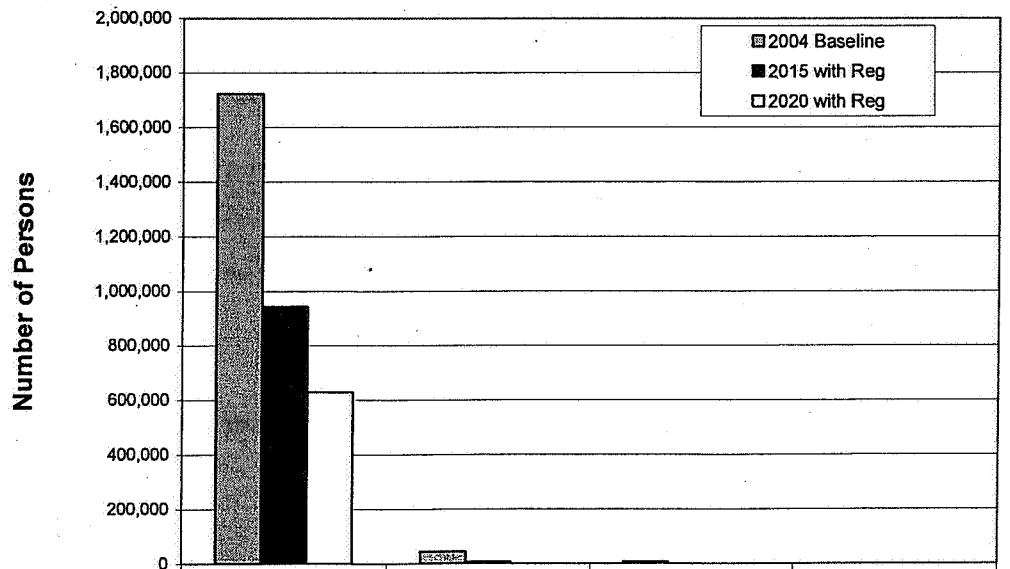
The emission reductions obtained from the proposed regulation would result in lower ambient PM levels and reductions in exposure to diesel PM. These reductions would result in a corresponding reduction in potential cancer risk. Based upon our analysis of harbor craft in the Ports of Los Angeles and Long Beach, the estimated reduction in cancer risk is shown on a residential area impacted basis in Figure 6 and, on a population basis, in Figure 7. The population impacted by a risk of 10 in a million would be reduced from 1.7 million persons, in 2004, down to 0.6 million persons by 2020, due to reductions from the proposed regulation as well as other factors.

Figure 6: Reduction Due to Proposed Harbor Craft Regulation in Residential Areas Impacted by Increased Potential Cancer Risk (POLA/LB)



	Risk > 10	Risk > 100	Risk > 200	Risk > 500
2004 Baseline	140,790	1,977	89	0
2015 with Reg	69,703	69	0	0
2020 with Reg	47,869	0	0	0

Figure 7: Reduction Due to Proposed Harbor Craft Regulation in Population Impacted by Increased Potential Cancer Risk (POLA/LB)



	Risk > 10	Risk > 100	Risk > 200	Risk > 500
2004 Baseline	1,722,364	44,155	7,651	0
2015 with Reg	943,280	6,267	0	0
2020 with Reg	629,594	0	0	0

B. Non-Cancer Risk

The emission reductions obtained from this regulation will result in lower ambient PM levels and reduced exposure to diesel PM. Staff estimates that, based on the incremental benefits of the proposed regulation, approximately 310 premature deaths [(90 to 530, 95 percent confidence interval (95% CI)] statewide will be avoided by the year 2025 from the implementation of the commercial harbor craft regulation. Estimates of other health effects avoided statewide include:

- 70 hospital admissions due to respiratory causes (40 to 90, 95% CI)
- 120 hospital admissions due to cardiovascular causes (80 to 190, 95% CI)
- 8,100 cases of asthma-related and other lower respiratory symptoms (3,100 to 13,000, 95% CI)
- 670 cases of acute bronchitis (0 to 1,500, 95% CI)
- 53,000 work loss days (45,000 to 61,000, 95% CI)
- 300,000 minor restricted activity days (250,000 to 360,000, 95% CI)

7. ENVIRONMENTAL IMPACT

No significant adverse environmental impacts are expected to occur from adoption of, and compliance with, the proposed requirements for commercial harbor craft engines. Implementation from the proposed amendments would reduce directly emitted and secondarily formed PM levels, provide both near source and regional risk reduction, and contribute to the overall effort of reducing PM mortality, hospital admissions, and lost work days.

8. IMPACT ON GLOBAL WARMING

Some actions required by the proposed regulations could result in slightly increased carbon dioxide (CO2) for some applications. For example, the design for new ferries would be required to include the best available control technology (after-treatment) to be used with propulsion engines. An increase in CO2 could occur if vessel operators choose to comply by using exhaust treatment technologies that use vessel power (e.g., scrubbers, selective catalytic reduction), increase the weight of the vessel, or require a larger engine to be installed on the vessel. However, other actions required by the rule will likely offset this effect. For instance, the accelerated phase-in of newer engines, which employ modern, less polluting technologies, should reduce greenhouse gas emissions from each new engine relative to the older, in-use engines. In addition, the proposed regulations will reduce emissions of black carbon (a component of diesel PM and a likely contributor to global warming), which will further offset the minor increases in CO2 emissions that may occur in some applications. Thus, staff expects the proposed regulations to have an overall negligible effect on global warming.

9. ECONOMIC IMPACTS

In assessing the costs associated with the proposed regulation, ARB staff developed two different estimates, one for regulatory costs and another for new equipment costs.

Regulatory costs are the estimated costs resulting from the proposed regulations due to the early replacement of in-use engines, the additional costs associated with adding aftertreatment to new ferry propulsion engines, and recordkeeping and reporting. The costs considered for the early replacement of engines includes the residual value of the engine being replaced, the residual value of the most recent engine rebuild work, and the time value of money. These regulatory costs are those directly attributable to compliance with the proposed regulation. New equipment costs are the estimated total out-of-pocket costs for purchasing and installing a new engine (engine replacement cost), new ferry costs associated with adding aftertreatment technology, and recordkeeping and reporting. A large portion of the new equipment costs, primarily the engine replacement costs, are an existing cost of doing business that would occur with or without the regulation when an engine reaches the end of its service life.

Staff estimates the regulatory cost for complying with the proposed regulation to be approximately $140 million (2006 dollars). This corresponds to about $10 million annually from 2009 through 2022. Industry costs for new equipment are estimated at approximately $460 million dollars (2006 dollars) over the lifetime of the proposed regulation (2009 – 2022).

Staff evaluated the economic impact of complying with the in-use engine requirements on the affected ferry, excursion, tugboat, and towboat businesses by evaluating the impact of the regulatory cost on typical business's "return on owner's equity" (ROE).

Using the ROE approach, we found that the overall change in ROE ranges from a negligible decline of about 0.5 percent for a typical tow company, to a decline of 3.5 percent for a ferry or tug company. Staff's analysis indicates that the change in ROE could be larger for small businesses. A decline of 0.5 to 3.5 percent in ROE is not considered to represent a significant impact on profitability. Additionally, businesses with compliance dates in the future may be eligible for incentive grant funds if they choose to comply early. Incentive funding opportunities are discussed in the Technical Support Document, Chapter VIII.

10. COST TO LOCAL, STATE, AND FEDERAL AGENCIES

Multiple federal, State, and local agencies would be impacted by the proposed regulation. The majority of the agencies would not be affected by the in-use compliance requirements and would only be subject to the reporting requirement, resulting in costs of approximately $100 per engine. One State agency, the California Department of Transportation (Caltrans), and three local agencies would be impacted by the in-use engine requirements. Regulatory costs to these agencies range from about $2,000 to $2 million.

There would be significant costs to the ARB to implement and enforce the regulation. Staff estimates that ARB's cost to implement the reporting program (initial report) would be approximately $25 to $50 per engine. An additional annual cost of $10 to $100 per engine (after the first year) is estimated to cover an inspection and report update at the

time of final compliance with the regulation. These total costs are estimated to be $200,000 to $400,000 over the life of the regulation. The ARB's administrative costs for outreach, educational efforts, and technical assistance would be absorbed within existing budgets and resources.

11. COST-EFFECTIVENESS

Cost-effectiveness is expressed in terms of costs in dollars per unit of emissions reduced (pounds or tons). The cost-effectiveness for the proposed regulation is determined by dividing the regulatory costs (cost specifically due to compliance with the proposed regulation) by the total pounds of diesel PM reduced during the years 2009 to 2022. All costs are in 2006 equivalent expenditure dollars. Table 10 shows the cost-effectiveness estimate for the proposed regulation expressed three ways.

Table 10: Summary of Average Cost-Effectiveness for the Period 2009-2022

Emissions	Total Regulatory Cost 2009 – 2022	Total Emissions Reduced 2009 - 2022	Total Cost-Effectiveness
All Costs Assigned to PM			
PM	$140,000,000	4,900,000 lbs	$29/lb
Divide Costs Equally Between PM and NOx			
PM	$70,000,000	4,900,000 lbs	$14.50/lb
NOx	$70,000,000	39,000 tons	$1,800/ton
Combine PM and NOx Emissions			
PM + NOx	$140,000,000	83,000,000 lbs	$1.70/lb

All values rounded

The cost-effectiveness values are well within the range of cost effectiveness for other diesel engine regulations adopted by the Board, as shown in Table 11.

Table 11: Diesel PM Cost-Effectiveness of the Proposal and Other Regulations/Measures (When All Costs Attributed to PM Reduction)

Regulation or Airborne Toxic Control Measure	Diesel PM Cost-Effectiveness Dollars/ Pound PM
Commercial Harbor Craft	$29
Cargo Handling Equipment	$41
Solid Waste Collection Vehicle Rule	$28
Stationary Diesel Engine ATCM	$4 - $26
Transport Refrigeration Unit ATCM	$10 - $20

The estimated value of the health benefits associated with the proposed regulation is substantial. Following standard U.S. EPA practice, ARB staff estimates the statewide benefits to be nearly $2.0 billion using a 3 percent discount rate, or $1.3 billion using a

7 percent discount rate. Nearly all of the monetized benefits result from avoiding premature death.

12. FEASIBILITY OF PROPOSED REGULATION

The ARB staff believes that engine replacement will be the primary compliance option chosen to meet the proposed in-use engine requirements. As of the 2003-2004 fiscal year, about 400 propulsion and 50 auxiliary engines have been replaced in approximately 300 harbor craft through California's Carl Moyer Memorial Air Quality Standards Attainment Program. Almost 50 of these vessels have been ferries, excursion vessels, tugboats, and towboats, illustrating the feasibility of repowering these vessels.

Staff has determined that the number of engine replacements that likely would occur due to the proposed regulation's compliance schedule would be achievable with the State's current capacity for engine replacements. Staff estimates that, under the proposed compliance schedule, an average of 128 replacements of both auxiliary and propulsion engines per year will occur over the 14-year compliance period. Of the 128 engine replacements, over 60 percent, or about 80, are propulsion engine replacements. Because auxiliary engine replacements are less involved and do not necessarily require a dry dock facility, staff assumed dry docking for the propulsion engine replacements would be the limiting factor for the State's capacity. While the 14-year average for propulsion engine replacement is 80 engines, the maximum number of propulsion engine repowers required in one year (2015) is estimated to be about 150.

Staff conducted a phone survey of boat yards, boat building, and boat repair facilities in California to determine the annual statewide capacity for harbor craft engine replacements. Based on the survey, staff has estimated the State's current capacity at about 220 to 270 repowers per year. However, capacity is also required for routine engine maintenance, repowers due to natural engine attrition, and repowers funded through incentive programs. Because the maximum 150 repowers required in a single year (2015) is between 60 and 70 percent of the maximum capacity, we believe there is sufficient remaining capacity even at the maximum repower rate to still allow current facilities to conduct other repowering and non-repowering activities. Additional facilities and capacity that may be built in response to this regulation would further ensure that the State will have sufficient capacity to conduct the expected number of repowers.

13. ALTERNATIVES CONSIDERED

The ARB staff considered two alternatives to the proposed harbor craft regulation. The first alternative would make all Tier 0 and Tier 1 diesel engines on ferries, excursion vessel, tugboats, and towboats throughout the State subject to a single statewide compliance schedule, as provided in Table 5. This compliance schedule replaces engines at a 15 year service life. The estimated regulatory cost for this alternative is $135 million. The total PM emissions reduced with this alternative would be about

10 percent less than with the proposed schedule, 4.4 million pounds during the 14 years from 2009 to 2022. The resulting cost-effectiveness for this alternative is slightly higher than the proposed regulation, $30 per pound of diesel PM reduced. The total NOx reduction of this same time period would be 36,000 tons, about 7 percent less than with the proposed regulation. However, this alternative would reduce the number of SCAQMD engine replacements in the first six years. Consequently, as previously shown in Figure 4 and Figure 5, SCAQMD would not receive the early reductions with this alternative that are necessary to help meet its PM2.5 attainment goals by 2014.

The second alternative would require that all Tier 0 and Tier 1 diesel engines on ferries, excursion vessel, tugboats, and towboats throughout the State be subject to the accelerated SCAQMD compliance schedule, as provided in Table 6. This compliance schedule replaces engines at a 13 year service life. This alternative would result in many engines replaced earlier than the proposed regulation. The estimated regulatory cost to the equipment owners, $170 million, from this alternative is greater than the proposed regulation's $140 million regulatory cost. Additionally, this alternative's cost affects the rest of the State two years earlier. The total PM emissions reduced with this alternative would be significantly more than with the proposed schedule, 6.0 million pounds during the 14 years from 2009 to 2022. The resulting cost-effectiveness for this alternative is nearly identical to that of the proposed regulation, $29 per pound of diesel PM reduced. The total NOx reduction of this same time period would be 46,000 tons, nearly 20 percent more than with the proposed regulation. This alternative would produce earlier reductions than the current proposal, with a cost-effectiveness similar to the current proposal. However, staff determined that this alternative would not be feasible because it would require more engines to be replaced in some years than statewide capacity would allow.

14. KEY ISSUES

A. BACT Requirement for New Ferries

The proposed regulation requires that all new build ferries comply with an additional propulsion engine requirement. The engines must be equipped with BACT for the engine and application. Staff is recommending that a case-by-case BACT determination be made by ARB for the new ferry propulsion engines rather than setting a specific reduction level in the proposed regulation. Staff is recommending this approach because of the unique features of each ferry and limited data on successful application of aftertreatment on ferries similar to those used in California.

The San Francisco Bay Area Water Transit Authority (WTA) has instituted a requirement for all ferries under their jurisdiction that the propulsion engines must be 85 percent cleaner than U.S. EPA marine engine standards. The 85 percent reduction can be met through a combination of NOx or PM reductions. A new ferry is currently under construction that is expected to meet this requirement through the use of compact selective catalytic reduction technology (SCR) combined with a diesel oxidation catalyst (DOC).

Staff considered including a similar 85 percent reduction requirement for new ferries in the proposed regulation. However, staff was not able to locate data that would support a successful durability demonstration of the required technology on smaller passenger ferries that are typical for California use. The recent failure of an SCR demonstration unit on a small high speed ferry, typical of many California ferries that would be subject to this requirement, illustrates the need for successful durability demonstration data.

B. Ocean-Going Tugboats

The proposed regulation includes all ocean-going tugboats in its engine compliance requirements. These tugboats are the same size and have similar operational characteristics as harbor tugboats and may be used interchangeably as an ocean-going tugboat or a harbor tugboat. We estimate that there are about 25 out-of-state ocean-going tugboats operating in California.

Owner and operators of out-of-state ocean-going tugboats that provide service to California have requested that their vessels not be included in the regulation and instead remain subject to the auxiliary engine rule for ocean-going vessels (13 CCR 2299.1, 17 CCR 93118). Under that regulation's definition for "ocean-going vessel" (see 13 CCR 2299.1(d)(21)(A)), these tugboats would be classified as "ocean-going vessel" only because they have a foreign trade registry. However, as noted before, these ocean-going tugboats are functionally equivalent or otherwise very similar to their harbor tugboat counterparts. Therefore, staff has proposed to include ocean-going tugboats in the proposed harbor craft regulation because of their functional equivalence to harbor tugboats and the frequency of their visits to California ports. Based on available data, we estimate these ocean-going tugboats made over 500 visits to California ports last year.

C. U.S. EPA Tier 4 Engines on In-Use Vessels

During our public workshops, engine owners and manufacturers raised an issue about the proposed regulation's originally proposed requirement to install Tier 4 engines on existing vessels. The U.S. EPA's proposed marine engine standards would require Tier 4 engines to have exhaust after-treatment (i.e., selective catalytic reduction and diesel particulate filter). Owners and manufacturers stated that installing Tier 4 engines and the additional exhaust aftertreatment equipment would create space, weight, and stability issues on existing vessels. After consideration of these issues, staff modified the proposal so that engines meeting Tier 4 standards are not required for engine repowers (i.e., on in-use vessels), but they would be required for new vessels.

15. OUTREACH

ARB has worked extensively with the various stakeholders over the past four years to identify issues, find ways to address these issues, and develop appropriate regulatory language. The proposed regulation has been discussed with the California Air Pollution Control Officers Association (CAPCOA) during several joint CAPCOA-ARB conference

calls. Additionally, ARB staff made extensive contacts with industry representatives, local air districts, environmental/pollution prevention and public health advocates, and other interested parties through meetings, telephone calls, and electronic mail. Staff has held 12 public workshops and 3 community outreach meetings (some specifically geared to fishermen and their concerns) to discuss the proposed regulation. Further, staff made several visits to vessel owners, representing a variety of vessel types. Finally, staff made information available via ARB's web site (http://www.arb.ca.gov/harborcraft) to further expand public outreach opportunities and reach the widest possible audience.

16. ENVIRONMENTAL JUSTICE

A public process that involves all parties affected by the proposed regulation is an important component of ARB rulemaking activities. The proposal is consistent with the ARB's environmental justice policy to reduce health risks from toxic air contaminants in all communities, including low-income and minority communities. The proposed regulation would reduce diesel PM and other emissions from harbor craft engine in all areas of the State where these engines are located. However, the vast majority of these engines operate within the Los Angeles/Long Beach and Bay Area ports, which are surrounded by densely populated areas, including some in low-income and minority communities. Therefore, the proposal will help address environmental justice concerns by reducing emissions and health risks in the areas where harbor craft emissions have the greatest impacts.

17. IMPLEMENTATION AND ENFORCEMENT

We believe that ARB staff needs to take the following actions to efficiently and effectively implement the proposed regulation:

- develop an outreach program to inform harbor craft owners and operators and suppliers of the requirements of the proposed regulation, as well as provide information about incentive programs such as the Carl Moyer programs, the Port of Los Angeles Air Quality Mitigation Funds, and the upcoming Proposition 1B air quality mitigation funds;
- develop recordkeeping and reporting guidance; and,
- provide implementation guidance and assistance as needed.

18. RECOMMENDATION

We recommend the Board approve the proposed harbor craft regulation presented in Appendix A of the staff report. The early turnover of in-use, pre-Tier 1 and Tier-1 certified ferries, excursion vessels, tugboats, and towboats to lower emitting Tier 2 and Tier 3 engines would reduce diesel PM, NOx, and other air pollutant emissions, exposure, and health risk across California, particularly along the shoreline. The ARB staff believes the proposed regulation is technologically feasible, cost-effective, and necessary to carry out the Board's responsibilities under State law and implement provisions of the Emission Reduction Plan for Ports and Goods Movement approved by the Board in April 2006.

REFERENCES:

(40 CFR Part 94) U.S. Environmental Protection Agency, *Control of Emissions from Marine Compression – Ignition Engines.*

(U.S. EPA, 2007) U.S. Environmental Protection Agency, *Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder*, 72 Fed.Reg. 15937 et seq. (April 3, 2007).

(ARB, 2000) California Air Resources Board, *Risk Reduction Plan to Reduce Particulate Matter Emission fro Diesel-Fueled Engines and Vehicles*, October 2000.

(ARB, 2006) California Air Resources Board, *Emission Reduction Plan for Ports and Goods Movement in California*; March 2006.

Appendix A

Proposed Regulations for Commercial Harbor Craft

PROPOSED REGULATION ORDER

EMISSION LIMITS AND REQUIREMENTS FOR DIESEL ENGINES ON COMMERCIAL HARBOR CRAFT OPERATED WITHIN CALIFORNIA WATERS AND 24 NAUTICAL MILES OF THE CALIFORNIA BASELINE

Adopt new section 2299.5, title 13, chapter 5.1, California Code of Regulations (CCR), to read as follows:

(Note: The entire text of section 2299.5 is new language.):

Section 2299.5. Low Sulfur Fuel Requirement, Emission Limits and Other Requirements for Commercial Harbor Craft.

(a) *Purpose.*

The purpose of this section is to reduce diesel particulate matter (PM), oxides of sulfur (SOx), and oxides of nitrogen (NO_x) from diesel propulsion and auxiliary engines on harbor craft that operate in any of the waters subject to this section ("Regulated California Waters"). This section implements provisions of the Goods Movement Emission Reduction Plan, adopted by the Air Resources Board (ARB) in April 2006, to reduce emissions and health risk from ports and the movement of goods in California.

(b) *Applicability.*

(1) Except as provided in subsections (b) and (c), this section applies to any person who sells, supplies, offers for sale, purchases, owns, operates, leases, charters, or rents any new or in-use diesel fueled harbor craft that is operated in any of the Regulated California Waters.

(2) In the event a harbor craft and its engine(s) are subject to the requirements of this section, and either the regulation for portable compression ignition (CI) engines and equipment (sections 93116-93116.5, title 17, California Code of Regulations (CCR)), or the regulation for off-road CI engines and equipment (sections 2420-2427, title 13, CCR), the requirements of this section shall supersede those of the other two regulations for all engines on the vessel that are permanently affixed to the vessel (i.e., the engine, its fueling system, or its exhaust system is welded or otherwise physically connected to the vessel or other vessel system in such a way that the engine cannot be easily removed for use in a land-based application without modifications).

(3) This section applies to towboats and tugboats engaged in or intending to engage in the service of pulling, pushing or hauling alongside tank vessels or tank barges.

(4) Notwithstanding the provisions of title 13, CCR, section 2299.1 and title 17, CCR, section 93118, this section shall apply to any ocean-going tugboats and towboats and shall supersede the requirements of 13 CCR 2299.1 and 17 CCR 93118 in their entirety for ocean-going tugboats and towboats. For purposes of this paragraph, "ocean-going tugboats and towboats" shall mean tugboats and towboats with a "registry" (foreign trade) endorsement on its United States Coast Guard certificate of documentation, or tugboats and towboats that are registered under the flag of a country other than the United States.

(5) Nothing in this section shall be construed to amend, repeal, modify, or change in any way any other applicable State, U.S. Coast Guard, or other federal 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 and any other applicable State and federal requirements, including but not limited to, obtaining any necessary approvals, exemptions, or orders from the U.S. Coast Guard.

(6) This section shall not apply to any engine and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act (42 U.S.C. 7543(e)(1)(A)) and as defined by regulation of the U.S. Environmental Protection Agency.

(c) *Exemptions.*

All or portions of this section do not apply to the following, as provided below, but vessels that are partly or wholly exempt from this section may be subject to other State and federal regulations and requirements. All other portions of this section shall apply unless otherwise specified:

(1) Harbor craft whose voyages are comprised 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 are exempt from this section in its entirety. "Continuous and expeditious navigation" includes stopping and anchoring only to the extent such stopping and anchoring are required by the U.S. Coast Guard; rendered necessary by force majeure or distress; or made for the purpose of rendering assistance to persons, ships, or aircraft in danger or distress. This exemption does not apply to the passage of a harbor craft that engages in any of the prejudicial activities specified in United Nations Convention on the Law of the Seas (UNCLOS) 1982, Article 19, subpart 2. Further, notwithstanding any Coast Guard mandated stops or stops due to force majeure or the rendering of assistance, this exemption does not apply to a vessel that was otherwise scheduled or intended to enter California internal or estuarine waters or call at a port, roadstead or terminal facility;

(2) Temporary replacement vessels are exempt only from the requirements set forth in subsection (e)(6) and only upon written approval by the California Air

Resources Board's Executive Officer (E.O.). All other provisions in this section shall apply to temporary replacement vessels subject to this paragraph. An owner or operator, who has or will have a vessel taken out of service, may apply in writing to the E.O. to operate a temporary replacement vessel pursuant to the following:

(A) The E.O. shall approve or disapprove such a request within 15 days of receipt. The E.O. shall not unreasonably withhold approval of the request to operate the temporary replacement vessel;
(B) If the approval is granted, the temporary replacement vessel's operating time will be specified in the approval by the E.O., along with any other terms, conditions or requirements the E.O. deems necessary, but in no case shall the approved operating time in Regulated California Waters for a specific temporary replacement vessel exceed one year total for any single vessel that is temporarily replaced; and
(C) No temporary replacement vessel exemptions shall be approved for a vessel that is taken out of service more than 12 months in any 24-month period or if the E.O. cannot determine the length of time a vessel has been taken out of service within any 24-month period.

(3) Temporary replacement vessels (SCAQMD) are exempt only from the compliance dates set forth in Table 8 of subsection (e)(6) and only upon written approval from the ARB's Executive Officer (E.O.). All other provisions in this section, including but not limited to, the compliance dates specified in Table 7 of subsection (e)(6), shall apply to temporary replacement vessels subject to this paragraph. An owner or operator, who has or will have a vessel taken out of service, may apply in writing to the E.O. to operate a temporary replacement vessel pursuant to the following:

(A) The E.O. shall approve or disapprove such a request within 15 days of receipt. The E.O. shall not unreasonably withhold approval of the request to operate the temporary replacement vessel;
(B) If the approval is granted, the temporary replacement vessel's operating time will be specified in the approval by the E.O., along with any other terms, conditions or requirements the E.O. deems necessary, but in no case shall the approved operating time in Regulated California Waters for a specific temporary replacement vessel exceed one year total for any single vessel that is temporarily replaced; and
(C) No temporary replacement vessel exemptions shall be approved for a vessel that is taken out of service more than 12 months in any 24-month period or if the E.O. cannot determine the length of time a vessel has been taken out of service within any 24-month period;

(4) Temporary emergency rescue/recovery vessels are exempt from this section in its entirety;

(5) Recreational vessels are exempt from this section in its entirety;

(6) Ocean-going vessels, except for ocean-going tugboats and towboats as provided in subsection (b)(4), are exempt from this section in its entirety;

(7) The following portable engines are exempt from this section in its entirety:

(A) All vessel engines, including engines on barges, that are registered with ARB's Portable Engine Registration Program (PERP) (sections 2450 through 2465, title 13, CCR) before January 1, 2009;
(B) All vessel engines that are registered with PERP on or after January 1, 2009 and are not permanently affixed to the vessel (i.e., the engine, its fueling system, and its exhaust system are not welded or otherwise physically connected to the vessel or other vessel system, which permits the engine to be easily removed for use in a land-based application without modifications); and
(C) All vessel engines that are registered and permitted under local air district regulations before January 1, 2009.

(8) Registered historic vessels are exempt only from subsection (e)(6);

(9) U.S. Coast Guard vessels are exempt from this section in its entirety;

(10) Military tactical support vessels are exempt from this section in its entirety;

(11) Engines rated less than 50 horsepower are exempt only from subsection (e)(6); and

(12) Engines and vessels that are operated less than 300 hours per calendar year shall be exempt only from the requirements of subsection (e)(6).

(13) Near-Retirement Vessels. A harbor craft that is scheduled to be taken out of service and retired permanently and has an engine that has a compliance date, as set forth in subsection (e)(6)(C), that is within one year of the vessel's scheduled retirement date, is exempt from the requirements of subsection (e)(6)(C) and (6)(D), provided the vessel is actually taken out of service and retired on or before the scheduled retirement date. Operation of a vessel subject to this provision after the scheduled retirement date or the engine's compliance date, whichever occurs later, is a separate violation of this section for each and every day of operation during which the vessel's engines do not meet the requirements of subsection (e)(6)(D) or other parts of this section.

(d) *Definitions.*

For purposes of this section, the definitions of Health and Safety Code sections 39010 through 39060 shall apply except as otherwise specified in this section:

(1) "Air District" means one of the local air pollution control districts (APCDs) or air quality management districts (AQMDs) established under Health and Safety Code section 40000 et seq.

(2) "Alternative Diesel Fuel" means any fuel used in a diesel engine that is not commonly or commercially known, sold, or represented by the supplier as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM D975-81, "Standard Specification for Diesel Fuel Oils," as modified in May 1982, which is incorporated herein by reference, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g., recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel and biodiesel blends not meeting the definition of CARB diesel fuel; Fischer-Tropsch fuels; emulsions of water in diesel fuel; and fuels with a fuel additive, unless:

(A) the additive is supplied to the engine fuel by an on-board dosing mechanism, or
(B) the additive is directly mixed into the base fuel inside the fuel tank of the engine, or
(C) the additive and base fuel are not mixed until engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine.

(3) "Alternative Fuel" means natural gas, propane, ethanol, methanol, gasoline, hydrogen, electricity, or other technologies that do not meet the definition of CARB diesel or alternative diesel fuel. "Alternative fuel" also means any mixture that only contains these fuels.

(4) "Annual Hours of Operation" means the total number of hours, rounded to the nearest whole hour, a vessel engine is used for all commercial purposes in Regulated California Waters in the calendar year (January 1 to December 31) immediately prior to the engine's applicable compliance date set forth in subsection (e)(6)(C). For example, if a vessel is used for commercial fishing and commercial non-fishing purposes, the total number of hours combined for both uses shall be the total annual hours of operation for that vessel.

(5) "Auxiliary Engine" means an engine designed primarily to provide power for uses other than propulsion.

(6) "Averaging" means an exchange of excess reduced regulated emissions among engines on vessels in the same owner's or operator's fleet.

(7) "Baseline" means the emissions level of a diesel engine using CARB diesel fuel as configured upon initial marine installation.

(8) "Barge" means a vessel having a flat-bottomed rectangular hull with sloping ends and built with or without a propulsion engine.

(9) "California Air Resources Board (CARB) Diesel Fuel" means any diesel fuel that meets the specifications of vehicular diesel fuel, as defined in title 13 CCR, sections 2281, 2282, 2284, 2299, and title 17 CCR section 93116.

(10) "California Baseline" means the mean lower low water line along the California coast, as shown on the following National Oceanic and Atmospheric Administration (NOAA) Nautical Charts as authored by the NOAA Office of Coast Survey, which are incorporated herein by reference:

(A) Chart 18600, Trinidad Head to Cape Blanco (January 2002);
(B) Chart 18620, Point Arena to Trinidad Head (June 2002);
(C) Chart 18640, San Francisco to Point Arena (August 2005);
(D) Chart 18680, Point Sur to San Francisco (June 2005);
(E) Chart 18700, Point Conception to Point Sur (July 2003);
(F) Chart 18720, Point Dume to Purisima Point (January 2005); and
(G) Chart 18740, San Diego to Santa Rosa Island (April 2005).

(11) "CARB" means the California Air Resources Board. CARB may also be referred to as "ARB."

(12) "Carbon Monoxide (CO)" is a colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels.

(13) "Category 1 engine" means any marine engine with a displacement of less than 5.0 liter per cylinder and with a maximum horsepower (hp) rating of 50 hp or greater.

(14) "Category 2 engine" means any marine engine with a displacement of 5.0 to less than 30 liter per cylinder.

(15) "Category 3 engine" means any marine engine with a displacement of greater than 30 liter per cylinder.

(16) "Certified engine" means an engine that is certified by U.S. EPA as meeting the requirements of title 40, Code of Federal Regulations, Part 94.

(17) "Coast Guard Vessel" means any vessel or boat owned or operated by the United States Coast Guard, including, but not limited to, Coast Guard cutters and patrol boats that are used for law enforcement, defense operations, marine

science, search and rescue missions, training missions, coastal surveillance, servicing aids to navigation, and marine environmental response.

(18) "Compliance Date" means the date, as set forth in Table 7 or Table 8 in subsection (e)(6)(C) (whichever applies), by which time a vessel engine must meet the requirements set forth in subsection (e)(6)(D).

(19) "Crew and Supply Vessel" means a self-propelled vessel used for carrying personnel and/or supplies to and from off-shore and in-harbor locations (including, but not limited to, off-shore work platforms, construction sites, and other vessels).

(20) "Date of Acquisition" means, for a vessel or engine subject to this regulation, the date of purchase as defined by the date shown on the front of the cashed check, the date of the financial transaction, or the date on the vessel or engine purchasing agreement, whichever is earliest of the three dates.

(21) "Diesel Engine" means an internal combustion, compression-ignition (CI) engine, or pilot ignition engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

(22) "Diesel Fuel" means any fuel that is commonly or commercially known, sold, or represented by the supplier as diesel fuel, including any mixture of primarily liquid hydrocarbons (HC) - organic compounds consisting exclusively of the elements carbon and hydrogen - that is sold or represented by the supplier as suitable for use in an internal combustion, compression-ignition engine.

(23) "Diesel-Fueled" means a diesel engine fueled in whole or part by diesel fuel.

(24) "Diesel Oxidation Catalyst (DOC)" means an emission control technology that employs a catalyst to promote oxidation processes in diesel exhaust gases, usually designed to reduce emissions of the organic fraction of diesel particulates, gas-phase HC, and CO.

(25) "Diesel Particulate Filter (DPF)" means an emission control technology that reduces diesel PM emissions in engine exhaust gases by trapping the particles in a flow filter substrate and periodically removes the collected particles by either physical action or by oxidizing (burning off) the particles in a process called regeneration.

(26) "Diesel Particulate Matter (Diesel PM)" means the particles found in the exhaust of diesel engines, which may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

(27) "Direct Control" means owning, operating, having a contract, lease, or other arrangement to operate a harbor craft.

(28) "Emission Control Strategy" means any device, system, or strategy employed to reduce emissions from an engine, including, but not limited to, diesel oxidation catalysts, selective catalytic reduction systems, diesel particulate filters, alternative diesel fuels, water emulsified fuels, and any combination of the above.

(29) "Estuarine Waters" means an arm of the sea or ocean that extends inland to meet the mouth of a river.

(30) "Excursion Vessel" means a vessel used for a short trip or outing to some place, usually for a special purpose and with the intention of a prompt return, including all public or private excursion vessels, such as dinner cruises, harbor, lake, or river tours, scuba diving expeditions, and whale watching tours.

(31) "Executive Officer" means the Executive Officer of the California Air Resources Board or his/her designee.

(32) "Ferry" means any self-propelled vessel or boat owned, controlled, operated, or managed for public use in transportation of carrying passengers, property, or vehicles on scheduled services.

(33) "Fishing Vessel" means a self-propelled boat or ship that is either: (A) a commercial fishing vessel dedicated to the search for, and collection of, fish for the purpose of sale at market or directly to a purchaser(s), or (B) or a charter fishing vessel used for hire by the general public dedicated to the search for and collection of, fish for the purpose of general consumption.

(34) "Fleet" means the total number of harbor craft owned, rented, or leased by an owner or operator in an air district or distinct locale within Regulated California Waters or the statewide population of a specific vessel type.

(35) "Fuel Additive" means any substance designed to be added to fuel or fuel systems or other engine-related engine systems such that it is present in-cylinder during combustion.

(36) "Harbor Craft" (also called "Commercial Harbor Craft") means any private, commercial, government, or military marine vessel including, but not limited to, passenger ferries, excursion vessels, tugboats, ocean-going tugboats, towboats, push-boats, crew and supply vessels, work boats, pilot vessels, supply boats, fishing vessels, research vessels, United States Coast Guard vessels, hovercraft, emergency response harbor craft, and barge vessels that do not otherwise meet the definition of ocean-going vessels or recreational vessels.

(37) "Homeport" means the port in which a vessel is registered or permanently based.

(38) "In-Use Harbor Craft" means a harbor craft that is not a new harbor craft.

(39) "In-Use Marine Engine" means a marine engine that is not a new marine engine.

(40) "Lease" means a contract by which the owner (lessor) of a property, such as a vessel or engine, grants the right to use or occupy the property to another person (lessee) for a specified term and for a specified rent.

(41) "Level" means, unless the context requires otherwise, one of three categories of Air Resources Board-verified diesel emission control strategies as set forth in title 13, CCR, section 2700 et seq.: Level 1 means the strategy reduces engine diesel PM emissions by between 25 and 49 percent; Level 2 means the strategy reduces engine diesel PM emissions by between 50 and 84 percent; and Level 3 means the strategy reduces engine diesel PM emissions by 85 percent or greater, or reduces engine PM emissions to less than or equal to 0.01 grams per brake horsepower-hour.

(42) "Low-Use" means the operation of any compression-ignition engine associated with a harbor craft vessel for less than 300 total annual hours of operation in Regulated California Waters, based on the immediately previous calendar year.

(43) "Military Tactical Support" means a vessel that meets military specifications, is owned by the U.S. Department of Defense, the U.S. Coast Guard, the U.S. Military services or its allies, and is used in combat, combat support, combat services support, tactical or relief operations or training for such operations.

(44) "Model Year" means the diesel engine manufacturer's annual production period, which includes January 1st of a calendar year, or if the manufacturer has no annual production period, the calendar year.

(45) "Multipurpose Harbor Craft" means a harbor craft that serves as a ferry, excursion vessel, tugboat, or towboat but is also used as a work, crew and supply, pilot, fishing, supply, or other vessel.

(46) "New Harbor Craft" means a harbor craft for which both of the following criteria are true:

(A) it is built, or its keel is laid, on or after January 1, 2009, and
(B) the equitable or legal title to the harbor craft has never been transferred to an ultimate purchaser.

Where the equitable or legal title to the harbor craft is not transferred to an ultimate purchaser prior to the harbor craft being placed into service, the harbor craft ceases to be new when it is placed into service. A harbor craft is placed into service when it is used for its functional purposes.

(47) "New Marine Engine" means a marine engine for which both of the following criteria are true:

(C) it is manufactured or imported on or after January 1, 2009, and
(D) the equitable or legal title to the engine has never been transferred to an ultimate purchaser.

Where the equitable or legal title to the engine is not transferred to an ultimate purchaser prior to the engine being placed into service, the engine ceases to be new when it is placed into service. An engine is placed into service when it is used for its functional purposes.

(48) "Nitrogen Oxides (NO_x)" means compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen, which are typically created during combustion processes and are major contributors to smog formation and acid deposition.

(49) "Non-Methane Hydrocarbons (NMHC)" means the sum of all hydrocarbon (HC) air pollutants except methane.

(50) "Ocean-going Vessel" means a commercial, government, or military vessel meeting any one of the following criteria:

(A) a vessel with a "registry" (foreign trade) endorsement on its United States Coast Guard certificate of documentation, or a vessel that is registered under the flag of a country other than the United States;

(B) a vessel greater than or equal to 400 feet in length overall (LOA) as defined in 50 CFR § 679.2, as adopted June 19, 1996;

(C) a vessel greater than or equal to 10,000 gross tons (GT ITC) per the convention measurement (international system) as defined in 46 CFR 69.51-.61, as adopted September 12, 1989; or

(D) a vessel propelled by a marine compression ignition engine with a per-cylinder displacement of greater than or equal to 30 liters.

(51) "Operate" means steering or otherwise running the vessel or its functions while the vessel is underway, moored, anchored, or at dock.

(52) "Own" means having all the incidents of ownership, including the legal title, whether or not that person lends, rents, or pledges the vessel; having or being entitled to the possession of a vessel as the purchaser under a conditional sale contract; or being the mortgagor of a vessel.

(53) "Particulate Matter (PM)" means any airborne finely divided material, except uncombined water, which exists as a liquid or solid at standard conditions (e.g., dust, smoke, mist fumes, or smog).

(54) "Person" includes all of the following:

(A) any person, firm, association, organization, partnership, business trust, corporation, limited liability company, or company;

(B) any state or local governmental agency or public district, or any officer or employee thereof; and

(C) the United States or its agencies, to the extent permitted by federal law.

(55) "Pilot Vessel" means a vessel designed for, but not limited to, the transfer and transport of maritime pilots to and from ocean going vessels while such vessels are underway.

(56) "Port" means any facility used for water-borne commerce. "Port" includes, but is not limited to, facilities also known as "marine terminals" and "roadsteads."

(57) "Portable CI Engine" means a compression ignition (CI) engine designed and capable of being carried or moved from one location to another. Indicators of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform. Portable engines are not self-propelled.

(58) "Portable Engine Registration Program (PERP)" means the statewide program designed to promote the use of clean portable engines in California, as provided for in title 13, CCR, sections 2450 through 2465. Once registered in the program, engines and equipment units can operate throughout the State without being required to obtain individual permits from each air pollution control or air quality management district in which they operate.

(59) "Pre-Tier 1 Engine" means an engine that was built before the effective date of U.S. EPA's Tier 1 marine engine standard, as set forth in 40 CFR 94.

(60) "Propulsion Engine" means an engine that provides power to move a vessel through the water or directs the movement of a vessel.

(61) "Purchase Date" means the date shown on the front of the cashed check; the date of the financial transaction; or the date on the engine or harbor craft purchase, rental, or lease agreement, whichever is earliest.

(62) "Push Boat" means any self-propelled vessel engaged in or intending to engage in the service of pulling, pushing, or hauling along side barges or other vessels,

or any combination of pulling, pushing, or hauling along side barges or other vessels. "Push boats" is interchangeable with "towboats."

(63) "Recreational Vessel" means a vessel that is intended by the vessel manufacturer to be operated primarily for pleasure or leased, rented or chartered to another for the latter's pleasure, excluding the following vessels: (1) vessels of less than 100 gross tons that carry more than 6 passengers, (2) vessels of 100 gross tons or more that carry one or more passengers, and (3) vessels used solely for competition.

(64) "Registered Historic Vessel" means a vessel listed in the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966 (16 U.S.C. 470).

(65) "Regulated California Waters" means all of the following:

(A) all California internal waters;
(B) all California estuarine waters;
(C) all California ports, roadsteads, and terminal facilities (collectively "ports");
(D) all waters within 3 nautical miles of the California baseline, starting at the California-Oregon border and ending at the California-Mexico border at the Pacific Ocean, inclusive;
(E) all waters within 12 nautical miles of the California baseline, starting at the California-Oregon border and ending at the California-Mexico border at the Pacific Ocean, inclusive;
(F) all waters within 24 nautical miles of the California baseline, starting at the California-Oregon border to 34.43 degrees North, 121.12 degrees West; inclusive; and
(G) all waters within the area, not including any islands, between the California baseline and a line starting at 34.43 degrees North, 121.12 degrees West; thence to 33.50 degrees North, 118.58 degrees West; thence to 32.48 degrees North, 117.67 degrees West; and ending at the California-Mexico border at the Pacific Ocean, inclusive.

(66) "Rent" means payment for the use of harbor craft or diesel engine for a specified term.

(67) "Retirement" means the act of taking an engine or harbor craft out of service (i.e., to "retire") so that it subsequently never again operates in any of the Regulated California Waters. "Retirement" does not include an engine or harbor craft that is sold for use outside California then subsequently operated in any of the Regulated California Waters.

(68) "SCAQMD" shall mean the South Coast Air Quality Management District, as defined in Health and Safety Code section 40410 et seq. and described in

section 60104, title 17, California Code of Regulations, and shall include all waters subject to the jurisdiction of the SCAQMD.

(69) "Supply Vessel" means a self-propelled vessel used for carrying supplies to and from off-shore and in-harbor locations including, but not limited to, off-shore work platforms, construction sites, and other vessels.

(70) "Take Out of Service" means the act of dry-docking, mooring, anchoring, or otherwise tying up a harbor craft at dock to conduct maintenance, repairs, replacements, or upgrades such that the vessel cannot be operated in Regulated California Waters while such acts are conducted on the vessel.

(71) "Tank Barge" means a non-self-propelled vessel constructed or adapted primarily to carry, or that carries, oil or hazardous material in bulk as cargo or cargo residue.

(72) "Tank Vessel" or "Tanker" means a self-propelled vessel constructed or adapted primarily to carry, or that carries, oil or hazardous material in bulk as cargo or cargo residue.

(73) "Temporary emergency rescue / recovery vessel" means a vessel whose homeport is not within California and is brought into California for the immediate use of emergency rescue or recovery and returns to its home port outside of California at the conclusion of its emergency rescue / recovery mission.

(74) "Temporary replacement vessel" means a vessel that is brought into service to temporarily replace a California vessel that has been temporarily taken out of service. There are two types of these vessels: (1) "temporary replacement vessels (SCAQMD)," which are used in the SCAQMD but have a homeport in California outside of the SCAQMD; and "temporary replacement vessels" which are used anywhere in California, including the SCAQMD, and have a homeport outside of California.

(75) "Tier 1 Marine Emission Standards (Tier 1)" (shown in Table 1 below) means the U.S. EPA marine engine Tier 1 emission standards, as promulgated by U.S. EPA and set forth in "Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 37 kW" (64 Federal Register 73299-73373, December 29, 1999)(40 Code of Federal Regulations Part 94), both of which are incorporated herein by reference.

Table 1: U.S. EPA Tier 1 Marine Engine Emission Standards

Category	Power (kW) & Displacement (Liters/cylinder)	Engine Speed	Tier 1 Model Year	PM (g/bhp-hr)	NO_x+HC (g/bhp-hr)	CO (g/bhp-hr)
1, 2, 3, including Recreational	≥ 37 kW & ≥ 2.5 l/cyl	rpm ≥ 2000	2004	-	7.3	-
		130 ≤ rpm <2000	2004	-	33.57 x rpm $^{-0.2}$	-
		rpm <130	2004	-	12.7	-

(40 CFR Part 94)
*converted maximum power rating from 40 CFR 94, which are expressed in g/kW-hr to g/hp-hr by the following: g/kW-hr (0.746) = g/hp-hr.

(76) "Tier 2 Marine Emission Standards (Tier 2)" (shown in Table 2 below) means the U.S. EPA marine engine Tier 2 emission standards, as promulgated by U.S. EPA and set forth in "Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 37 kW" (64 FR 73299-73373, December 29, 1999)(40 CFR Part 94), both of which are incorporated herein by reference.

Table 2: U.S. EPA Tier 2 Marine Engine Emission Standards for NO_x + HC, PM, and CO

Category	Displacement (liters/cylinder)	Date	NO_x+HC (g/bhp-hr)*	PM (g/bhp-hr)*	CO (g/bhp-hr)
1	Disp.< 0.9 and power ≥50 hp*	2005	5.6	0.30	3.7
	0.9 ≤ Disp. < 1.2	2004	5.4	0.22	3.7
	1.2 ≤ Disp. < 2.5	2004	5.4	0.15	3.7
	2.5 ≤ Disp. < 5.0	2007	5.4	0.15	3.7
2	5.0 ≤ Disp. < 15	2007	5.8	0.20	3.7
	15 ≤ Disp. < 20 (power < 4424 hp*)	2007	6.5	0.37	3.7
	15 ≤ Disp. < 20 (power ≥ 4424 hp*)	2007	7.3	0.37	3.7
	20 ≤ Disp. < 25	2007	7.3	0.37	3.7
	25 ≤ Disp. < 30	2007	8.2	0.37	3.7

(40 CFR Part 94)
*converted maximum power rating from 40 CFR 94, which are expressed in g/kW-hr to g/hp-hr by the following: g/kW-hr (0.746) = g/hp-hr or kW (1.34) = hp

(77) "Tier 3 Marine Engine Standards (Tier 3)" (shown in Table 3, Table 4, and Table 5 below) means the U.S. EPA proposed Tier 3 Marine Engine standards, as set forth in "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder" (72 FR 15937 et seq., April 3, 2007), which is incorporated herein by reference.

Table 3: U.S. EPA Proposed Tier 3 Standards for Marine Diesel Category 1 Commercial Standard Power Density Engines

Rated kW	L/Cylinder	PM g/bhp-hr	NOx + HC g/bhp-hr	Model Year
19 - < 75 kW	<0.9 [a]	0.22	5.6	2009
		0.22 [b]	3.5 [b]	2014
75 – 3700 kW	<0.9	0.10	4.0	2012
	0.9 - <1.2	0.09	4.0	2013
	1.2 - <2.5	0.08 [c]	4.2	2014
	2.5 - <3.5	0.08 [c]	4.2	2013
	3.5 - <7.0	0.08 [c]	4.3	2012

(a) <75 kW engines at or above 0.9 L/cylinder are subject to the corresponding 37-3700 kW standards.
(b) Option: 0.15 PM / 4.3 NOx in 2014.
(c) This standard level drops to 0.07 in 2018 for <600 kW engines.

Table 4: U.S. EPA Proposed Tier 3 Standards for Marine Diesel Category 1 Recreational and Commercial High Power Density Engines

Rated kW	L/Cylinder	PM g/bhp-hr	NOx + HC g/bhp-hr	Model Year
19 - <75 kW	<0.9 [a]	0.22	5.6	2009
		0.22 [b]	3.5 [b]	2014
75 – 3700 kW	<0.9	0.11	4.3	2012
	0.9 - <1.2	0.10	4.3	2013
	1.2 - <2.5	0.09	4.3	2014
	2.5 - <3.5	0.09	4.3	2013
	3.5 - <7.0	0.09	4.0	2012

(a) <75 kW engines at or above 0.9 L/cylinder are subject to the corresponding 75-3700 kW standards.
(b) Option: 0.15 PM / 4.3 NOx+HC in 2014.

Table 5: U.S. EPA Proposed Tier 3 Standards for Marine Diesel Category 2 Engines

Rated kW	L/Cylinder	PM g/bhp-hr	NOx+HC g/bhp-hr	Model Year
=<3700 kW	7 - <15	0.10	4.6	2013
	15 - <20	0.20 [a]	6.5 [a]	2014
	20 - <25	0.20	7.3	2014
	25 - <30	0.20	8.2	2014

(a) For engines at or below 3300 kW in this group, the PM / NOx+HC Tier 3 standards are 0.25 / 5.2.

(78) "Tier 4 Marine Engine Standards (Tier 4)" (shown in Table 6 below) means the U.S. EPA proposed Tier 4 Marine Engine standards, as set forth in "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder" (72 FR 15937 et seq., April 3, 2007), which is incorporated herein by reference.

Table 6: U.S. EPA Proposed Tier 4 Standards for Marine Diesel Category 1 and Category 2 Engines

Rated kW	PM g/bhp-hr	NOx g/bhp-hr	HC g/bhp-hr	Model Year
>3700 kW	0.09[a]	1.3	0.14	2014
	0.04	1.3	0.14	2016[b]
1400 – 3700 kW	0.03	1.3	0.14	2016[c]
600 - <1400 kW	0.03	1.3	0.14	2014[b]

(a) This standard is 0.19 g/bhp-hr for engines with 15-30 liter/cylinder displacement.
(b) Optional compliance start dates are proposed within these model years; see Draft Locomotive and Marine NPRM Preamble (72 FR 15937 et seq.).
(c) Option for engines with 7-15 liter/cylinder displacement: Tier 4 PM and HC in 2015 and Tier 4 NOx in 2017.

(79) "Total Hydrocarbons (THC)" or "Hydrocarbons (HC)" means the total mass of open chain and cyclic hydrocarbon molecules.

(80) "Towboat" means any self-propelled vessel engaged in or intending to engage in the service of pulling, pushing, or hauling along side barges or other vessels, or any combination of pulling, pushing, or hauling along side barges or other vessels.

(81) "Tugboat" means any self-propelled vessel engaged in, or intending to engage in, the service of pulling, pushing, maneuvering, berthing, or hauling along side other vessels, or any combination of pulling, pushing, maneuvering, berthing or hauling along side such vessels in harbors, over the open seas, or through rivers and canals. Tugboats generally can be divided into three groups: harbor or short haul tugboats, ocean-going or long-haul tugboats, and barge tugboats. "Tugboat" is interchangeable with "towboat" and "push boat" when the vessel is used in conjunction with barges.

(82) "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (Verification Procedure)" means the Air Resources Board (ARB) regulatory procedure codified in title 13, CCR, commencing with section 2700, which is incorporated herein by reference, that engine manufacturers, sellers, owners, or operators may use to

verify the reductions of diesel PM or NO_x from in-use diesel engines through the use of a particular diesel emission control strategy.

(83) "Verified Diesel Emission Control Strategy (VDECS)" means an emission control strategy, designed primarily for the reduction of diesel PM emissions, which has been verified pursuant to the "Verification Procedure for In-Use Strategies to Control Emissions from Diesel Engines" in title 13, California Code of Regulations, commencing with section 2700. VDECS can be verified to achieve Level 1 diesel PM reductions (25 percent), Level 2 diesel PM reductions (50 percent), or Level 3 diesel PM reductions (85 percent). VDECS may also be verified to achieve NOx reductions.

(84) "Vessel" or "Marine Vessel" means any tugboat, tanker, freighter, passenger ship, barge, or other boat, ship, or watercraft; except those used primarily for recreation.

(85) "Work Boat" means a self-propelled vessel that performs duties such as fire/rescue, law enforcement, hydrographic surveys, spill/response, research, training, and construction (including drilling).

(e) *Fuel Use and Engine Emission Requirements.*

[Note: The plain English narrative in this overview is intended as a convenient guide for the reader and in no way adds, deletes, modifies, or otherwise affects the legal requirements and substantive provisions specified in subsection (e) or any other part of this section. Subsection (e) sets forth the various fuel and emission requirements for harbor craft subject to this regulation, and can be broken down as follows:

- Subsection (e)(1) specifies low sulfur fuel use requirements that apply to all harbor craft, new and in-use.
- Subsection (e)(2) specifies the requirement for installing hour-meters on all harbor craft, new and in-use.
- Subsection (e)(3) establishes requirements that apply to transactions involving new engines to be installed on in-use vessels, including a limited 6-month "sell-through" provision for non-complying engines.
- Subsection (e)(4) sets forth requirements that apply to newly acquired new harbor craft, including ferries.
- Subsection (e)(5) sets forth requirements that apply only to newly acquired new ferries, above and beyond those established in subsection (e)(4). These provisions include requirements for applying Best Available Control Technology to new ferries and their engines.
- Subsection (e)(6) is the key provision of this regulation, as it achieves emission reductions by requiring the eventual replacement or cleanup of engines in the fleet of in-use ferries, excursion vessels, tugboats, towboats, push boats, and multipurpose harbor craft. This subsection requires that owners and operators eventually replace or otherwise bring into compliance with the specified engine standards all of their pre-Tier 1 and Tier 1-certified engines in their in-use vessels by the dates shown in the specified compliance schedules. The compliance dates are designed to clean up the fleet's oldest and dirtiest engines first, while giving more time for relatively newer, Tier 1 engines to be upgraded or replaced. Vessels with their homeport in the South Coast Air Quality Management District (SCAQMD) have an accelerated compliance schedule to reflect that district's greater need for expedited emission reductions. The compliance schedules are grouped by vessel type, location of the vessel's home port, the engine's model year, and the engine's annual hours of operation.
- Subsection (e)(7) provides for a limited set of circumstances under which the Executive Officer may grant short extensions to the compliance dates if warranted.]

(1) *All Harbor Craft – Low Sulfur Fuel Use Requirement.*

As of January 1, 2009, no person shall fuel any diesel engine on a harbor craft within any of the Regulated California Waters unless the fuel is one of the following:

(A) CARB Diesel Fuel; or
(B) an alternative diesel fuel as defined in subsection (d)(2); or
(C) any alternative diesel fuel that does not meet subsection (e)(1)(B) above but is certified by CARB as meeting the requirements of the Verification Procedure; or
(D) CARB Diesel Fuel used with fuel additives that meet the requirements of the Verification Procedure; or
(E) any combination of subsection (e)(1)(A) through (D) above.

(2) *All Harbor Craft – Installation and Use of Non-Resettable Hour Meters.*

As of January 1, 2009, no person shall operate a harbor craft within any of the Regulated California Waters without an installed and properly operating, non-resettable hour meter, which accurately measures the number of hours an engine operates. The hour meter shall be installed on each diesel engine on the vessel in a manner that allows reasonable personnel access without impediment.

(3) *All In-Use Harbor Craft – Requirements for Newly Acquired Engines.*

Except as otherwise provided in this paragraph, as of January 1, 2009, no person shall sell, purchase, offer for sale, lease, rent, import, or otherwise acquire a diesel engine for an in-use harbor craft, which is intended to operate or actually operates in any of the Regulated California Waters, unless that engine:

(A) meets the applicable Tier 2 or Tier 3 engine standards in effect on the date of acquisition of the engine. Once Tier 4 engine standards come into effect, a newly acquired engine meeting the Tier 3 standard may be used to comply with this paragraph unless the engine being replaced on the in-use vessel was certified to a Tier 4 standard, in which case the newly acquired engine must meet at least the Tier 4 standard, or cleaner, or

(B) does not meet the requirements specified in paragraph (A) above, but it is sold, supplied, or offered for sale for use in the harbor craft within 6 months after the effective date of the applicable Tier 2, Tier 3, or Tier 4 standards. The provisions of this paragraph (B) shall apply only to instances when the engine is sold, supplied, or offered for sale within the 6 month period specified above. Engines that are subsequently sold, supplied, or offered for sale after the 6 month period specified above shall be subject to the requirements specified in paragraph (A), regardless of whether it was

previously sold, supplied, or offered for sale within the 6 month period specified above.

(4) *All New Harbor Craft (Including All New Ferries) – Requirements for Newly Acquired Vessels.*

As of January 1, 2009, no person shall sell, purchase, offer for sale, lease, rent, import, or otherwise acquire a new harbor craft for use in any of the Regulated California Waters unless each of the diesel engines on the vessel meets the applicable Tier 2, Tier 3, or Tier 4 standards in effect on the date of vessel acquisition. Additional requirements shall apply for diesel propulsion engines in newly acquired new ferries, as specified in subsection (e)(5).

(5) *Selected New Ferries Only – Additional Requirements for All Newly Acquired Propulsion Engines.*

(A) As of January 1, 2009, no person shall sell, purchase, offer for sale, import, or otherwise acquire a new ferry with the capacity to transport 75 or more passengers for use in any of the Regulated California Waters unless each propulsion diesel engine on the vessel:

1. meets either the Tier 2 or Tier 3 standards that are in effect on the date of vessel acquisition; and

2. will be operated only in conjunction with the use of Best Available Control Technology (BACT), as determined and pre-approved by the Executive Officer pursuant to this provision.

(B) In lieu of installing or using BACT pursuant to paragraph (A)2 above, a person may comply with paragraph (A)2 by installing on the new ferry a propulsion engine(s) that is certified to the Tier 4 standards, if a Tier 4-certified engine is available at the time that the new ferry is delivered. If no Tier 4-certified engines are available at the time of ferry delivery, the provisions of paragraphs (A)1 and (A)2 shall apply.

(C) For purposes of this section, "BACT" is the diesel emission control strategy (DECS), whether verified or unverified pursuant to 13 CCR section 2700 et seq., that is determined by the E.O. as meeting all of the following criteria:

1. it provides or is expected to continuously provide the greatest reduction feasible of NOx or diesel PM when used with the ferry's propulsion diesel engine;

2. the use of BACT does not result in an increase of 10 percent or more of any air pollutant, including NOx and diesel PM, relative to the engine's emissions of that air pollutant without the use of BACT; and

3. either the DECS manufacturer or an authorized dealer of the DECS determines or otherwise agrees with the E.O. that use of the DECS on or with the new ferry's propulsion engine(s) would not invalidate or otherwise adversely affect the propulsion engine's original warranty.

DECS shall include, but not be limited to, exhaust treatment controls and the use of alternative fuels or fuel additives.

(D) The E.O. shall determine the appropriate level of BACT and specify such BACT in an Executive Order granting such approval. Applications to comply with the requirements of paragraph (A)2 by using BACT shall follow the application and review procedure set forth below:

1. Application Process.

For all new ferries for which the keel is laid on or after January 1, 2009, the application for BACT approval shall be submitted in writing to the E.O. for evaluation before the keel is laid. The BACT application shall contain, at a minimum, the following information:

a. the applicant company's name, address, and contact information;
b. information specific to the harbor craft and engine(s) on which BACT will be used, including the vessel name and identification number(s); engine make, model, and serial numbers; and all other information that uniquely identify the engine;
c. certification documentation, engineering calculations, emissions test data, or other information that establishes the diesel PM and NO_x emissions of the engine in combination with the proposed BACT. Emissions and emission reduction estimates shall include both diesel PM and NO_x emissions and shall be expressed in grams per brake horsepower-hour (g/bhp-hr) unless otherwise specified by the E.O. Information submitted pursuant to this provision shall be used as follows:

i. The E.O. shall use the information to compare the emissions resulting from the proposed use of BACT with the emissions quantified in BACT determinations previously approved by the E.O.;
ii. If there are no previous BACT determinations available for comparison, the E.O. shall use ARB staff's best engineering judgment to determine if the proposed BACT provides the greatest feasible reduction of diesel PM or NOx; and
iii. The E.O. may require the applicant to submit additional emissions data for other air pollutants if the E.O. believes that the proposed use of BACT may increase any air pollutant by 10

percent or more relative to the engine emissions without the proposed BACT.

d. the proposed recordkeeping, reporting, monitoring, and testing procedures that the applicant plans to use to demonstrate continued effectiveness of the BACT.

2. E.O. Review and Final Decision-Making Process.

a. Within 15 days after receiving a BACT application, the E.O. shall notify the applicant whether the application is deemed sufficiently complete to proceed with further evaluation. If the application is deemed incomplete, the notification shall identify the application's deficiencies. The E.O. shall have an additional 15-day period for reviewing each set of documents or information submitted in response to an incomplete determination. Nothing in this subsection prohibits the E.O. from requesting additional information from the applicant, during any part of the BACT application process, which the E.O. determines is necessary to evaluate the application.

b. Within 30 days of deeming an application complete, the E.O. shall take final action to either approve or deny a BACT application, and the E.O. shall notify the applicant accordingly. If the application is denied or modified, the Executive Officer shall state the reasons for the denial or modification in the notification. The E.O. shall specify all terms, conditions, and requirements the E.O. believes are necessary for the ferry engine and BACT to operate properly and reduce emissions of air pollutants consistent with this section. The reporting and recordkeeping requirements specific to the use of BACT shall include, but not be limited to:

i. hours of operation for the engine and BACT and fuel usage;
ii. usage of any alternative fuels, additives, agents, flow rates, and emission test results;
iii. maint enance procedures for the engine(s) and its BACT;
iv. any other measurements or recordings specified by the E.O.

The approval/disapproval notification to the applicant and approved BACT shall be made available to the public on ARB's internet site.

3. Post-Approval Vessel, Engine, and BACT Operation.

Any person subject to this provision shall maintain operating records and other information in the manner and form specified by the E.O. in the BACT approval. All records and reports created pursuant to this

provision shall be submitted to ARB upon request and shall be maintained and retained for ARB inspection a minimum of three years.

(6) *In-Use Engines and Vessels – Schedules for Meeting Tier 2 or Tier 3 Standards.*

(A) For Pre-Tier 1 and Tier 1-Certified Engines on Ferries, Excursion Vessels, Tugboats, Towboats, Push Boats and Multipurpose Harbor Craft Only.

Except as provided in subsection (c), beginning January 1, 2009, no person shall own, operate, sell, purchase, offer for sale, lease, rent, import, or otherwise acquire an in-use ferry, excursion vessel, tugboat, towboat, push boat or multipurpose harbor craft with pre-Tier 1 or Tier 1-certified engines for use in any of the Regulated California Waters unless the vessel's in-use pre-Tier 1 or Tier 1-certified engines meet the requirements of subsection (e)(6)(D) on or before the compliance date set forth in Table 7 or Table 8 of subsection (e)(6)(C) below, whichever date is applicable. For purposes of this section, a multipurpose harbor craft's total annual hours of operation shall be the basis for determining that vessel's compliance date in Table 7 or Table 8 of subsection (e)(6)(C).

(B) [Reserved for Future Use].

(C) Compliance Schedules and Determination of Engine Model Year.

Except as otherwise provided for in subsection (c), in this subsection (e)(6)(C), and in subsection (e)(6)(D), the following compliance dates shall apply to all in-use engines and persons subject to subsection (e)(6)(A). Table 7 specifies the compliance dates, by engine model year and annual hours of operation, that apply to in-use engines in harbor craft subject to subsection (e)(6)(A) and for which the vessel's homeport is located outside the South Coast Air Quality Management District (SCAQMD). Table 8 contains the compliance dates, by engine model year and annual hours of operation, that apply to in-use engines in harbor craft subject to subsection (e)(6)(A) and for which the vessel's homeport is located within SCAQMD.

For purposes of determining the applicable compliance date in Table 7 or Table 8, the engine's model year shall be determined using any of the following:

1. the engine's actual model year of manufacture;
2. the engine's effective model year based on the "Engine's Model Year + 5" method, which is as follows:

The "Engine's Model Year + 5" method extends the effective model year if the person uses an emissions control strategy pursuant to this paragraph. To use this method, the person must use an emission control strategy with the existing in-use engine that reduces either diesel

PM or NOx by a minimum of 25 percent and does not increase either pollutant by more than 10 percent, relative to the emissions of those pollutants without the use of the emission control strategy. If the emission control strategy is not a VDECS, the person shall demonstrate compliance with this paragraph by submitting emissions data that demonstrate the non-verified emission control technology achieves a diesel PM or NOx emission reduction of 25 percent or better, using the test methods specified in subsection (j). Upon approval of the E.O., the person may submit data derived from the use of other test methods to demonstrate the required 25 percent minimum emission reductions, such as:

a. marine engine certification test data for the harbor craft propulsion or auxiliary engine, or engine manufacturer emission test data; or
b. emissions test data derived from another engine that is configured and used in a substantially similar way to the in-use engine on which the emission control strategy is to be used; or
c. emissions test data used to meet the regulatory requirements of the ARB Verification Procedure for the non-verified emission control strategy implemented.

A person's use of an emissions control strategy pursuant to this provision extends the engine's effective compliance date to the compliance date for a similar engine that is five model years newer (i.e., the actual model year for the engine with the emissions control strategy + 5). For example, the owner of a 1995 model year engine on a tugboat with a homeport outside of SCAQMD and which operates in Regulated California Waters for 750 hours in 2013, would normally be required to meet a December 31, 2014 compliance date, as set forth in Table 7. However, if an emissions control strategy that meets the requirements of this provision is implemented with this engine prior to the 2014 nominal compliance date, the engine's effective compliance date would be extended to the compliance date for a 2000 model year engine (i.e., the 1995 model year + 5). Accordingly, in that scenario, the engine's effective compliance date would be December 31, 2016; or

3. the engine's effective model year based on the "Engine's Tier 1 Rebuild Model Year" method, which is as follows;

This method requires the person to demonstrate to the E.O.'s written satisfaction that the existing pre-2004 model year engine was rebuilt to conform with U.S. EPA Tier 1 standards prior to January 1, 2008. If the E.O. is thus satisfied, the effective model year of the Tier 1 rebuilt engine for purposes of determining the Table 7 or Table 8 compliance date shall be the actual year in which the Tier 1 rebuild occurred.

Table 7. Compliance Dates for Vessels with Homeports Outside SCAQMD

Engine Model Year	Total Annual Hours of Operation	Compliance Date
1975 and earlier	≥ 1500	12/31/2009
1975 and earlier	≥300 and < 1500	12/31/2010
1976 - 1985	≥1500	12/31/2011
1976 - 1985	≥ 300 and < 1500	12/31/2012
1986 - 1995	≥ 1500	12/31/2013
1986 - 1995	≥ 300 and < 1500	12/31/2014
1996 - 2000	≥1500	12/31/2015
1996 - 2000	≥ 300 and < 1500	12/31/2016
2001 - 2002	≥ 300	12/31/2017
2003	≥ 300	12/31/2018
2004	≥ 300	12/31/2019
2005	≥ 300	12/31/2020
2006	≥ 300	12/31/2021
2007	≥ 300	12/31/2022

[Note: For example, if a 1982-model year diesel engine on a tugboat operating in Regulated California Waters is used for 750 hours in 2011, the owner or operator must bring the engine into compliance with the requirements of subsection (e)(6)(D) by December 31, 2012.].

Table 8. Compliance Dates for Vessels with Homeport in SCAQMD

Engine Model Year	Total Annual Hours of Operation	Compliance Date
1979 and earlier	≥ 300	12/31/2009
1980 – 1985	≥ 300	12/31/2010
1986 – 1990	≥ 300	12/31/2011
1991 – 1995	≥ 300	12/31/2012
1996 – 2000	≥ 300	12/31/2013
2001	≥ 300	13/31/2014
2002	≥ 300	12/31/2015
2003	≥ 300	12/31/2016
2004	≥ 300	12/31/2017
2005	≥ 300	12/31/2018
2006	≥ 300	12/31/2019
2007	≥ 300	12/31/2020

[Note: For example, if a 1982-model year diesel engine on a tugboat operating in Regulated California Waters is used for 300 or more hours in 2009, the owner or operator must bring the engine into compliance with the requirements of subsection (e)(6)(D) by December 31, 2010.].

(D) Compliance Requirements:

Any person subject to the requirements of subsection (e)(6)(A) shall use at least one of the following compliance methods for each engine on the vessel by the date specified in Table 7 or Table 8 above, whichever compliance date applies:

1. Method 1: Replacement of the in-use pre-Tier 1 or Tier-1 certified engine with a U.S. EPA certified Tier 2 or Tier 3 engine; the Tier 2 or Tier 3 standard that applies to the in-use engine is the U.S. EPA standard that would apply to the engine had that engine been a new engine at the time of the compliance date specified in subsection (e)(6)(A). Tier 3-certified engines may still be used to comply with this paragraph, even if Tier 4-certified engines become available by the engine's compliance date; or

2. Method 2: Demonstrate to the E.O.'s written satisfaction that the existing pre-Tier 1 or Tier 1-certified in-use engine already meets the Tier 2 or Tier 3 standard that would apply to the in-use engine had that engine been a new engine at the time of the compliance date specified in subsection (e)(6)(A). A demonstration that the existing engine meets the Tier 3 standard may still be used to comply with this paragraph, even if Tier 4 standards come into effect by the engine's compliance date. The in-use engine may be rebuilt to a cleaner standard or implement a diesel emission control strategy to aid in meeting these standards. The demonstration may involve using the test method specified in section (j) or through an alternative method approved by the Executive Officer. Upon approval by the Executive Officer, other data may be used to demonstrate emission reduction level, such as:

   (a) the engine manufacturer's certification test data or other emissions test data for that in-use engine; or
   (b) emissions test data derived from another engine that is configured and used in a substantially similar way to the in-use engine; or
   (c) emissions test data used to meet the regulatory requirements of ARB's Verification Procedure for the non-verified emission control strategy implemented; or

3. Method 3: Demonstrate to the E.O's written satisfaction that the in-use engine has not and will not operate 300 or more hours per calendar year.

(E) Compliance Extensions.

The E.O. may grant an owner or operator an extension from a compliance deadline specified in subsection (e)(6)(C) for any one of the reasons set forth

below. An owner or operator granted such an extension shall be deemed to be in compliance with the requirements of subsection (e)(6)(D) only upon written authorization from the E.O. made pursuant to this provision and only until the end of the extension period. Except as provided in paragraph 3 below, compliance extensions granted pursuant to this provision may not be combined with any other compliance date extensions, including those set forth in this provision and in subsection (e)(6)(C)2 and (C)3. Except as provided in paragraphs 2 and 3 below, under no circumstances shall the E.O. grant more than one compliance extension for any individual engine, set of engines, or harbor craft.

1. *Change in Annual Hours of Operation.* The E.O. may grant a one-time, maximum one year extension to the compliance dates set forth in subsection (e)(6)(C), provided the applicant demonstrates to the E.O.'s satisfaction that the following has occurred:

    a. The vessel owner or operator reasonably determined the vessel engine's nominal compliance date based on the engine's hours of operation two years before the nominal compliance date;
    b. In the year immediately prior to the nominal compliance date, the engine's annual hours of operation significantly increased from the prior year such that the engine's effective compliance date would have been accelerated from one compliance date to an earlier compliance date.

[Note: For example, let's assume an operator has a 1982-model year engine on a tugboat, which has a homeport outside of SCAQMD and operates for 750 hours in Regulated California Waters in 2010. If it is reasonable for the operator to assume the annual hours of operation in 2011 will be similar to 2010, the operator would project from Table 7 that the engine's compliance date would be December 31, 2012, and would plan his operations accordingly. However, if the vessel engine's operation increased substantially to 1600 hours in 2011, the engine normally would then have its compliance date accelerated to December 31, 2011, according to Table 7. The one-year extension would, therefore, extend the engine's actual compliance date back to what it would have been without the change in hours of operation (i.e., back to December 31, 2012).].

2. *No Suitable Engine Replacement for Harbor Craft.* The E.O. may grant to an owner or operator a one year extension, which can be renewed annually, provided the owner or operator demonstrates to the E.O.'s written satisfaction that there is no suitable Tier 2-certified or Tier 3-certified replacement engine available anywhere that can be used in his/her specific vessel and he/she cannot otherwise meet the requirements of subsection (e)(6). For purposes of this paragraph, the only considerations for an engine's suitability to replace an existing engine are whether the replacement engine is similar in horsepower to

the existing engine, can fit within the vessel's engine compartment, and installation of the replacement engine would not cause the vessel to violate U.S. Coast Guard or other applicable safety regulations; the cost of the replacement engine shall not be a valid basis for replacement suitability. The application for and issuance of an initial extension and subsequent extensions pursuant to this paragraph shall be subject to the following requirements:

a. For an initial extension and all subsequent annual extensions to be granted pursuant to this paragraph, the E.O. shall follow the same procedures for applying, determining completeness, allowing public review and considering public comments, taking final action, and publishing E.O. decisions that are set forth in subsection (g) for ACE applications;

b. The E.O. shall consider all information submitted by the public, including but not limited to, information related to the availability of replacement engines suitable for the applicant's vessel;

c. Except for the engine(s) for which the extension is sought, the applicant shall demonstrate that all other engines subject to the owner or operator's direct control meet the requirements of subsection (e)(6);

d. The application shall be submitted to and received by the E.O. no later than six months before the compliance date of the engine for which the extension is requested;

e. The application shall identify each engine for which the extension is requested;

f. For each engine identified in paragraph (E)2.e above, the applicant shall provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that no suitable replacement engines are available. This description shall include, but not be limited to, detailed engineering diagrams, calculations, and citations to applicable U.S. Coast Guard regulations that support the applicant's claim that there are no suitable replacement engines available.

g. The E.O. may grant additional one year extensions, provided the following requirements are met:

    i. All procedures specified in paragraph 2.a and 2.b above are followed;

ii. The application for an additional extension demonstrates the engines identified in paragraph 2.c remain in compliance with this section;

iii. Th e application is received by the E.O. no sooner than six months but no later than 2 months before the expiration of the previous extension;

iv. The application identifies the engine(s) for which the additional extension is requested;

v. For each engine identified in paragraph iv. above, the applicant shall provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that suitable replacement engines remain unavailable. This description shall include, but not be limited to, detailed engineering diagrams, calculations, and citations to applicable U.S. Coast Guard regulations that support the applicant's claim that there are still no suitable replacement engines available.

3. *Equipment Manufacturer Delays or Installation Difficulties.* Upon written request by a vessel owner or operator, the E.O. may grant a six-month extension to the compliance date set forth in subsection (e)(6)(C), provided all the following criteria are met:

   a. the owner or operator ordered the new replacement engine or other equipment necessary to comply with the requirements of subsection (e)(6)(D) prior to the compliance date set forth in subsection (e)(6)(C);
   b. the purchase order identified in subpart a above was placed with the manufacturer no later than six months before the engine's compliance date;
   c. the new engine or equipment has not been received or installed since it was ordered due to manufacturing delays or excessive difficulties encountered by the engine or equipment installer;
   d. the applicant for the extension provides documentation to the E.O.'s satisfaction that demonstrates the criteria in subparts a through c above have been met.

4. *Same Fleet Vessel Engines that Share Compliance Dates.* Upon written request, the E.O. may grant to owners or operators of multiple vessels in the same fleet that have engines with the same compliance date a one-time, maximum one-year extension to the compliance date set forth in subsection (e)(6)(C), for each set of engines that have the same compliance date. For all other engines on the vessels not

subject to an extension granted pursuant to this paragraph, the compliance dates for such engines shall remain as set forth in subsection (e)(6)(C).

(F) *Special Provisions Applicable to the Use of a Diesel Emission Control Strategy (DECS).*

The requirements specified in this paragraph shall apply to any use of a DECS pursuant to subsections (e)(5) and (e)(6) and are in addition to any other applicable requirements. Once the DECS is installed or otherwise employed, the owner or operator shall continue to operate and maintain the DECS, in accordance with the manufacturer directions, to achieve the original level of emission reductions that the DECS was designed and intended to achieve. In the event a DECS fails, breaks down, or is otherwise damaged such that it cannot be repaired (collectively referred to hereinafter as "fail" or "failure"), the vessel owner or operator shall, within 90 days of the DECS failure, either replace the failed DECS with another DECS or employ another method that meets the requirements of subsection (e)(6)(D) and other applicable provisions of this section. The determination of whether a DECS cannot be repaired shall be from either the DECS manufacturer or an authorized dealer. The owner or operator shall provide to the E.O. the same documentation for the replacement DECS that was required for the DECS that failed, and shall obtain the same E.O. approvals that were required with the failed DECS.

(f) *Alternative Control of Emissions (ACE).*

(1) Requirements.

(A) The purpose of this subsection is to allow any person ("person" or "applicant") the option of complying with the requirements of this subsection in lieu of the requirements of subsection (e). Under this subsection, alternative emission control strategies (AECS) can be implemented as an alternative control of emissions (ACE), provided they result in no greater emissions, expressed in pounds, of diesel PM and NO_x and no increase of 10 percent or more of any other air pollutants from the engines over the applicable calendar year, relative to the emissions that would have occurred under compliance with subsection (e).

(B) An applicant wishing to participate in an ACE may include one or more harbor craft in the ACE, but an applicant shall only include harbor craft that the person owns or operates under their direct control.

(C) No harbor craft shall be included in more than one ACE plan.

(D) Harbor craft included in an ACE must continue to be included in the ACE for the duration of the ACE.

(E) AECS may include, but are not limited to, any combination of the following:

1. engine modifications;
2. exhaust treatment control;
3. engine repower;
4. use of alternative fuels or fuel additives;
5. shore-side power;
6. fleet averaging; and
7. any other measures that sufficiently reduce emissions.

(F) The ACE application demonstrating compliance with this subsection shall contain, at a minimum, the following information:

1. the company name, address, and contact information;
2. the harbor craft and engine(s) subject to the ACE, including the vessel name and identification number(s), engine make, model, and serial numbers, and other information that uniquely identify the engine;
3. documentation, calculations, emissions test data, or other information that establishes the diesel PM and NO_x reductions, expressed in pounds, shall be equivalent to or greater than the emission reductions that would have been achieved upon compliance with subsection (e), including but not limited to the requirements specified in subsection (e)(6)(C) and (6)(D);
4. the proposed recordkeeping, reporting, monitoring, and testing procedures that the applicant plans to use to demonstrate continued compliance with the ACE.

(G) Emission reduction estimates demonstrating equivalence with the requirements of subsection (e) shall include diesel PM and NO_x emissions only from harbor craft to which the ACE applies that port within a single specific California air district, or another defined geographic area approved by the E.O.

(H) Any owner or operator subject to an approved ACE shall maintain operating records in a manner and form as specified by the E.O as an element of any approved ACE. Required records shall include, but are not limited to:

1. reporting and recordkeeping requirements specified in subsections (g) and (h);
2. maintenance procedures; and

3. emissions test results.

Any owner or operator subject to an approved ACE shall retain records and reports on each vessel or nearby office for the lifetime of each engine and shall submit these records and reports to the E.O. in the manner specified in the approved ACE or upon request by the E.O.

(I) Emission reductions included in an ACE shall not include reductions that are otherwise required by any local, State, or federal rule, regulation, or statute, or that are achieved or estimated from equipment not located in the region to which the ACE applies.

(J) No person may operate any harbor craft under an ACE unless the applicant has first been notified in writing by the E.O. that the ACE application has been approved. Prior to such approval, applicants shall comply with the provisions of this section, including the requirements in subsection (e)(6)(C) and (6)(D).

(2) Application Process.

(A) Applications for an ACE shall be submitted in writing to the Executive Officer for evaluation.

(B) The Executive Officer shall establish an internet site ("ACE internet site") in which all documents pertaining to an ACE application shall be made available for public review. The Executive Officer shall also provide a copy of all such documents to each person who has requested copies of the documents; these persons shall be treated as interested parties. The Executive Officer shall provide two separate public comment periods during the ACE Application process, as specified in subsection (f)(2)(D) and (f)(2)(E).

(C) Completeness Determination.

Within 15 days after receiving an ACE application, the Executive Officer shall notify an applicant whether the application is deemed sufficiently complete to proceed with further evaluation. If the application is deemed incomplete, the notification shall identify the application's deficiencies. The Executive Officer shall have an additional 15-day period for reviewing each set of documents or information submitted in response to an incomplete determination. Nothing in this subsection prohibits the Executive Officer from requesting additional information from the applicant, during any part of the ACE application process, which the Executive Officer determines is necessary to evaluate the application.

(D) Notice of Completeness and 30-Day First Public Comment Period.

After an ACE application has been deemed complete, the Executive Officer shall provide a 30-day public comment period to receive comments on any element of the ACE application and whether the Executive Officer should approve or disapprove the ACE application based on the contents and merits of the application. The Executive Officer shall notify all interested parties of the following:

1. the applicant(s);
2. the start and end dates for the 30-day first comment period; and
3. the address of the ACE internet site where the application is posted.

The Executive Officer shall also make this notification available for public review on the ACE internet site.

(E) Proposed Action and 15-Day Second Public Comment Period.

Within 30 days after the first public comment period ends, the Executive Officer shall notify the applicant and all interested parties of ARB's proposed approval or disapproval. This notification shall propose to approve the application as submitted, disapprove the application, or approve the ACE application with modifications as deemed necessary by the Executive Officer. The notification shall identify the start and end dates for the 15-day second public comment period.

During the second public comment period, any person may comment on the Executive Officer's proposed approval or disapproval of the ACE application and any element of the application. The Executive Officer shall also make this notification available for public review on the ACE internet site.

(F) Final Action.

Within 15 days after the second public comment period ends, the Executive Officer shall take final action to either approve or deny an ACE application and shall notify the applicant accordingly. If the application is denied or modified, the Executive Officer shall state the reasons for the denial or modification in the notification. The notification to the applicant and approved ACE plan, if applicable, shall be made available to the public on the ACE internet site. In addition, the Executive Officer shall consider and address all comments received during the first and second public comment periods, and provide responses to each comment on the ACE internet site.

(G) Renewal of an Approved ACE.

An applicant can apply for renewal of an approved ACE by forwarding the Executive Officer updated information for all elements of the approved ACE for review and re-approval. The Executive Officer must receive all ACE renewal applications 30 days prior to the end of the compliance period.

(H) Notification to the Executive Officer of Changes to an Approved ACE.

An applicant shall notify the Executive Officer in writing within 30 days upon learning of any information that would alter the emissions estimates submitted during any part of the ACE application process. If the Executive Officer has reason to believe that an approved ACE has been granted to a person that no longer meets the criteria for an ACE, the Executive Officer may, pursuant to subsection (f)(3) below, modify or revoke the ACE as necessary to assure that the applicant and subject vessel(s) shall meet the emission reduction requirements in this section.

(3) Revocation or Modification of Approved ACEs.

With 30 days of notice of violation to the ACE holder, the Executive Officer may revoke or modify, as needed, an approved ACE if there have been multiple violations of the ACE provisions or the requirements of the approved ACE plan; or if the Executive Officer has reason to believe that an approved ACE has been granted that no longer meets the criteria or requirements for an ACE or the applicant can no longer comply with the requirements of the approved ACE in its current form. Public notification of a revocation or modification of an approved ACE shall be made available on the ACE internet site.

(g) *Recordkeeping Requirements.*

Beginning January 1, 2009, an owner or operator of harbor craft shall maintain the records specified in this subsection on the vessel or at the vessel's homeport for the life of each engine subject to this section. An owner or operator shall provide such records for inspection to an agent or employee of ARB upon request for all harbor craft subject to this section. Records can be provided as a hard copy, electronic, or any alternative reporting strategy approved by the E.O. may approve an alternative reporting strategy, and shall include, at a minimum, the following:

(1) Owner or Operator Contact Information:
- (A) Company name;
- (B) Contact name, phone and fax number, address, e-mail address;
- (C) Address where vessel is registered; and
- (D) Reporting year.

(2) Vessel information:
- (A) Harbor craft name;
- (B) Specify vessel use(s) (ferry, excursion vessel, tugboat, ocean-going tugboat, towboat, push boat, work boat, commercial fishing vessel, charter fishing vessel, crew and supply vessel, pilot vessel, or other if none of the preceding apply);
- (C) Vessel home port;
- (D) Vessel build year;
- (E) U.S. Coast Guard Documentation Number;
- (F) California Fish and Game License Number;
- (G) International Maritime Organization (IMO) Number;
- (H) Call Sign Number; and
- (I) Maritime Mobile Service Identity Number.

(3) Engine Information (for each diesel engine on the vessel):
- (A) Current hour meter reading;
- (B) Make of engine;
- (C) Model of engine;
- (D) Engine family (if applicable);
- (E) Engine serial number;
- (F) Year of manufacture of engine (if unable to determine, provide its approximate age);
- (G) Rated brake horsepower;
- (H) Total engine displacement; and
- (I) Number of cylinders.

(4) Operational Information:
- (A) Describe the general use of engine (propulsion or auxiliary engine);
- (B) Total annual hours of operation, based upon readings of the non-resettable hour meters for previous calendar year per engine (for engines without an hour meter before 2009, provide an estimate);
- (C) Estimated annual fuel usage per engine; and
- (D) Estimated percent operating time as a function of distance from shore at the distances below:
  1. 0-3 nautical miles;
  2. >3-24 nautical miles; and
  3. >24 nautical miles from shore.

(5) Control Equipment (if applicable):
- (A) Type of diesel emission control strategy;
- (B) Manufacturer of installed diesel emission control strategy;
- (C) Model of installed diesel emission control strategy;
- (D) Level of control – air pollutants controlled and percent reductions;
- (E) Emission control serial number; and
- (F) Date control equipment installed.

(6) Maintenance records for each installed engine and diesel emission control strategy:
(A) Hour meter reading at last top end rebuild (i.e., less than full rebuild);
(B) Hour meter reading at last full engine rebuild; and
(C) Number of times full engine rebuild completed.

(7) For each near-retirement vessel for which an owner or operator is claiming an exemption pursuant to subsection (c)(13), the retirement date of each of the vessels.

(8) For each engine for which the model year is determined using the "Engine's Model Year + 5" method pursuant to subsection (e)(6)(C)2:

(A) the name and contact information (representative, address, and phone number) for the manufacturer of the emission control strategy;
(B) the name and type of emission control strategy;
(C) the installation date of the emission control strategy; and,
(D) if a VDECS is not being used for this purpose, the test plan, and the data demonstrating the emission reductions achieved due to the emission control strategy.

(9) For each engine for which an owner or operator is claiming an extension pursuant to subsection (e)(6)(E)3, the purchase order or signed contract between the owner or operator and seller of the new engine or equipment that has been purchased to comply with subsection (e)(6)(C) and (6)(D).

(10) For each engine an owner or operator claims to have replaced, written documentation that the engine has been dismantled or destroyed.

(11) Records for each engine shall be retained by the owner or operator for the entire engine life.

(12) All records specific to an Executive Officer approved ACE plan.

(13) All records specific to a Best Available Control Technology approved by the E.O. pursuant to subsection (e)(5).

(h) *Initial and Compliance Plan Reporting Requirements.*

(1) Initial Reporting of California Harbor Craft Fleet. By February 28, 2009, each owner or operator of any harbor craft vessel shall submit the information specified in subsections (g)(1) through (g)(6) for all harbor craft vessels in his/her California fleet. For purposes of this paragraph, "California fleet" means the total population of harbor craft under the direct control of the owner or operator as of January 1, 2009.

(2) Compliance Plan. By February 28, 2009, each owner or operator of any harbor craft subject to the requirements of subsection (e)(6)(C) and (D) shall submit a Compliance Plan to the E.O. that describes in detail the engine replacements, rebuilds, upgrades, use of DECS, and any other measures the owner or operator plans to use to meet the requirements of subsection (e)(6)(C) and (6)(D) for each of the owner or operator's engines and harbor craft. The owner or operator may revise the Compliance Plan, as needed, but the owner or operator shall notify the E.O. within 10 working days of any changes to the Compliance Plan after the initial Compliance Plan is submitted. The Compliance Plan is for the E.O.'s informational and planning use only, and is not binding on either the E.O. or the owner or operator that submitted the Compliance Plan. The E.O.'s receipt and acceptance of a submitted Compliance Plan shall not constitute or be interpreted as evidence of compliance with the requirements of subsection (e)(6)(C) or (6)(D).

(3) Demonstration of Compliance. By no later than the applicable compliance date specified in subsection (e)(6)(C), the owner or operator of an in-use harbor craft subject to the requirements of subsection (e) shall provide the following information to the Executive Officer:

(A) All information specified in subsections (g)(1) through (g)(6), and

(B) The implementation date and the emission control strategy implemented for each engine in accordance with the requirements of subsection (e)(6)(C) and (e)(6)(D), respectively, for purposes of demonstrating compliance.

(4) Reporting for change of annual hours of operation, vessel category/use, transfers of vessels, or a change of ownership of vessel or engine.

(A) The owner or operator shall submit to the E.O. the information specified in subsection (g)(1) through (g)(6) within 30 days of a significant change of annual hours of operation (i.e., enough to change the engine's compliance date), vessel category/use, purchase, lease, rental, or change of ownership of the vessel or engine. In the case of a purchase, lease, rental, or change in ownership, the party in control or possession of the engine or vessel after the transaction shall be responsible for meeting the requirements of this paragraph;

(B) Within 90 days of a significant change of annual hours of operation, vessel category/use, purchase, lease, rental, or change of ownership, or by the earliest applicable compliance date specified in subsection (e)(6)(C), whichever is later, the owner or operator of vessels subject to subsection (e)(6) shall submit a new Compliance Plan with the updated information pursuant to the Compliance Plan requirements specified in paragraph 2 above.

(i) *Violations.*

(1) Any person who is subject to this section and commits a violation of any provision, standard, criteria or requirement in this section is subject to the penalties, injunctive relief, and other remedies specified in Health and Safety Code section 42400 et seq.; other applicable sections in the Health and Safety Code; and other applicable provisions as provided under California law for each violation. Nothing in this section shall be construed to limit or otherwise affect any applicable penalties or other remedies available under federal law.

(2) Any failure to meet any provision, standard, criteria or requirement in this section, including but not limited to the applicable emission limits; recordkeeping requirements; and Alternative Control of Emissions (ACE) provision, including the requirements of any approved ACE plans, shall constitute a single, separate violation of this section for each hour that a person operates an ocean-going vessel within the Regulated California Waters until such provision, standard, criteria or requirement has been met.

(3) Any person who is subject to this section is liable for meeting the requirements of this section, notwithstanding any contractual arrangement that person may have with any third-parties.

(j) *Methods to Demonstrate Compliance with Engine and Fuel Standards.*

(1) Diesel PM, NO_x, NO, CO, HC, NMHC, and CO_2 testing shall be done in accordance with the applicable method specified in the following procedures: International Organization for Standardization (ISO) 8178-2: 1996(E) ("ISO 8178 Part 2"); (2) ISO 8178-4: 1996(E) ("ISO 8178 Part 4"); and applicable methods and procedures specified in 40 CFR Part 94.

(2) The Executive Officer may approve in writing any alternative test methods not specified in paragraph (1) above that the method's proponent has demonstrated to the E.O.'s satisfaction provides equivalent or better results to the methods in paragraph (1).

(k) *Right of Entry.*

An agent or employee of the Air Resources Board has the right of entry to board any harbor craft for the purpose of inspecting propulsion and auxiliary engines, emission control strategies, fuel systems and fuel storage; collecting fuel sample(s) not to exceed one liter per fuel tank; and acquiring and inspecting records required pursuant to this section.

(l) *Severability.*

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

(m) *Submittal of Documents.*

(1) All documents required under this regulation to be submitted to the Executive Officer shall be submitted as follows:

California Air Resources Board
Stationary Source Division, Harbor Craft
P.O. Box 2815
Sacramento, California 95812-2815

(2) Electronic submittals of information associated with compliance with this section may be approved by the Executive Officer upon request, provided such electronic submittals use digital signatures that meet the requirements specified in Government Code section 16.5. The Executive Officer may request the submittal of a hard copy of any electronic submittal.

NOTE: Authority cited: Sections 39600, 39601, 41511, 43013, and 43018, Health and Safety Code. Reference: Sections 39000, 39001, 39515, 39516, 41510, 41511, 43013, 43016, and 43018, Health and Safety Code; and *Western Oil and Gas Ass'n v. Orange County Air Pollution Control District*, 14 Cal.3rd 411, 121 Cal.Rptr. 249 (1975).

PROPOSED REGULATION ORDER

AIRBORNE TOXIC CONTROL MEASURE FOR DIESEL ENGINES ON COMMERCIAL HARBOR CRAFT OPERATED WITHIN CALIFORNIA WATERS AND 24 NAUTICAL MILES OF THE CALIFORNIA BASELINE

Adopt new section 93118.5, title 17, chapter 1, subchapter 7.5, California Code of Regulations (CCR), to read as follows:

(Note: The entire text of section 93118.5 is new language.):

Section 93118.5. Airborne Toxic Control Measure for Commercial Harbor Craft.

(a) *Purpose.*

The purpose of this section is to reduce diesel particulate matter (PM), oxides of sulfur (SOx), and oxides of nitrogen (NO_x) from diesel propulsion and auxiliary engines on harbor craft that operate in any of the waters subject to this section ("Regulated California Waters"). This section implements provisions of the Goods Movement Emission Reduction Plan, adopted by the Air Resources Board (ARB) in April 2006, to reduce emissions and health risk from ports and the movement of goods in California.

(b) *Applicability.*

(1) Except as provided in subsections (b) and (c), this section applies to any person who sells, supplies, offers for sale, purchases, owns, operates, leases, charters, or rents any new or in-use diesel fueled harbor craft that is operated in any of the Regulated California Waters.

(2) In the event a harbor craft and its engine(s) are subject to the requirements of this section, and either the regulation for portable compression ignition (CI) engines and equipment (sections 93116-93116.5, title 17, California Code of Regulations (CCR)), or the regulation for off-road CI engines and equipment (sections 2420-2427, title 13, CCR), the requirements of this section shall supersede those of the other two regulations for all engines on the vessel that are permanently affixed to the vessel (i.e., the engine, its fueling system, or its exhaust system is welded or otherwise physically connected to the vessel or other vessel system in such a way that the engine cannot be easily removed for use in a land-based application without modifications).

(3) This section applies to towboats and tugboats engaged in or intending to engage in the service of pulling, pushing or hauling alongside tank vessels or tank barges.

(4) Notwithstanding the provisions of title 13, CCR, section 2299.1 and title 17, CCR, section 93118, this section shall apply to any ocean-going tugboats and towboats and shall supersede the requirements of 13 CCR 2299.1 and 17 CCR 93118 in their entirety for ocean-going tugboats and towboats. For purposes of this paragraph, "ocean-going tugboats and towboats" shall mean tugboats and towboats with a "registry" (foreign trade) endorsement on its United States Coast Guard certificate of documentation, or tugboats and towboats that are registered under the flag of a country other than the United States.

(5) Nothing in this section shall be construed to amend, repeal, modify, or change in any way any other applicable State, U.S. Coast Guard, or other federal 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 and any other applicable State and federal requirements, including but not limited to, obtaining any necessary approvals, exemptions, or orders from the U.S. Coast Guard.

(6) This section shall not apply to any engine and equipment that fall within the scope of the preemption of Section 209(e)(1)(A) of the Federal Clean Air Act (42 U.S.C. 7543(e)(1)(A)) and as defined by regulation of the U.S. Environmental Protection Agency.

(c) *Exemptions.*

All or portions of this section do not apply to the following, as provided below, but vessels that are partly or wholly exempt from this section may be subject to other State and federal regulations and requirements. All other portions of this section shall apply unless otherwise specified:

(1) Harbor craft whose voyages are comprised 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 are exempt from this section in its entirety. "Continuous and expeditious navigation" includes stopping and anchoring only to the extent such stopping and anchoring are required by the U.S. Coast Guard; rendered necessary by force majeure or distress; or made for the purpose of rendering assistance to persons, ships, or aircraft in danger or distress. This exemption does not apply to the passage of a harbor craft that engages in any of the prejudicial activities specified in United Nations Convention on the Law of the Seas (UNCLOS) 1982, Article 19, subpart 2. Further, notwithstanding any Coast Guard mandated stops or stops due to force majeure or the rendering of assistance, this exemption does not apply to a vessel that was otherwise scheduled or intended to enter California internal or estuarine waters or call at a port, roadstead or terminal facility;

(2) Temporary replacement vessels are exempt only from the requirements set forth in subsection (e)(6) and only upon written approval by the California Air

Resources Board's Executive Officer (E.O.). All other provisions in this section shall apply to temporary replacement vessels subject to this paragraph. An owner or operator, who has or will have a vessel taken out of service, may apply in writing to the E.O. to operate a temporary replacement vessel pursuant to the following:

(A) The E.O. shall approve or disapprove such a request within 15 days of receipt. The E.O. shall not unreasonably withhold approval of the request to operate the temporary replacement vessel;
(B) If the approval is granted, the temporary replacement vessel's operating time will be specified in the approval by the E.O., along with any other terms, conditions or requirements the E.O. deems necessary, but in no case shall the approved operating time in Regulated California Waters for a specific temporary replacement vessel exceed one year total for any single vessel that is temporarily replaced; and
(C) No temporary replacement vessel exemptions shall be approved for a vessel that is taken out of service more than 12 months in any 24-month period or if the E.O. cannot determine the length of time a vessel has been taken out of service within any 24-month period.

(3) Temporary replacement vessels (SCAQMD) are exempt only from the compliance dates set forth in Table 8 of subsection (e)(6) and only upon written approval from the ARB's Executive Officer (E.O.). All other provisions in this section, including but not limited to, the compliance dates specified in Table 7 of subsection (e)(6), shall apply to temporary replacement vessels subject to this paragraph. An owner or operator, who has or will have a vessel taken out of service, may apply in writing to the E.O. to operate a temporary replacement vessel pursuant to the following:

(A) The E.O. shall approve or disapprove such a request within 15 days of receipt. The E.O. shall not unreasonably withhold approval of the request to operate the temporary replacement vessel;
(B) If the approval is granted, the temporary replacement vessel's operating time will be specified in the approval by the E.O., along with any other terms, conditions or requirements the E.O. deems necessary, but in no case shall the approved operating time in Regulated California Waters for a specific temporary replacement vessel exceed one year total for any single vessel that is temporarily replaced; and
(C) No temporary replacement vessel exemptions shall be approved for a vessel that is taken out of service more than 12 months in any 24-month period or if the E.O. cannot determine the length of time a vessel has been taken out of service within any 24-month period;

(4) Temporary emergency rescue/recovery vessels are exempt from this section in its entirety;

(5) Recreational vessels are exempt from this section in its entirety;

(6) Ocean-going vessels, except for ocean-going tugboats and towboats as provided in subsection (b)(4), are exempt from this section in its entirety;

(7) The following portable engines are exempt from this section in its entirety:

(A) All vessel engines, including engines on barges, that are registered with ARB's Portable Engine Registration Program (PERP) (sections 2450 through 2465, title 13, CCR) before January 1, 2009;
(B) All vessel engines that are registered with PERP on or after January 1, 2009 and are not permanently affixed to the vessel (i.e., the engine, its fueling system, and its exhaust system are not welded or otherwise physically connected to the vessel or other vessel system, which permits the engine to be easily removed for use in a land-based application without modifications); and
(C) All vessel engines that are registered and permitted under local air district regulations before January 1, 2009.

(8) Registered historic vessels are exempt only from subsection (e)(6);

(9) U.S. Coast Guard vessels are exempt from this section in its entirety;

(10) Military tactical support vessels are exempt from this section in its entirety;

(11) Engines rated less than 50 horsepower are exempt only from subsection (e)(6); and

(12) Engines and vessels that are operated less than 300 hours per calendar year shall be exempt only from the requirements of subsection (e)(6).

(13) Near-Retirement Vessels. A harbor craft that is scheduled to be taken out of service and retired permanently and has an engine that has a compliance date, as set forth in subsection (e)(6)(C), that is within one year of the vessel's scheduled retirement date, is exempt from the requirements of subsection (e)(6)(C) and (6)(D), provided the vessel is actually taken out of service and retired on or before the scheduled retirement date. Operation of a vessel subject to this provision after the scheduled retirement date or the engine's compliance date, whichever occurs later, is a separate violation of this section for each and every day of operation during which the vessel's engines do not meet the requirements of subsection (e)(6)(D) or other parts of this section.

(d) *Definitions.*

For purposes of this section, the definitions of Health and Safety Code sections 39010 through 39060 shall apply except as otherwise specified in this section:

(1) "Air District" means one of the local air pollution control districts (APCDs) or air quality management districts (AQMDs) established under Health and Safety Code section 40000 et seq.

(2) "Alternative Diesel Fuel" means any fuel used in a diesel engine that is not commonly or commercially known, sold, or represented by the supplier as diesel fuel No. 1-D or No. 2-D, pursuant to the specifications in ASTM D975-81, "Standard Specification for Diesel Fuel Oils," as modified in May 1982, which is incorporated herein by reference, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g., recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel and biodiesel blends not meeting the definition of CARB diesel fuel; Fischer-Tropsch fuels; emulsions of water in diesel fuel; and fuels with a fuel additive, unless:

(A) the additive is supplied to the engine fuel by an on-board dosing mechanism, or
(B) the additive is directly mixed into the base fuel inside the fuel tank of the engine, or
(C) the additive and base fuel are not mixed until engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine.

(3) "Alternative Fuel" means natural gas, propane, ethanol, methanol, gasoline, hydrogen, electricity, or other technologies that do not meet the definition of CARB diesel or alternative diesel fuel. "Alternative fuel" also means any mixture that only contains these fuels.

(4) "Annual Hours of Operation" means the total number of hours, rounded to the nearest whole hour, a vessel engine is used for all commercial purposes in Regulated California Waters in the calendar year (January 1 to December 31) immediately prior to the engine's applicable compliance date set forth in subsection (e)(6)(C). For example, if a vessel is used for commercial fishing and commercial non-fishing purposes, the total number of hours combined for both uses shall be the total annual hours of operation for that vessel.

(5) "Auxiliary Engine" means an engine designed primarily to provide power for uses other than propulsion.

(6) "Averaging" means an exchange of excess reduced regulated emissions among engines on vessels in the same owner's or operator's fleet.

(7) "Baseline" means the emissions level of a diesel engine using CARB diesel fuel as configured upon initial marine installation.

(8) "Barge" means a vessel having a flat-bottomed rectangular hull with sloping ends and built with or without a propulsion engine.

(9) "California Air Resources Board (CARB) Diesel Fuel" means any diesel fuel that meets the specifications of vehicular diesel fuel, as defined in title 13 CCR, sections 2281, 2282, 2284, 2299, and title 17 CCR section 93116.

(10) "California Baseline" means the mean lower low water line along the California coast, as shown on the following National Oceanic and Atmospheric Administration (NOAA) Nautical Charts as authored by the NOAA Office of Coast Survey, which are incorporated herein by reference:

(A) Chart 18600, Trinidad Head to Cape Blanco (January 2002);
(B) Chart 18620, Point Arena to Trinidad Head (June 2002);
(C) Chart 18640, San Francisco to Point Arena (August 2005);
(D) Chart 18680, Point Sur to San Francisco (June 2005);
(E) Chart 18700, Point Conception to Point Sur (July 2003);
(F) Chart 18720, Point Dume to Purisima Point (January 2005); and
(G) Chart 18740, San Diego to Santa Rosa Island (April 2005).

(11) "CARB" means the California Air Resources Board. CARB may also be referred to as "ARB."

(12) "Carbon Monoxide (CO)" is a colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels.

(13) "Category 1 engine" means any marine engine with a displacement of less than 5.0 liter per cylinder and with a maximum horsepower (hp) rating of 50 hp or greater.

(14) "Category 2 engine" means any marine engine with a displacement of 5.0 to less than 30 liter per cylinder.

(15) "Category 3 engine" means any marine engine with a displacement of greater than 30 liter per cylinder.

(16) "Certified engine" means an engine that is certified by U.S. EPA as meeting the requirements of title 40, Code of Federal Regulations, Part 94.

(17) "Coast Guard Vessel" means any vessel or boat owned or operated by the United States Coast Guard, including, but not limited to, Coast Guard cutters and patrol boats that are used for law enforcement, defense operations, marine

science, search and rescue missions, training missions, coastal surveillance, servicing aids to navigation, and marine environmental response.

(18) "Compliance Date" means the date, as set forth in Table 7 or Table 8 in subsection (e)(6)(C) (whichever applies), by which time a vessel engine must meet the requirements set forth in subsection (e)(6)(D).

(19) "Crew and Supply Vessel" means a self-propelled vessel used for carrying personnel and/or supplies to and from off-shore and in-harbor locations (including, but not limited to, off-shore work platforms, construction sites, and other vessels).

(20) "Date of Acquisition" means, for a vessel or engine subject to this regulation, the date of purchase as defined by the date shown on the front of the cashed check, the date of the financial transaction, or the date on the vessel or engine purchasing agreement, whichever is earliest of the three dates.

(21) "Diesel Engine" means an internal combustion, compression-ignition (CI) engine, or pilot ignition engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

(22) "Diesel Fuel" means any fuel that is commonly or commercially known, sold, or represented by the supplier as diesel fuel, including any mixture of primarily liquid hydrocarbons (HC) - organic compounds consisting exclusively of the elements carbon and hydrogen - that is sold or represented by the supplier as suitable for use in an internal combustion, compression-ignition engine.

(23) "Diesel-Fueled" means a diesel engine fueled in whole or part by diesel fuel.

(24) "Diesel Oxidation Catalyst (DOC)" means an emission control technology that employs a catalyst to promote oxidation processes in diesel exhaust gases, usually designed to reduce emissions of the organic fraction of diesel particulates, gas-phase HC, and CO.

(25) "Diesel Particulate Filter (DPF)" means an emission control technology that reduces diesel PM emissions in engine exhaust gases by trapping the particles in a flow filter substrate and periodically removes the collected particles by either physical action or by oxidizing (burning off) the particles in a process called regeneration.

(26) "Diesel Particulate Matter (Diesel PM)" means the particles found in the exhaust of diesel engines, which may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

(27) "Direct Control" means owning, operating, having a contract, lease, or other arrangement to operate a harbor craft.

(28) "Emission Control Strategy" means any device, system, or strategy employed to reduce emissions from an engine, including, but not limited to, diesel oxidation catalysts, selective catalytic reduction systems, diesel particulate filters, alternative diesel fuels, water emulsified fuels, and any combination of the above.

(29) "Estuarine Waters" means an arm of the sea or ocean that extends inland to meet the mouth of a river.

(30) "Excursion Vessel" means a vessel used for a short trip or outing to some place, usually for a special purpose and with the intention of a prompt return, including all public or private excursion vessels, such as dinner cruises, harbor, lake, or river tours, scuba diving expeditions, and whale watching tours.

(31) "Executive Officer" means the Executive Officer of the California Air Resources Board or his/her designee.

(32) "Ferry" means any self-propelled vessel or boat owned, controlled, operated, or managed for public use in transportation of carrying passengers, property, or vehicles on scheduled services.

(33) "Fishing Vessel" means a self-propelled boat or ship that is either: (A) a commercial fishing vessel dedicated to the search for, and collection of, fish for the purpose of sale at market or directly to a purchaser(s), or (B) or a charter fishing vessel used for hire by the general public dedicated to the search for and collection of, fish for the purpose of general consumption.

(34) "Fleet" means the total number of harbor craft owned, rented, or leased by an owner or operator in an air district or distinct locale within Regulated California Waters or the statewide population of a specific vessel type.

(35) "Fuel Additive" means any substance designed to be added to fuel or fuel systems or other engine-related engine systems such that it is present in-cylinder during combustion.

(36) "Harbor Craft" (also called "Commercial Harbor Craft") means any private, commercial, government, or military marine vessel including, but not limited to, passenger ferries, excursion vessels, tugboats, ocean-going tugboats, towboats, push-boats, crew and supply vessels, work boats, pilot vessels, supply boats, fishing vessels, research vessels, United States Coast Guard vessels, hovercraft, emergency response harbor craft, and barge vessels that do not otherwise meet the definition of ocean-going vessels or recreational vessels.

(37) "Homeport" means the port in which a vessel is registered or permanently based.

(38) "In-Use Harbor Craft" means a harbor craft that is not a new harbor craft.

(39) "In-Use Marine Engine" means a marine engine that is not a new marine engine.

(40) "Lease" means a contract by which the owner (lessor) of a property, such as a vessel or engine, grants the right to use or occupy the property to another person (lessee) for a specified term and for a specified rent.

(41) "Level" means, unless the context requires otherwise, one of three categories of Air Resources Board-verified diesel emission control strategies as set forth in title 13, CCR, section 2700 et seq.: Level 1 means the strategy reduces engine diesel PM emissions by between 25 and 49 percent; Level 2 means the strategy reduces engine diesel PM emissions by between 50 and 84 percent; and Level 3 means the strategy reduces engine diesel PM emissions by 85 percent or greater, or reduces engine PM emissions to less than or equal to 0.01 grams per brake horsepower-hour.

(42) "Low-Use" means the operation of any compression-ignition engine associated with a harbor craft vessel for less than 300 total annual hours of operation in Regulated California Waters, based on the immediately previous calendar year.

(43) "Military Tactical Support" means a vessel that meets military specifications, is owned by the U.S. Department of Defense, the U.S. Coast Guard, the U.S. Military services or its allies, and is used in combat, combat support, combat services support, tactical or relief operations or training for such operations.

(44) "Model Year" means the diesel engine manufacturer's annual production period, which includes January 1st of a calendar year, or if the manufacturer has no annual production period, the calendar year.

(45) "Multipurpose Harbor Craft" means a harbor craft that serves as a ferry, excursion vessel, tugboat, or towboat but is also used as a work, crew and supply, pilot, fishing, supply, or other vessel.

(46) "New Harbor Craft" means a harbor craft for which both of the following criteria are true:

(A) it is built, or its keel is laid, on or after January 1, 2009, and
(B) the equitable or legal title to the harbor craft has never been transferred to an ultimate purchaser.

Where the equitable or legal title to the harbor craft is not transferred to an ultimate purchaser prior to the harbor craft being placed into service, the harbor craft ceases to be new when it is placed into service. A harbor craft is placed into service when it is used for its functional purposes.

(47) "New Marine Engine" means a marine engine for which both of the following criteria are true:

(C) it is manufactured or imported on or after January 1, 2009, and
(D) the equitable or legal title to the engine has never been transferred to an ultimate purchaser.

Where the equitable or legal title to the engine is not transferred to an ultimate purchaser prior to the engine being placed into service, the engine ceases to be new when it is placed into service. An engine is placed into service when it is used for its functional purposes.

(48) "Nitrogen Oxides (NO_x)" means compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen, which are typically created during combustion processes and are major contributors to smog formation and acid deposition.

(49) "Non-Methane Hydrocarbons (NMHC)" means the sum of all hydrocarbon (HC) air pollutants except methane.

(50) "Ocean-going Vessel" means a commercial, government, or military vessel meeting any one of the following criteria:

(A) a vessel with a "registry" (foreign trade) endorsement on its United States Coast Guard certificate of documentation, or a vessel that is registered under the flag of a country other than the United States;

(B) a vessel greater than or equal to 400 feet in length overall (LOA) as defined in 50 CFR § 679.2, as adopted June 19, 1996;

(C) a vessel greater than or equal to 10,000 gross tons (GT ITC) per the convention measurement (international system) as defined in 46 CFR 69.51-.61, as adopted September 12, 1989; or

(D) a vessel propelled by a marine compression ignition engine with a per-cylinder displacement of greater than or equal to 30 liters.

(51) "Operate" means steering or otherwise running the vessel or its functions while the vessel is underway, moored, anchored, or at dock.

(52) "Own" means having all the incidents of ownership, including the legal title, whether or not that person lends, rents, or pledges the vessel; having or being entitled to the possession of a vessel as the purchaser under a conditional sale contract; or being the mortgagor of a vessel.

(53) "Particulate Matter (PM)" means any airborne finely divided material, except uncombined water, which exists as a liquid or solid at standard conditions (e.g., dust, smoke, mist fumes, or smog).

(54) "Person" includes all of the following:

(A) any person, firm, association, organization, partnership, business trust, corporation, limited liability company, or company;

(B) any state or local governmental agency or public district, or any officer or employee thereof; and

(C) the United States or its agencies, to the extent permitted by federal law.

(55) "Pilot Vessel" means a vessel designed for, but not limited to, the transfer and transport of maritime pilots to and from ocean going vessels while such vessels are underway.

(56) "Port" means any facility used for water-borne commerce. "Port" includes, but is not limited to, facilities also known as "marine terminals" and "roadsteads."

(57) "Portable CI Engine" means a compression ignition (CI) engine designed and capable of being carried or moved from one location to another. Indicators of portability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform. Portable engines are not self-propelled.

(58) "Portable Engine Registration Program (PERP)" means the statewide program designed to promote the use of clean portable engines in California, as provided for in title 13, CCR, sections 2450 through 2465. Once registered in the program, engines and equipment units can operate throughout the State without being required to obtain individual permits from each air pollution control or air quality management district in which they operate.

(59) "Pre-Tier 1 Engine" means an engine that was built before the effective date of U.S. EPA's Tier 1 marine engine standard, as set forth in 40 CFR 94.

(60) "Propulsion Engine" means an engine that provides power to move a vessel through the water or directs the movement of a vessel.

(61) "Purchase Date" means the date shown on the front of the cashed check; the date of the financial transaction; or the date on the engine or harbor craft purchase, rental, or lease agreement, whichever is earliest.

(62) "Push Boat" means any self-propelled vessel engaged in or intending to engage in the service of pulling, pushing, or hauling along side barges or other vessels,

or any combination of pulling, pushing, or hauling along side barges or other vessels. "Push boats" is interchangeable with "towboats."

(63) "Recreational Vessel" means a vessel that is intended by the vessel manufacturer to be operated primarily for pleasure or leased, rented or chartered to another for the latter's pleasure, excluding the following vessels: (1) vessels of less than 100 gross tons that carry more than 6 passengers, (2) vessels of 100 gross tons or more that carry one or more passengers, and (3) vessels used solely for competition.

(64) "Registered Historic Vessel" means a vessel listed in the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966 (16 U.S.C. 470).

(65) "Regulated California Waters" means all of the following:

(A) all California internal waters;
(B) all California estuarine waters;
(C) all California ports, roadsteads, and terminal facilities (collectively "ports");
(D) all waters within 3 nautical miles of the California baseline, starting at the California-Oregon border and ending at the California-Mexico border at the Pacific Ocean, inclusive;
(E) all waters within 12 nautical miles of the California baseline, starting at the California-Oregon border and ending at the California-Mexico border at the Pacific Ocean, inclusive;
(F) all waters within 24 nautical miles of the California baseline, starting at the California-Oregon border to 34.43 degrees North, 121.12 degrees West; inclusive; and
(G) all waters within the area, not including any islands, between the California baseline and a line starting at 34.43 degrees North, 121.12 degrees West; thence to 33.50 degrees North, 118.58 degrees West; thence to 32.48 degrees North, 117.67 degrees West; and ending at the California-Mexico border at the Pacific Ocean, inclusive.

(66) "Rent" means payment for the use of harbor craft or diesel engine for a specified term.

(67) "Retirement" means the act of taking an engine or harbor craft out of service (i.e., to "retire") so that it subsequently never again operates in any of the Regulated California Waters. "Retirement" does not include an engine or harbor craft that is sold for use outside California then subsequently operated in any of the Regulated California Waters.

(68) "SCAQMD" shall mean the South Coast Air Quality Management District, as defined in Health and Safety Code section 40410 et seq. and described in

section 60104, title 17, California Code of Regulations, and shall include all waters subject to the jurisdiction of the SCAQMD.

(69) "Supply Vessel" means a self-propelled vessel used for carrying supplies to and from off-shore and in-harbor locations including, but not limited to, off-shore work platforms, construction sites, and other vessels.

(70) "Take Out of Service" means the act of dry-docking, mooring, anchoring, or otherwise tying up a harbor craft at dock to conduct maintenance, repairs, replacements, or upgrades such that the vessel cannot be operated in Regulated California Waters while such acts are conducted on the vessel.

(71) "Tank Barge" means a non-self-propelled vessel constructed or adapted primarily to carry, or that carries, oil or hazardous material in bulk as cargo or cargo residue.

(72) "Tank Vessel" or "Tanker" means a self-propelled vessel constructed or adapted primarily to carry, or that carries, oil or hazardous material in bulk as cargo or cargo residue.

(73) "Temporary emergency rescue / recovery vessel" means a vessel whose homeport is not within California and is brought into California for the immediate use of emergency rescue or recovery and returns to its home port outside of California at the conclusion of its emergency rescue / recovery mission.

(74) "Temporary replacement vessel" means a vessel that is brought into service to temporarily replace a California vessel that has been temporarily taken out of service. There are two types of these vessels: (1) "temporary replacement vessels (SCAQMD)," which are used in the SCAQMD but have a homeport in California outside of the SCAQMD; and "temporary replacement vessels" which are used anywhere in California, including the SCAQMD, and have a homeport outside of California.

(75) "Tier 1 Marine Emission Standards (Tier 1)" (shown in Table 1 below) means the U.S. EPA marine engine Tier 1 emission standards, as promulgated by U.S. EPA and set forth in "Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 37 kW" (64 Federal Register 73299-73373, December 29, 1999)(40 Code of Federal Regulations Part 94), both of which are incorporated herein by reference.

Table 1: U.S. EPA Tier 1 Marine Engine Emission Standards

Category	Power (kW) & Displacement (Liters/cylinder)	Engine Speed	Tier 1 Model Year	PM (g/bhp-hr)	NO_x+HC (g/bhp-hr)	CO (g/bhp-hr)
1, 2, 3, including Recreational	≥ 37 kW & ≥ 2.5 l/cyl	rpm ≥ 2000	2004	-	7.3	-
		130 ≤ rpm <2000	2004	-	33.57 x rpm $^{-0.2}$	-
		rpm <130	2004	-	12.7	-

(40 CFR Part 94)
*converted maximum power rating from 40 CFR 94, which are expressed in g/kW-hr to g/hp-hr by the following: g/kW-hr (0.746) = g/hp-hr.

(76) "Tier 2 Marine Emission Standards (Tier 2)" (shown in Table 2 below) means the U.S. EPA marine engine Tier 2 emission standards, as promulgated by U.S. EPA and set forth in "Control of Emissions of Air Pollution from New Marine Compression-Ignition Engines at or Above 37 kW" (64 FR 73299-73373, December 29, 1999)(40 CFR Part 94), both of which are incorporated herein by reference.

Table 2: U.S. EPA Tier 2 Marine Engine Emission Standards for NO_x + HC, PM, and CO

Category	Displacement (liters/cylinder)	Date	NO_x+HC (g/bhp-hr)*	PM (g/bhp-hr)*	CO (g/bhp-hr)
1	Disp.< 0.9 and power ≥50 hp*	2005	5.6	0.30	3.7
	0.9 ≤ Disp. < 1.2	2004	5.4	0.22	3.7
	1.2 ≤ Disp. < 2.5	2004	5.4	0.15	3.7
	2.5 ≤ Disp. < 5.0	2007	5.4	0.15	3.7
2	5.0 ≤ Disp. < 15	2007	5.8	0.20	3.7
	15 ≤ Disp. < 20 (power < 4424 hp*)	2007	6.5	0.37	3.7
	15 ≤ Disp. < 20 (power ≥ 4424 hp*)	2007	7.3	0.37	3.7
	20 ≤ Disp. < 25	2007	7.3	0.37	3.7
	25 ≤ Disp. < 30	2007	8.2	0.37	3.7

(40 CFR Part 94)
*converted maximum power rating from 40 CFR 94, which are expressed in g/kW-hr to g/hp-hr by the following: g/kW-hr (0.746) = g/hp-hr or kW (1.34) = hp

(77) "Tier 3 Marine Engine Standards (Tier 3)" (shown in Table 3, Table 4, and Table 5 below) means the U.S. EPA proposed Tier 3 Marine Engine standards, as set forth in "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder" (72 FR 15937 et seq., April 3, 2007), which is incorporated herein by reference.

Table 3: U.S. EPA Proposed Tier 3 Standards for Marine Diesel Category 1 Commercial Standard Power Density Engines

Rated kW	L/Cylinder	PM g/bhp-hr	NOx + HC g/bhp-hr	Model Year
19 - < 75 kW	<0.9 [a]	0.22	5.6	2009
		0.22 [b]	3.5 [b]	2014
75 – 3700 kW	<0.9	0.10	4.0	2012
	0.9 - <1.2	0.09	4.0	2013
	1.2 - <2.5	0.08 [c]	4.2	2014
	2.5 - <3.5	0.08 [c]	4.2	2013
	3.5 - <7.0	0.08 [c]	4.3	2012

(a) <75 kW engines at or above 0.9 L/cylinder are subject to the corresponding 37-3700 kW standards.
(b) Option: 0.15 PM / 4.3 NOx in 2014.
(c) This standard level drops to 0.07 in 2018 for <600 kW engines.

Table 4: U.S. EPA Proposed Tier 3 Standards for Marine Diesel Category 1 Recreational and Commercial High Power Density Engines

Rated kW	L/Cylinder	PM g/bhp-hr	NOx + HC g/bhp-hr	Model Year
19 - <75 kW	<0.9 [a]	0.22	5.6	2009
		0.22 [b]	3.5 [b]	2014
75 – 3700 kW	<0.9	0.11	4.3	2012
	0.9 - <1.2	0.10	4.3	2013
	1.2 - <2.5	0.09	4.3	2014
	2.5 - <3.5	0.09	4.3	2013
	3.5 - <7.0	0.09	4.0	2012

(a) <75 kW engines at or above 0.9 L/cylinder are subject to the corresponding 75-3700 kW standards.
(b) Option: 0.15 PM / 4.3 NOx+HC in 2014.

Table 5: U.S. EPA Proposed Tier 3 Standards for Marine Diesel Category 2 Engines

Rated kW	L/Cylinder	PM g/bhp-hr	NOx+HC g/bhp-hr	Model Year
=<3700 kW	7 - <15	0.10	4.6	2013
	15 - <20	0.20 [a]	6.5 [a]	2014
	20 - <25	0.20	7.3	2014
	25 - <30	0.20	8.2	2014

(a) For engines at or below 3300 kW in this group, the PM / NOx+HC Tier 3 standards are 0.25 / 5.2.

(78) "Tier 4 Marine Engine Standards (Tier 4)" (shown in Table 6 below) means the U.S. EPA proposed Tier 4 Marine Engine standards, as set forth in "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters Per Cylinder" (72 FR 15937 et seq., April 3, 2007), which is incorporated herein by reference.

Table 6: U.S. EPA Proposed Tier 4 Standards for Marine Diesel Category 1 and Category 2 Engines

Rated kW	PM g/bhp-hr	NOx g/bhp-hr	HC g/bhp-hr	Model Year
>3700 kW	0.09[a]	1.3	0.14	2014
	0.04	1.3	0.14	2016[b]
1400 – 3700 kW	0.03	1.3	0.14	2016[c]
600 - <1400 kW	0.03	1.3	0.14	2014[b]

(a) This standard is 0.19 g/bhp-hr for engines with 15-30 liter/cylinder displacement.
(b) Optional compliance start dates are proposed within these model years; see Draft Locomotive and Marine NPRM Preamble (72 FR 15937 et seq.).
(c) Option for engines with 7-15 liter/cylinder displacement: Tier 4 PM and HC in 2015 and Tier 4 NOx in 2017.

(79) "Total Hydrocarbons (THC)" or "Hydrocarbons (HC)" means the total mass of open chain and cyclic hydrocarbon molecules.

(80) "Towboat" means any self-propelled vessel engaged in or intending to engage in the service of pulling, pushing, or hauling along side barges or other vessels, or any combination of pulling, pushing, or hauling along side barges or other vessels.

(81) "Tugboat" means any self-propelled vessel engaged in, or intending to engage in, the service of pulling, pushing, maneuvering, berthing, or hauling along side other vessels, or any combination of pulling, pushing, maneuvering, berthing or hauling along side such vessels in harbors, over the open seas, or through rivers and canals. Tugboats generally can be divided into three groups: harbor or short haul tugboats, ocean-going or long-haul tugboats, and barge tugboats. "Tugboat" is interchangeable with "towboat" and "push boat" when the vessel is used in conjunction with barges.

(82) "Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (Verification Procedure)" means the Air Resources Board (ARB) regulatory procedure codified in title 13, CCR, commencing with section 2700, which is incorporated herein by reference, that engine manufacturers, sellers, owners, or operators may use to

verify the reductions of diesel PM or NO_x from in-use diesel engines through the use of a particular diesel emission control strategy.

(83) "Verified Diesel Emission Control Strategy (VDECS)" means an emission control strategy, designed primarily for the reduction of diesel PM emissions, which has been verified pursuant to the "Verification Procedure for In-Use Strategies to Control Emissions from Diesel Engines" in title 13, California Code of Regulations, commencing with section 2700. VDECS can be verified to achieve Level 1 diesel PM reductions (25 percent), Level 2 diesel PM reductions (50 percent), or Level 3 diesel PM reductions (85 percent). VDECS may also be verified to achieve NOx reductions.

(84) "Vessel" or "Marine Vessel" means any tugboat, tanker, freighter, passenger ship, barge, or other boat, ship, or watercraft, except those used primarily for recreation.

(85) "Work Boat" means a self-propelled vessel that performs duties such as fire/rescue, law enforcement, hydrographic surveys, spill/response, research, training, and construction (including drilling).

(e) *Fuel Use and Engine Emission Requirements.*

[Note: The plain English narrative in this overview is intended as a convenient guide for the reader and in no way adds, deletes, modifies, or otherwise affects the legal requirements and substantive provisions specified in subsection (e) or any other part of this section. Subsection (e) sets forth the various fuel and emission requirements for harbor craft subject to this regulation, and can be broken down as follows:

- Subsection (e)(1) specifies low sulfur fuel use requirements that apply to all harbor craft, new and in-use.
- Subsection (e)(2) specifies the requirement for installing hour-meters on all harbor craft, new and in-use.
- Subsection (e)(3) establishes requirements that apply to transactions involving new engines to be installed on in-use vessels, including a limited 6-month "sell-through" provision for non-complying engines.
- Subsection (e)(4) sets forth requirements that apply to newly acquired new harbor craft, including ferries.
- Subsection (e)(5) sets forth requirements that apply only to newly acquired new ferries, above and beyond those established in subsection (e)(4). These provisions include requirements for applying Best Available Control Technology to new ferries and their engines.
- Subsection (e)(6) is the key provision of this regulation, as it achieves emission reductions by requiring the eventual replacement or cleanup of engines in the fleet of in-use ferries, excursion vessels, tugboats, towboats, push boats, and multipurpose harbor craft. This subsection requires that owners and operators eventually replace or otherwise bring into compliance with the specified engine standards all of their pre-Tier 1 and Tier 1-certified engines in their in-use vessels by the dates shown in the specified compliance schedules. The compliance dates are designed to clean up the fleet's oldest and dirtiest engines first, while giving more time for relatively newer, Tier 1 engines to be upgraded or replaced. Vessels with their homeport in the South Coast Air Quality Management District (SCAQMD) have an accelerated compliance schedule to reflect that district's greater need for expedited emission reductions. The compliance schedules are grouped by vessel type, location of the vessel's home port, the engine's model year, and the engine's annual hours of operation.
- Subsection (e)(7) provides for a limited set of circumstances under which the Executive Officer may grant short extensions to the compliance dates if warranted.]

(1) *All Harbor Craft – Low Sulfur Fuel Use Requirement.*

As of January 1, 2009, no person shall fuel any diesel engine on a harbor craft within any of the Regulated California Waters unless the fuel is one of the following:

(A) CARB Diesel Fuel; or
(B) an alternative diesel fuel as defined in subsection (d)(2); or
(C) any alternative diesel fuel that does not meet subsection (e)(1)(B) above but is certified by CARB as meeting the requirements of the Verification Procedure; or
(D) CARB Diesel Fuel used with fuel additives that meet the requirements of the Verification Procedure; or
(E) any combination of subsection (e)(1)(A) through (D) above.

(2) *All Harbor Craft – Installation and Use of Non-Resettable Hour Meters.*

As of January 1, 2009, no person shall operate a harbor craft within any of the Regulated California Waters without an installed and properly operating, non-resettable hour meter, which accurately measures the number of hours an engine operates. The hour meter shall be installed on each diesel engine on the vessel in a manner that allows reasonable personnel access without impediment.

(3) *All In-Use Harbor Craft – Requirements for Newly Acquired Engines.*

Except as otherwise provided in this paragraph, as of January 1, 2009, no person shall sell, purchase, offer for sale, lease, rent, import, or otherwise acquire a diesel engine for an in-use harbor craft, which is intended to operate or actually operates in any of the Regulated California Waters, unless that engine:

(A) meets the applicable Tier 2 or Tier 3 engine standards in effect on the date of acquisition of the engine. Once Tier 4 engine standards come into effect, a newly acquired engine meeting the Tier 3 standard may be used to comply with this paragraph unless the engine being replaced on the in-use vessel was certified to a Tier 4 standard, in which case the newly acquired engine must meet at least the Tier 4 standard, or cleaner, or

(B) does not meet the requirements specified in paragraph (A) above, but it is sold, supplied, or offered for sale for use in the harbor craft within 6 months after the effective date of the applicable Tier 2, Tier 3, or Tier 4 standards. The provisions of this paragraph (B) shall apply only to instances when the engine is sold, supplied, or offered for sale within the 6 month period specified above. Engines that are subsequently sold, supplied, or offered for sale after the 6 month period specified above shall be subject to the requirements specified in paragraph (A), regardless of whether it was

previously sold, supplied, or offered for sale within the 6 month period specified above.

(4) *All New Harbor Craft (Including All New Ferries) – Requirements for Newly Acquired Vessels.*

As of January 1, 2009, no person shall sell, purchase, offer for sale, lease, rent, import, or otherwise acquire a new harbor craft for use in any of the Regulated California Waters unless each of the diesel engines on the vessel meets the applicable Tier 2, Tier 3, or Tier 4 standards in effect on the date of vessel acquisition. Additional requirements shall apply for diesel propulsion engines in newly acquired new ferries, as specified in subsection (e)(5).

(5) *Selected New Ferries Only – Additional Requirements for All Newly Acquired Propulsion Engines.*

(A) As of January 1, 2009, no person shall sell, purchase, offer for sale, import, or otherwise acquire a new ferry with the capacity to transport 75 or more passengers for use in any of the Regulated California Waters unless each propulsion diesel engine on the vessel:

1. meets either the Tier 2 or Tier 3 standards that are in effect on the date of vessel acquisition; and

2. will be operated only in conjunction with the use of Best Available Control Technology (BACT), as determined and pre-approved by the Executive Officer pursuant to this provision.

(B) In lieu of installing or using BACT pursuant to paragraph (A)2 above, a person may comply with paragraph (A)2 by installing on the new ferry a propulsion engine(s) that is certified to the Tier 4 standards, if a Tier 4-certified engine is available at the time that the new ferry is delivered. If no Tier 4-certified engines are available at the time of ferry delivery, the provisions of paragraphs (A)1 and (A)2 shall apply.

(C) For purposes of this section, "BACT" is the diesel emission control strategy (DECS), whether verified or unverified pursuant to 13 CCR section 2700 et seq., that is determined by the E.O. as meeting all of the following criteria:

1. it provides or is expected to continuously provide the greatest reduction feasible of NOx or diesel PM when used with the ferry's propulsion diesel engine;

2. the use of BACT does not result in an increase of 10 percent or more of any air pollutant, including NOx and diesel PM, relative to the engine's emissions of that air pollutant without the use of BACT; and

3. either the DECS manufacturer or an authorized dealer of the DECS determines or otherwise agrees with the E.O. that use of the DECS on or with the new ferry's propulsion engine(s) would not invalidate or otherwise adversely affect the propulsion engine's original warranty.

DECS shall include, but not be limited to, exhaust treatment controls and the use of alternative fuels or fuel additives.

(D) The E.O. shall determine the appropriate level of BACT and specify such BACT in an Executive Order granting such approval. Applications to comply with the requirements of paragraph (A)2 by using BACT shall follow the application and review procedure set forth below:

1. Application Process.

For all new ferries for which the keel is laid on or after January 1, 2009, the application for BACT approval shall be submitted in writing to the E.O. for evaluation before the keel is laid. The BACT application shall contain, at a minimum, the following information:

a. the applicant company's name, address, and contact information;
b. information specific to the harbor craft and engine(s) on which BACT will be used, including the vessel name and identification number(s); engine make, model, and serial numbers; and all other information that uniquely identify the engine;
c. certification documentation, engineering calculations, emissions test data, or other information that establishes the diesel PM and NO_x emissions of the engine in combination with the proposed BACT. Emissions and emission reduction estimates shall include both diesel PM and NO_x emissions and shall be expressed in grams per brake horsepower-hour (g/bhp-hr) unless otherwise specified by the E.O. Information submitted pursuant to this provision shall be used as follows:

i. The E.O. shall use the information to compare the emissions resulting from the proposed use of BACT with the emissions quantified in BACT determinations previously approved by the E.O.;
ii. If there are no previous BACT determinations available for comparison, the E.O. shall use ARB staff's best engineering judgment to determine if the proposed BACT provides the greatest feasible reduction of diesel PM or NOx; and
iii. The E.O. may require the applicant to submit additional emissions data for other air pollutants if the E.O. believes that the proposed use of BACT may increase any air pollutant by 10

percent or more relative to the engine emissions without the proposed BACT.

d. the proposed recordkeeping, reporting, monitoring, and testing procedures that the applicant plans to use to demonstrate continued effectiveness of the BACT.

2. E.O. Review and Final Decision-Making Process.

a. Within 15 days after receiving a BACT application, the E.O. shall notify the applicant whether the application is deemed sufficiently complete to proceed with further evaluation. If the application is deemed incomplete, the notification shall identify the application's deficiencies. The E.O. shall have an additional 15-day period for reviewing each set of documents or information submitted in response to an incomplete determination. Nothing in this subsection prohibits the E.O. from requesting additional information from the applicant, during any part of the BACT application process, which the E.O. determines is necessary to evaluate the application.

b. Within 30 days of deeming an application complete, the E.O. shall take final action to either approve or deny a BACT application, and the E.O. shall notify the applicant accordingly. If the application is denied or modified, the Executive Officer shall state the reasons for the denial or modification in the notification. The E.O. shall specify all terms, conditions, and requirements the E.O. believes are necessary for the ferry engine and BACT to operate properly and reduce emissions of air pollutants consistent with this section. The reporting and recordkeeping requirements specific to the use of BACT shall include, but not be limited to:

i. hours of operation for the engine and BACT and fuel usage;
ii. usage of any alternative fuels, additives, agents, flow rates, and emission test results;
iii. maint enance procedures for the engine(s) and its BACT;
iv. any other measurements or recordings specified by the E.O.

The approval/disapproval notification to the applicant and approved BACT shall be made available to the public on ARB's internet site.

3. Post-Approval Vessel, Engine, and BACT Operation.

Any person subject to this provision shall maintain operating records and other information in the manner and form specified by the E.O. in the BACT approval. All records and reports created pursuant to this

provision shall be submitted to ARB upon request and shall be maintained and retained for ARB inspection a minimum of three years.

(6) *In-Use Engines and Vessels – Schedules for Meeting Tier 2 or Tier 3 Standards.*

(A) For Pre-Tier 1 and Tier 1-Certified Engines on Ferries, Excursion Vessels, Tugboats, Towboats, Push Boats and Multipurpose Harbor Craft Only.

Except as provided in subsection (c), beginning January 1, 2009, no person shall own, operate, sell, purchase, offer for sale, lease, rent, import, or otherwise acquire an in-use ferry, excursion vessel, tugboat, towboat, push boat or multipurpose harbor craft with pre-Tier 1 or Tier 1-certified engines for use in any of the Regulated California Waters unless the vessel's in-use pre-Tier 1 or Tier 1-certified engines meet the requirements of subsection (e)(6)(D) on or before the compliance date set forth in Table 7 or Table 8 of subsection (e)(6)(C) below, whichever date is applicable. For purposes of this section, a multipurpose harbor craft's total annual hours of operation shall be the basis for determining that vessel's compliance date in Table 7 or Table 8 of subsection (e)(6)(C).

(B) [Reserved for Future Use].

(C) Compliance Schedules and Determination of Engine Model Year.

Except as otherwise provided for in subsection (c), in this subsection (e)(6)(C), and in subsection (e)(6)(D), the following compliance dates shall apply to all in-use engines and persons subject to subsection (e)(6)(A). Table 7 specifies the compliance dates, by engine model year and annual hours of operation, that apply to in-use engines in harbor craft subject to subsection (e)(6)(A) and for which the vessel's homeport is located outside the South Coast Air Quality Management District (SCAQMD). Table 8 contains the compliance dates, by engine model year and annual hours of operation, that apply to in-use engines in harbor craft subject to subsection (e)(6)(A) and for which the vessel's homeport is located within SCAQMD.

For purposes of determining the applicable compliance date in Table 7 or Table 8, the engine's model year shall be determined using any of the following:

1. the engine's actual model year of manufacture;
2. the engine's effective model year based on the "Engine's Model Year + 5" method, which is as follows:

The "Engine's Model Year + 5" method extends the effective model year if the person uses an emissions control strategy pursuant to this paragraph. To use this method, the person must use an emission control strategy with the existing in-use engine that reduces either diesel

PM or NOx by a minimum of 25 percent and does not increase either pollutant by more than 10 percent, relative to the emissions of those pollutants without the use of the emission control strategy. If the emission control strategy is not a VDECS, the person shall demonstrate compliance with this paragraph by submitting emissions data that demonstrate the non-verified emission control technology achieves a diesel PM or NOx emission reduction of 25 percent or better, using the test methods specified in subsection (j). Upon approval of the E.O., the person may submit data derived from the use of other test methods to demonstrate the required 25 percent minimum emission reductions, such as:

a. marine engine certification test data for the harbor craft propulsion or auxiliary engine, or engine manufacturer emission test data; or
b. emissions test data derived from another engine that is configured and used in a substantially similar way to the in-use engine on which the emission control strategy is to be used; or
c. emissions test data used to meet the regulatory requirements of the ARB Verification Procedure for the non-verified emission control strategy implemented.

A person's use of an emissions control strategy pursuant to this provision extends the engine's effective compliance date to the compliance date for a similar engine that is five model years newer (i.e., the actual model year for the engine with the emissions control strategy + 5). For example, the owner of a 1995 model year engine on a tugboat with a homeport outside of SCAQMD and which operates in Regulated California Waters for 750 hours in 2013, would normally be required to meet a December 31, 2014 compliance date, as set forth in Table 7. However, if an emissions control strategy that meets the requirements of this provision is implemented with this engine prior to the 2014 nominal compliance date, the engine's effective compliance date would be extended to the compliance date for a 2000 model year engine (i.e., the 1995 model year + 5). Accordingly, in that scenario, the engine's effective compliance date would be December 31, 2016; or

3. the engine's effective model year based on the "Engine's Tier 1 Rebuild Model Year" method, which is as follows;

This method requires the person to demonstrate to the E.O.'s written satisfaction that the existing pre-2004 model year engine was rebuilt to conform with U.S. EPA Tier 1 standards prior to January 1, 2008. If the E.O. is thus satisfied, the effective model year of the Tier 1 rebuilt engine for purposes of determining the Table 7 or Table 8 compliance date shall be the actual year in which the Tier 1 rebuild occurred.

Table 7. Compliance Dates for Vessels with Homeports Outside SCAQMD

Engine Model Year	Total Annual Hours of Operation	Compliance Date
1975 and earlier	≥ 1500	12/31/2009
1975 and earlier	≥300 and < 1500	12/31/2010
1976 - 1985	≥1500	12/31/2011
1976 - 1985	≥ 300 and < 1500	12/31/2012
1986 - 1995	≥ 1500	12/31/2013
1986 - 1995	≥ 300 and < 1500	12/31/2014
1996 - 2000	≥1500	12/31/2015
1996 - 2000	≥ 300 and < 1500	12/31/2016
2001 - 2002	≥ 300	12/31/2017
2003	≥ 300	12/31/2018
2004	≥ 300	12/31/2019
2005	≥ 300	12/31/2020
2006	≥ 300	12/31/2021
2007	≥ 300	12/31/2022

[Note: For example, if a 1982-model year diesel engine on a tugboat operating in Regulated California Waters is used for 750 hours in 2011, the owner or operator must bring the engine into compliance with the requirements of subsection (e)(6)(D) by December 31, 2012.].

Table 8. Compliance Dates for Vessels with Homeport in SCAQMD

Engine Model Year	Total Annual Hours of Operation	Compliance Date
1979 and earlier	≥ 300	12/31/2009
1980 – 1985	≥ 300	12/31/2010
1986 – 1990	≥ 300	12/31/2011
1991 – 1995	≥ 300	12/31/2012
1996 – 2000	≥ 300	12/31/2013
2001	≥ 300	13/31/2014
2002	≥ 300	12/31/2015
2003	≥ 300	12/31/2016
2004	≥ 300	12/31/2017
2005	≥ 300	12/31/2018
2006	≥ 300	12/31/2019
2007	≥ 300	12/31/2020

[Note: For example, if a 1982-model year diesel engine on a tugboat operating in Regulated California Waters is used for 300 or more hours in 2009, the owner or operator must bring the engine into compliance with the requirements of subsection (e)(6)(D) by December 31, 2010.].

(D) Compliance Requirements:

Any person subject to the requirements of subsection (e)(6)(A) shall use at least one of the following compliance methods for each engine on the vessel by the date specified in Table 7 or Table 8 above, whichever compliance date applies:

1. Method 1: Replacement of the in-use pre-Tier 1 or Tier-1 certified engine with a U.S. EPA certified Tier 2 or Tier 3 engine; the Tier 2 or Tier 3 standard that applies to the in-use engine is the U.S. EPA standard that would apply to the engine had that engine been a new engine at the time of the compliance date specified in subsection (e)(6)(A). Tier 3-certified engines may still be used to comply with this paragraph, even if Tier 4-certified engines become available by the engine's compliance date; or

2. Method 2: Demonstrate to the E.O.'s written satisfaction that the existing pre-Tier 1 or Tier 1-certified in-use engine already meets the Tier 2 or Tier 3 standard that would apply to the in-use engine had that engine been a new engine at the time of the compliance date specified in subsection (e)(6)(A). A demonstration that the existing engine meets the Tier 3 standard may still be used to comply with this paragraph, even if Tier 4 standards come into effect by the engine's compliance date. The in-use engine may be rebuilt to a cleaner standard or implement a diesel emission control strategy to aid in meeting these standards. The demonstration may involve using the test method specified in section (j) or through an alternative method approved by the Executive Officer. Upon approval by the Executive Officer, other data may be used to demonstrate emission reduction level, such as:

   (a) the engine manufacturer's certification test data or other emissions test data for that in-use engine; or
   (b) emissions test data derived from another engine that is configured and used in a substantially similar way to the in-use engine; or
   (c) emissions test data used to meet the regulatory requirements of ARB's Verification Procedure for the non-verified emission control strategy implemented; or

3. Method 3: Demonstrate to the E.O's written satisfaction that the in-use engine has not and will not operate 300 or more hours per calendar year.

(E) Compliance Extensions.

The E.O. may grant an owner or operator an extension from a compliance deadline specified in subsection (e)(6)(C) for any one of the reasons set forth

below. An owner or operator granted such an extension shall be deemed to be in compliance with the requirements of subsection (e)(6)(D) only upon written authorization from the E.O. made pursuant to this provision and only until the end of the extension period. Except as provided in paragraph 3 below, compliance extensions granted pursuant to this provision may not be combined with any other compliance date extensions, including those set forth in this provision and in subsection (e)(6)(C)2 and (C)3. Except as provided in paragraphs 2 and 3 below, under no circumstances shall the E.O. grant more than one compliance extension for any individual engine, set of engines, or harbor craft.

1. *Change in Annual Hours of Operation.* The E.O. may grant a one-time, maximum one year extension to the compliance dates set forth in subsection (e)(6)(C), provided the applicant demonstrates to the E.O.'s satisfaction that the following has occurred:

    a. The vessel owner or operator reasonably determined the vessel engine's nominal compliance date based on the engine's hours of operation two years before the nominal compliance date;
    b. In the year immediately prior to the nominal compliance date, the engine's annual hours of operation significantly increased from the prior year such that the engine's effective compliance date would have been accelerated from one compliance date to an earlier compliance date.

[Note: For example, let's assume an operator has a 1982-model year engine on a tugboat, which has a homeport outside of SCAQMD and operates for 750 hours in Regulated California Waters in 2010. If it is reasonable for the operator to assume the annual hours of operation in 2011 will be similar to 2010, the operator would project from Table 7 that the engine's compliance date would be December 31, 2012, and would plan his operations accordingly. However, if the vessel engine's operation increased substantially to 1600 hours in 2011, the engine normally would then have its compliance date accelerated to December 31, 2011, according to Table 7. The one-year extension would, therefore, extend the engine's actual compliance date back to what it would have been without the change in hours of operation (i.e., back to December 31, 2012).].

2. *No Suitable Engine Replacement for Harbor Craft.* The E.O. may grant to an owner or operator a one year extension, which can be renewed annually, provided the owner or operator demonstrates to the E.O.'s written satisfaction that there is no suitable Tier 2-certified or Tier 3-certified replacement engine available anywhere that can be used in his/her specific vessel and he/she cannot otherwise meet the requirements of subsection (e)(6). For purposes of this paragraph, the only considerations for an engine's suitability to replace an existing engine are whether the replacement engine is similar in horsepower to

the existing engine, can fit within the vessel's engine compartment, and installation of the replacement engine would not cause the vessel to violate U.S. Coast Guard or other applicable safety regulations; the cost of the replacement engine shall not be a valid basis for replacement suitability. The application for and issuance of an initial extension and subsequent extensions pursuant to this paragraph shall be subject to the following requirements:

a. For an initial extension and all subsequent annual extensions to be granted pursuant to this paragraph, the E.O. shall follow the same procedures for applying, determining completeness, allowing public review and considering public comments, taking final action, and publishing E.O. decisions that are set forth in subsection (g) for ACE applications;

b. The E.O. shall consider all information submitted by the public, including but not limited to, information related to the availability of replacement engines suitable for the applicant's vessel;

c. Except for the engine(s) for which the extension is sought, the applicant shall demonstrate that all other engines subject to the owner or operator's direct control meet the requirements of subsection (e)(6);

d. The application shall be submitted to and received by the E.O. no later than six months before the compliance date of the engine for which the extension is requested;

e. The application shall identify each engine for which the extension is requested;

f. For each engine identified in paragraph (E)2.e above, the applicant shall provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that no suitable replacement engines are available. This description shall include, but not be limited to, detailed engineering diagrams, calculations, and citations to applicable U.S. Coast Guard regulations that support the applicant's claim that there are no suitable replacement engines available.

g. The E.O. may grant additional one year extensions, provided the following requirements are met:

    i. All procedures specified in paragraph 2.a and 2.b above are followed;

ii. The application for an additional extension demonstrates the engines identified in paragraph 2.c remain in compliance with this section;

iii. Th e application is received by the E.O. no sooner than six months but no later than 2 months before the expiration of the previous extension;

iv. The application identifies the engine(s) for which the additional extension is requested;

v. For each engine identified in paragraph iv. above, the applicant shall provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that suitable replacement engines remain unavailable. This description shall include, but not be limited to, detailed engineering diagrams, calculations, and citations to applicable U.S. Coast Guard regulations that support the applicant's claim that there are still no suitable replacement engines available.

3. *Equipment Manufacturer Delays or Installation Difficulties.* Upon written request by a vessel owner or operator, the E.O. may grant a six-month extension to the compliance date set forth in subsection (e)(6)(C), provided all the following criteria are met:

   a. the owner or operator ordered the new replacement engine or other equipment necessary to comply with the requirements of subsection (e)(6)(D) prior to the compliance date set forth in subsection (e)(6)(C);
   b. the purchase order identified in subpart a above was placed with the manufacturer no later than six months before the engine's compliance date;
   c. the new engine or equipment has not been received or installed since it was ordered due to manufacturing delays or excessive difficulties encountered by the engine or equipment installer;
   d. the applicant for the extension provides documentation to the E.O.'s satisfaction that demonstrates the criteria in subparts a through c above have been met.

4. *Same Fleet Vessel Engines that Share Compliance Dates.* Upon written request, the E.O. may grant to owners or operators of multiple vessels in the same fleet that have engines with the same compliance date a one-time, maximum one-year extension to the compliance date set forth in subsection (e)(6)(C), for each set of engines that have the same compliance date. For all other engines on the vessels not

subject to an extension granted pursuant to this paragraph, the compliance dates for such engines shall remain as set forth in subsection (e)(6)(C).

(F) *Special Provisions Applicable to the Use of a Diesel Emission Control Strategy (DECS).*

The requirements specified in this paragraph shall apply to any use of a DECS pursuant to subsections (e)(5) and (e)(6) and are in addition to any other applicable requirements. Once the DECS is installed or otherwise employed, the owner or operator shall continue to operate and maintain the DECS, in accordance with the manufacturer directions, to achieve the original level of emission reductions that the DECS was designed and intended to achieve. In the event a DECS fails, breaks down, or is otherwise damaged such that it cannot be repaired (collectively referred to hereinafter as "fail" or "failure"), the vessel owner or operator shall, within 90 days of the DECS failure, either replace the failed DECS with another DECS or employ another method that meets the requirements of subsection (e)(6)(D) and other applicable provisions of this section. The determination of whether a DECS cannot be repaired shall be from either the DECS manufacturer or an authorized dealer. The owner or operator shall provide to the E.O. the same documentation for the replacement DECS that was required for the DECS that failed, and shall obtain the same E.O. approvals that were required with the failed DECS.

(f) *Alternative Control of Emissions (ACE).*

(1) Requirements.

(A) The purpose of this subsection is to allow any person ("person" or "applicant") the option of complying with the requirements of this subsection in lieu of the requirements of subsection (e). Under this subsection, alternative emission control strategies (AECS) can be implemented as an alternative control of emissions (ACE), provided they result in no greater emissions, expressed in pounds, of diesel PM and NO_x and no increase of 10 percent or more of any other air pollutants from the engines over the applicable calendar year, relative to the emissions that would have occurred under compliance with subsection (e).

(B) An applicant wishing to participate in an ACE may include one or more harbor craft in the ACE, but an applicant shall only include harbor craft that the person owns or operates under their direct control.

(C) No harbor craft shall be included in more than one ACE plan.

(D) Harbor craft included in an ACE must continue to be included in the ACE for the duration of the ACE.

(E) AECS may include, but are not limited to, any combination of the following:

1. engine modifications;
2. exhaust treatment control;
3. engine repower;
4. use of alternative fuels or fuel additives;
5. shore-side power;
6. fleet averaging; and
7. any other measures that sufficiently reduce emissions.

(F) The ACE application demonstrating compliance with this subsection shall contain, at a minimum, the following information:

1. the company name, address, and contact information;
2. the harbor craft and engine(s) subject to the ACE, including the vessel name and identification number(s), engine make, model, and serial numbers, and other information that uniquely identify the engine;
3. documentation, calculations, emissions test data, or other information that establishes the diesel PM and NO_x reductions, expressed in pounds, shall be equivalent to or greater than the emission reductions that would have been achieved upon compliance with subsection (e), including but not limited to the requirements specified in subsection (e)(6)(C) and (6)(D);
4. the proposed recordkeeping, reporting, monitoring, and testing procedures that the applicant plans to use to demonstrate continued compliance with the ACE.

(G) Emission reduction estimates demonstrating equivalence with the requirements of subsection (e) shall include diesel PM and NO_x emissions only from harbor craft to which the ACE applies that port within a single specific California air district, or another defined geographic area approved by the E.O.

(H) Any owner or operator subject to an approved ACE shall maintain operating records in a manner and form as specified by the E.O as an element of any approved ACE. Required records shall include, but are not limited to:

1. reporting and recordkeeping requirements specified in subsections (g) and (h);
2. maintenance procedures; and

3. emissions test results.

Any owner or operator subject to an approved ACE shall retain records and reports on each vessel or nearby office for the lifetime of each engine and shall submit these records and reports to the E.O. in the manner specified in the approved ACE or upon request by the E.O.

(I) Emission reductions included in an ACE shall not include reductions that are otherwise required by any local, State, or federal rule, regulation, or statute, or that are achieved or estimated from equipment not located in the region to which the ACE applies.

(J) No person may operate any harbor craft under an ACE unless the applicant has first been notified in writing by the E.O. that the ACE application has been approved. Prior to such approval, applicants shall comply with the provisions of this section, including the requirements in subsection (e)(6)(C) and (6)(D).

(2) Application Process.

(A) Applications for an ACE shall be submitted in writing to the Executive Officer for evaluation.

(B) The Executive Officer shall establish an internet site ("ACE internet site") in which all documents pertaining to an ACE application shall be made available for public review. The Executive Officer shall also provide a copy of all such documents to each person who has requested copies of the documents; these persons shall be treated as interested parties. The Executive Officer shall provide two separate public comment periods during the ACE Application process, as specified in subsection (f)(2)(D) and (f)(2)(E).

(C) Completeness Determination.

Within 15 days after receiving an ACE application, the Executive Officer shall notify an applicant whether the application is deemed sufficiently complete to proceed with further evaluation. If the application is deemed incomplete, the notification shall identify the application's deficiencies. The Executive Officer shall have an additional 15-day period for reviewing each set of documents or information submitted in response to an incomplete determination. Nothing in this subsection prohibits the Executive Officer from requesting additional information from the applicant, during any part of the ACE application process, which the Executive Officer determines is necessary to evaluate the application.

(D) Notice of Completeness and 30-Day First Public Comment Period.

After an ACE application has been deemed complete, the Executive Officer shall provide a 30-day public comment period to receive comments on any element of the ACE application and whether the Executive Officer should approve or disapprove the ACE application based on the contents and merits of the application. The Executive Officer shall notify all interested parties of the following:

1. the applicant(s);
2. the start and end dates for the 30-day first comment period; and
3. the address of the ACE internet site where the application is posted.

The Executive Officer shall also make this notification available for public review on the ACE internet site.

(E) Proposed Action and 15-Day Second Public Comment Period.

Within 30 days after the first public comment period ends, the Executive Officer shall notify the applicant and all interested parties of ARB's proposed approval or disapproval. This notification shall propose to approve the application as submitted, disapprove the application, or approve the ACE application with modifications as deemed necessary by the Executive Officer. The notification shall identify the start and end dates for the 15-day second public comment period.

During the second public comment period, any person may comment on the Executive Officer's proposed approval or disapproval of the ACE application and any element of the application. The Executive Officer shall also make this notification available for public review on the ACE internet site.

(F) Final Action.

Within 15 days after the second public comment period ends, the Executive Officer shall take final action to either approve or deny an ACE application and shall notify the applicant accordingly. If the application is denied or modified, the Executive Officer shall state the reasons for the denial or modification in the notification. The notification to the applicant and approved ACE plan, if applicable, shall be made available to the public on the ACE internet site. In addition, the Executive Officer shall consider and address all comments received during the first and second public comment periods, and provide responses to each comment on the ACE internet site.

(G) Renewal of an Approved ACE.

An applicant can apply for renewal of an approved ACE by forwarding the Executive Officer updated information for all elements of the approved ACE for review and re-approval. The Executive Officer must receive all ACE renewal applications 30 days prior to the end of the compliance period.

(H) Notification to the Executive Officer of Changes to an Approved ACE.

An applicant shall notify the Executive Officer in writing within 30 days upon learning of any information that would alter the emissions estimates submitted during any part of the ACE application process. If the Executive Officer has reason to believe that an approved ACE has been granted to a person that no longer meets the criteria for an ACE, the Executive Officer may, pursuant to subsection (f)(3) below, modify or revoke the ACE as necessary to assure that the applicant and subject vessel(s) shall meet the emission reduction requirements in this section.

(3) Revocation or Modification of Approved ACEs.

With 30 days of notice of violation to the ACE holder, the Executive Officer may revoke or modify, as needed, an approved ACE if there have been multiple violations of the ACE provisions or the requirements of the approved ACE plan; or if the Executive Officer has reason to believe that an approved ACE has been granted that no longer meets the criteria or requirements for an ACE or the applicant can no longer comply with the requirements of the approved ACE in its current form. Public notification of a revocation or modification of an approved ACE shall be made available on the ACE internet site.

(g) *Recordkeeping Requirements.*

Beginning January 1, 2009, an owner or operator of harbor craft shall maintain the records specified in this subsection on the vessel or at the vessel's homeport for the life of each engine subject to this section. An owner or operator shall provide such records for inspection to an agent or employee of ARB upon request for all harbor craft subject to this section. Records can be provided as a hard copy, electronic, or any alternative reporting strategy approved by the E.O. may approve an alternative reporting strategy, and shall include, at a minimum, the following:

(1) Owner or Operator Contact Information:
- (A) Company name;
- (B) Contact name, phone and fax number, address, e-mail address;
- (C) Address where vessel is registered; and
- (D) Reporting year.

(2) Vessel information:
- (A) Harbor craft name;
- (B) Specify vessel use(s) (ferry, excursion vessel, tugboat, ocean-going tugboat, towboat, push boat, work boat, commercial fishing vessel, charter fishing vessel, crew and supply vessel, pilot vessel, or other if none of the preceding apply);
- (C) Vessel home port;
- (D) Vessel build year;
- (E) U.S. Coast Guard Documentation Number;
- (F) California Fish and Game License Number;
- (G) International Maritime Organization (IMO) Number;
- (H) Call Sign Number; and
- (I) Maritime Mobile Service Identity Number.

(3) Engine Information (for each diesel engine on the vessel):
- (A) Current hour meter reading;
- (B) Make of engine;
- (C) Model of engine;
- (D) Engine family (if applicable);
- (E) Engine serial number;
- (F) Year of manufacture of engine (if unable to determine, provide its approximate age);
- (G) Rated brake horsepower;
- (H) Total engine displacement; and
- (I) Number of cylinders.

(4) Operational Information:
- (A) Describe the general use of engine (propulsion or auxiliary engine);
- (B) Total annual hours of operation, based upon readings of the non-resettable hour meters for previous calendar year per engine (for engines without an hour meter before 2009, provide an estimate);
- (C) Estimated annual fuel usage per engine; and
- (D) Estimated percent operating time as a function of distance from shore at the distances below:
  1. 0-3 nautical miles;
  2. >3-24 nautical miles; and
  3. >24 nautical miles from shore.

(5) Control Equipment (if applicable):
- (A) Type of diesel emission control strategy;
- (B) Manufacturer of installed diesel emission control strategy;
- (C) Model of installed diesel emission control strategy;
- (D) Level of control – air pollutants controlled and percent reductions;
- (E) Emission control serial number; and
- (F) Date control equipment installed.

(6) Maintenance records for each installed engine and diesel emission control strategy:
(A) Hour meter reading at last top end rebuild (i.e., less than full rebuild);
(B) Hour meter reading at last full engine rebuild; and
(C) Number of times full engine rebuild completed.

(7) For each near-retirement vessel for which an owner or operator is claiming an exemption pursuant to subsection (c)(13), the retirement date of each of the vessels.

(8) For each engine for which the model year is determined using the "Engine's Model Year + 5" method pursuant to subsection (e)(6)(C)2:

(A) the name and contact information (representative, address, and phone number) for the manufacturer of the emission control strategy;
(B) the name and type of emission control strategy;
(C) the installation date of the emission control strategy; and,
(D) if a VDECS is not being used for this purpose, the test plan, and the data demonstrating the emission reductions achieved due to the emission control strategy.

(9) For each engine for which an owner or operator is claiming an extension pursuant to subsection (e)(6)(E)3, the purchase order or signed contract between the owner or operator and seller of the new engine or equipment that has been purchased to comply with subsection (e)(6)(C) and (6)(D).

(10) For each engine an owner or operator claims to have replaced, written documentation that the engine has been dismantled or destroyed.

(11) Records for each engine shall be retained by the owner or operator for the entire engine life.

(12) All records specific to an Executive Officer approved ACE plan.

(13) All records specific to a Best Available Control Technology approved by the E.O. pursuant to subsection (e)(5).

(h) *Initial and Compliance Plan Reporting Requirements.*

(1) Initial Reporting of California Harbor Craft Fleet. By February 28, 2009, each owner or operator of any harbor craft vessel shall submit the information specified in subsections (g)(1) through (g)(6) for all harbor craft vessels in his/her California fleet. For purposes of this paragraph, "California fleet" means the total population of harbor craft under the direct control of the owner or operator as of January 1, 2009.

(2) Compliance Plan. By February 28, 2009, each owner or operator of any harbor craft subject to the requirements of subsection (e)(6)(C) and (D) shall submit a Compliance Plan to the E.O. that describes in detail the engine replacements, rebuilds, upgrades, use of DECS, and any other measures the owner or operator plans to use to meet the requirements of subsection (e)(6)(C) and (6)(D) for each of the owner or operator's engines and harbor craft. The owner or operator may revise the Compliance Plan, as needed, but the owner or operator shall notify the E.O. within 10 working days of any changes to the Compliance Plan after the initial Compliance Plan is submitted. The Compliance Plan is for the E.O.'s informational and planning use only, and is not binding on either the E.O. or the owner or operator that submitted the Compliance Plan. The E.O.'s receipt and acceptance of a submitted Compliance Plan shall not constitute or be interpreted as evidence of compliance with the requirements of subsection (e)(6)(C) or (6)(D).

(3) Demonstration of Compliance. By no later than the applicable compliance date specified in subsection (e)(6)(C), the owner or operator of an in-use harbor craft subject to the requirements of subsection (e) shall provide the following information to the Executive Officer:

(A) All information specified in subsections (g)(1) through (g)(6), and

(B) The implementation date and the emission control strategy implemented for each engine in accordance with the requirements of subsection (e)(6)(C) and (e)(6)(D), respectively, for purposes of demonstrating compliance.

(4) Reporting for change of annual hours of operation, vessel category/use, transfers of vessels, or a change of ownership of vessel or engine.

(A) The owner or operator shall submit to the E.O. the information specified in subsection (g)(1) through (g)(6) within 30 days of a significant change of annual hours of operation (i.e., enough to change the engine's compliance date), vessel category/use, purchase, lease, rental, or change of ownership of the vessel or engine. In the case of a purchase, lease, rental, or change in ownership, the party in control or possession of the engine or vessel after the transaction shall be responsible for meeting the requirements of this paragraph;

(B) Within 90 days of a significant change of annual hours of operation, vessel category/use, purchase, lease, rental, or change of ownership, or by the earliest applicable compliance date specified in subsection (e)(6)(C), whichever is later, the owner or operator of vessels subject to subsection (e)(6) shall submit a new Compliance Plan with the updated information pursuant to the Compliance Plan requirements specified in paragraph 2 above.

(i) *Violations.*

(1) Any person who is subject to this section and commits a violation of any provision, standard, criteria or requirement in this section is subject to the penalties, injunctive relief, and other remedies specified in Health and Safety Code section 42400 et seq.; other applicable sections in the Health and Safety Code; and other applicable provisions as provided under California law for each violation. Nothing in this section shall be construed to limit or otherwise affect any applicable penalties or other remedies available under federal law.

(2) Any failure to meet any provision, standard, criteria or requirement in this section, including but not limited to the applicable emission limits; recordkeeping requirements; and Alternative Control of Emissions (ACE) provision, including the requirements of any approved ACE plans, shall constitute a single, separate violation of this section for each hour that a person operates an ocean-going vessel within the Regulated California Waters until such provision, standard, criteria or requirement has been met.

(3) Any person who is subject to this section is liable for meeting the requirements of this section, notwithstanding any contractual arrangement that person may have with any third-parties.

(j) *Methods to Demonstrate Compliance with Engine and Fuel Standards.*

(1) Diesel PM, NO_x, NO, CO, HC, NMHC, and CO_2 testing shall be done in accordance with the applicable method specified in the following procedures: International Organization for Standardization (ISO) 8178-2: 1996(E) ("ISO 8178 Part 2"); (2) ISO 8178-4: 1996(E) ("ISO 8178 Part 4"); and applicable methods and procedures specified in 40 CFR Part 94.

(2) The Executive Officer may approve in writing any alternative test methods not specified in paragraph (1) above that the method's proponent has demonstrated to the E.O.'s satisfaction provides equivalent or better results to the methods in paragraph (1).

(k) *Right of Entry.*

An agent or employee of the Air Resources Board has the right of entry to board any harbor craft for the purpose of inspecting propulsion and auxiliary engines, emission control strategies, fuel systems and fuel storage; collecting fuel sample(s) not to exceed one liter per fuel tank; and acquiring and inspecting records required pursuant to this section.

(l) *Severability.*

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

(m) *Submittal of Documents.*

(1) All documents required under this regulation to be submitted to the Executive Officer shall be submitted as follows:

California Air Resources Board
Stationary Source Division, Harbor Craft
P.O. Box 2815
Sacramento, California 95812-2815

(2) Electronic submittals of information associated with compliance with this section may be approved by the Executive Officer upon request, provided such electronic submittals use digital signatures that meet the requirements specified in Government Code section 16.5. The Executive Officer may request the submittal of a hard copy of any electronic submittal.

NOTE: Authority cited: Sections 39600, 39601, 39650, 39658, 39659, 39666 and 41511, Health and Safety Code. Reference: Sections 39650, 39658, 39659, 39666, 41510, and 41511, Health and Safety Code.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER PROPOSED AMENDMENTS TO THE SUGGESTED CONTROL MEASURE FOR ARCHITECTURAL COATINGS

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to consider approval of proposed amendments to the Suggested Control Measure (SCM) for emissions of volatile organic compounds (VOC) from the application of architectural coatings.

DATE: October 25, 2007

TIME: 9:00 a.m.

PLACE: California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium, Second Floor
1001 I Street
Sacramento, California 95814

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., October 25, 2007, and may continue at 8:30 a.m., October 26, 2007. This item may not be considered until October 26, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before October 25, 2007, to determine the day on which this item will be considered.

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

Background

Architectural coatings include a wide variety of paints and other coatings that are applied to stationary structures and their appurtenances. The use of architectural coatings in California results in approximately 95 tons per day of VOC emissions, which contribute to the formation of ozone and particulate matter – two of California's most serious air quality problems.

Under California law, the primary authority for controlling emissions from architectural coatings is vested in the local air pollution control districts and air quality management districts ("districts," see Health and Safety Code, Sections 39002, 40000, and 40001). However, ARB often provides guidance and other assistance to the districts, including the development of model rules such as the SCM for architectural coatings. ARB's

authority to do this is provided by sections 39001, 39003, 39500, 39600, 39602, 39605, 40916, and 41500 of the Health and Safety Code.

Widespread regulation of architectural coatings began in 1977, when ARB approved an initial SCM for architectural coatings. A number of districts adopted architectural coatings rules based on the 1977 SCM and subsequent revisions to the SCM in 1985, 1989, and 2000. Currently, 20 of California's 35 districts have adopted architectural coatings rules based on the SCM that was approved by ARB in 2000.

Since 2000, lower VOC coatings have been developed. Many districts need further reductions in VOC emissions to attain health-based air quality standards. Therefore, ARB worked with districts, industry, and other stakeholders to develop the proposed SCM update. During this multi-year effort, ARB staff completed the following activities: (1) conducted two comprehensive surveys of architectural coatings; (2) held regular meetings with districts, the U.S. Environmental Protection Agency (U.S. EPA), and industry representatives; (3) evaluated data from durability and performance testing for various coating categories; (4) reviewed the South Coast Air Quality Management District (SCAQMD) Rule 1113 for architectural coatings and U.S. EPA's national architectural coating rule; (5) performed a technology assessment of all the coating categories in the proposed amended SCM; and (6) analyzed potential environmental and economic impacts. ARB staff also conducted three public workshops and held numerous meetings with individual manufacturers and other interested parties from March 2006 through August 2007.

The Board's approval of the proposed amendments to the SCM will not impose binding requirements on any person. Binding requirements will only be imposed if a district adopts the amended SCM as a district rule. Upon adoption, a district rule would then apply to affected persons within the jurisdiction of the district. In addition, the Board's approval of the proposed amendments to the SCM will not impose an obligation on any district to subsequently adopt the amended SCM. It will be up to each district to decide if adoption of the amended SCM as a district rule is needed to attain the state and federal ambient air quality standards within the district. Current architectural coating rules in the districts will remain in effect, unchanged, until districts formally adopt the amended SCM.

Description of the Proposed Amendments to the Architectural Coatings SCM

The proposed amended SCM specifies VOC limits for 42 categories of architectural coatings. These categories include general use paints, such as flat and nonflat (glossy coatings), and a wide variety of specialty coatings, such as industrial maintenance coatings, wood coatings, floor coatings, roof coatings, rust preventative coatings, stains, and primers. The proposed amended SCM would lower VOC limits for 19 of the 42 architectural coating categories. The proposed effective date for the VOC limits is January 1, 2010, for all categories except rust preventative coatings and specialty primers, sealers, and undercoaters. The proposed effective date for the VOC limits for

rust preventative coatings and specialty primers, sealers, and undercoaters is January 1, 2012.

The proposed amended SCM would reduce VOC emissions from architectural coatings by 15 tons per day statewide (excluding the SCAQMD, which has already adopted lower VOC limits in its Rule 1113).

The SCM also contains definitions, test methods, and requirements that apply to painting practices, thinning, container labeling, and reporting. For coatings that are manufactured before the applicable effective dates, the proposed amended SCM contains a three year "sell through" provision. Proposed amendments to the SCM also include miscellaneous changes to improve clarity, flexibility, and enforceability.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The ARB staff has prepared a Staff Report on the proposed amended SCM. The Staff Report contains the full text of the proposed amended SCM, a description of the technical assessment that was conducted to develop the proposed amended SCM, and an analysis of the potential environmental and economic impacts.

Copies of the Staff Report and meeting notice may be obtained from the ARB's Public Information Office, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990, October 15, 2007. The Staff Report, including the text of the proposed amended SCM, and this meeting notice may also be accessed on the ARB internet site at http://www.arb.ca.gov/coatings/arch/docs.htm.

Further inquiries regarding this matter should be directed to Mr. Jim Nyarady, Manager, Strategy Evaluation Section, Stationary Source Division, by phone at (916) 322-8273 or by email at jnyarady@arb.ca.gov.

SUBMITTAL OF COMMENTS

At the October 25, 2007, public meeting, staff will recommend that the Board approve the proposed amended SCM. Interested members of the public may present comments relating to this matter orally or in writing at the meeting, and in writing or by email before the meeting. To be considered by the Board, written submissions not physically submitted at the public meeting must be received **no later than 12:00 noon, October 24, 2007,** and addressed to the following:

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

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

Facsimile submittal: (916) 322-3928

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

The Board requests, but does not require, that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the public meeting so that ARB staff and Board Members have time to fully consider each comment. The Board encourages members of the public to bring to the attention of staff in advance of the public meeting any suggestions for modification of the proposed amended SCM.

CALIFORNIA AIR RESOURCES BOARD

Michael V. Scheible

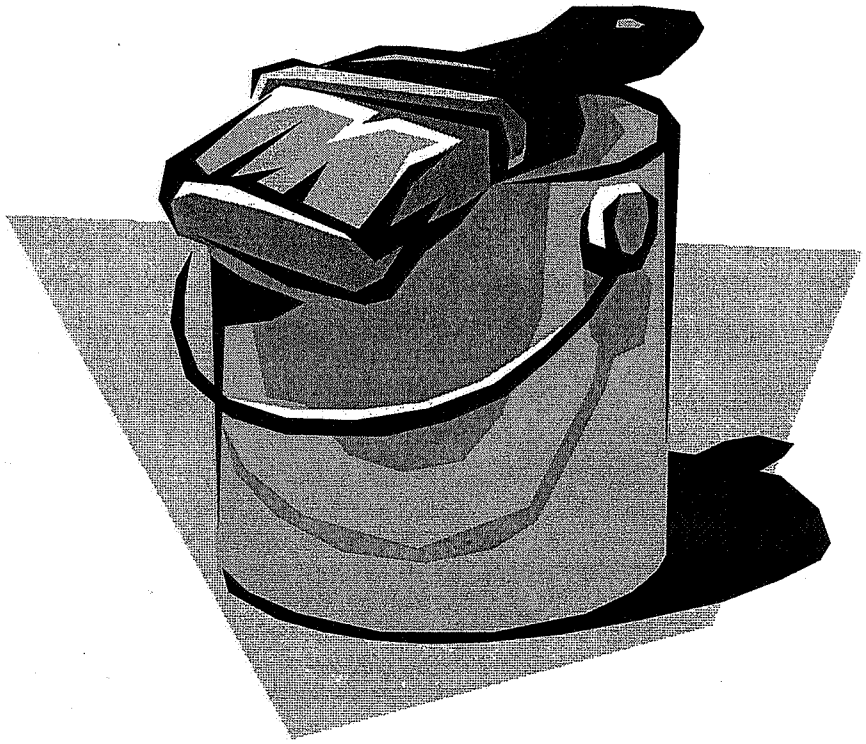
for Thomas Cackette
Acting Executive Officer

Date: September 25, 2007

California Environmental Protection Agency

Air Resources Board

STAFF REPORT FOR PROPOSED AMENDMENTS TO THE SUGGESTED CONTROL MEASURE FOR ARCHITECTURAL COATINGS



September 2007

State of California
AIR RESOURCES BOARD

STAFF REPORT
FOR PROPOSED AMENDMENTS TO THE SUGGESTED CONTROL MEASURE FOR ARCHITECTURAL COATINGS

Public Meeting to Consider

PROPOSED AMENDMENTS TO THE
SUGGESTED CONTROL MEASURE FOR
ARCHITECTURAL COATINGS

To be considered by the Air Resources Board on October 25, 2007

California Environmental Protection Agency
Headquarters Building
1001 "I" Street
Sacramento, California

This report has been prepared by the staff of the Air Resources Board. Publication does not signify that the contents reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE SUGGESTED CONTROL MEASURE FOR ARCHITECTURAL COATINGS

Prepared by:

Stationary Source Division
Air Resources Board

Reviewed by:

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Barbara Fry, Chief, Measures Assessment Branch
Robert Barham, Ph.D., Assistant Chief, Stationary Source Division
Robert Fletcher, P.E., Chief, Stationary Source Division

September 2007

ACKNOWLEDGMENTS

This report and the proposed amendments to the Suggested Control Measure for Architectural Coatings were developed by the following Air Resources Board staff:

Monique Spears Davis, P.E.
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Kyle Keene
Stephanie Lee, Ph.D.
Camille McCallion
Lynna Negri
Sarah Penfield
Diane Kiyota, J.D.
Reza Mahdavi, Ph.D.

We would like to extend our appreciation to the following stakeholders for facilitating discussion among industry and governmental representatives:

National Paint and Coatings Association (NPCA)
Roof Coatings Manufacturers Association (RCMA)
South Coast Air Quality Management District (SCAQMD)
California Air Pollution Control Officers Association (CAPCOA)

We also would like to thank those coating manufacturers that met with ARB staff to share specific technical information regarding their products.

Staff Report
Proposed Amendments to the Suggested Control Measure for Architectural Coatings

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A. INTRODUCTION

This Staff Report presents the Air Resources Board (ARB or Board) staff's proposed amendments to the Suggested Control Measure (SCM) for Architectural Coatings (proposed SCM). The proposed SCM would reduce emissions of volatile organic compounds (VOC) that result from the application of architectural coatings. The proposed SCM is not a formal regulation; it is a model rule that can be adopted by the local air pollution control and air quality management districts (APCD/AQMD or district) that need to reduce VOC emissions to improve air quality.

Since the proposed SCM is a model rule, rather than a formal regulation, ARB staff is not required to prepare an Initial Statement of Reasons or a Final Statement of Reasons to respond to public comments. Instead, staff has prepared a Technical Support Document that is similar to an Initial Statement of Reasons and addresses comments that were received during the development process. In this Staff Report and the Technical Support Document, staff presents their rationale for the proposed update to the SCM, which includes more than 40 categories of architectural coatings.

This Staff Report provides an abbreviated version of the information covered in the Technical Support Document and covers the following topics:

- History and Background;
- Emissions and Reductions;
- Proposed Suggested Control Measure (SCM);
- Process for Developing Proposed SCM;
- Environmental Impacts;
- Economic Impacts; and
- Future Activities.

B. HISTORY AND BACKGROUND

1. What are architectural coatings?

Architectural coatings are products that are applied to stationary structures and their accessories. They include house paints, stains, industrial maintenance coatings, traffic coatings, and many other products. When these coatings are applied, VOCs are emitted from the coatings and from solvents that are used for thinning and clean-up.

2. Who regulates architectural coatings?

Control of VOC emissions from architectural coatings is primarily the responsibility of the districts. ARB is responsible for serving as an oversight

agency and providing assistance to the districts. One way that ARB provides assistance is by developing an SCM for architectural coatings. The SCM serves as a model rule that can be used by districts throughout California. ARB approved an SCM for architectural coatings in 1977 and amended it in 1985, 1989, and 2000. While ARB provides support to the districts by developing the SCM, the districts are ultimately responsible for adopting, implementing, and enforcing architectural coating rules in California.

Currently, 20 districts have architectural coating rules based on the SCM that the Board approved in 2000. In addition, the Ozone Transport Commission (OTC), which represents northeastern states, has developed a model rule for architectural coatings based primarily on the 2000 SCM. Environment Canada has also used the 2000 SCM as the basis for Canada's proposed architectural coatings regulation. The U.S. EPA is planning to update its national architectural coatings rule based on the OTC's version of the 2000 SCM.

The proposed SCM will update the current version of the SCM. The proposed SCM lowers the VOC limits and improves definitions for many categories. Staff is also proposing the SCM to promote consistency and uniformity among district rules. This consistency makes it easier for manufacturers and painting contractors to comply with district rules.

3. Why do districts regulate architectural coatings?

Architectural coatings represent a significant source of VOC emissions throughout California. In the presence of sunlight, VOCs and nitrogen oxides (NO_x) undergo a series of chemical reactions to form ozone. VOC emissions from architectural coatings can also lead to the formation of particulate matter (PM). Ozone and PM are two of the most serious air pollutants in California. Ozone is a strong oxidizer that irritates the respiratory system, leading to a variety of adverse health effects. It also damages plant life and property. Particulate matter less than 10 microns in diameter can be inhaled deep into the lungs. PM exposure has also been associated with a wide range of adverse health impacts, including hospitalization and premature death. Since the use of architectural coatings generates air pollutants, ARB staff has worked with districts and other stakeholders to reduce emissions from architectural coatings and help districts achieve their air quality goals.

To protect California's population from the harmful effects of exposure to ozone and PM, the ARB and the U.S. EPA have established air quality standards for these contaminants. Most of California's 35 local districts are classified as "nonattainment", because they don't comply with State or federal air quality standards for ozone and PM. For nonattainment districts, clean air laws require districts to develop plans to describe how they will attain ambient air quality standards. The California Clean Air Act requires nonattainment districts to prepare and submit plans for attaining and maintaining the State standards. The

federal Clean Air Act requires districts to develop state implementation plans (SIPs) if they have not attained federal air quality standards.

In many of the nonattainment districts, substantial VOC emission reductions are needed to achieve and maintain air quality standards. Reductions are achieved by implementing rules that target sources of VOC emissions. The proposed SCM for architectural coatings is intended to assist districts by providing a model rule that will reduce VOC emissions and help them attain the ozone and PM standards.

The proposed SCM is primarily intended for the 20 districts that currently have a rule based on the 2000 SCM. In addition, the proposed SCM is intended for districts that may need to adopt a new architectural coating rule to achieve VOC emission reductions and meet air quality standards. The South Coast AQMD is not expected to adopt the proposed SCM because its architectural coatings Rule 1113 includes VOC limits that are, in most cases, at least as stringent as the proposed SCM. The 20 districts with an SCM based rule encompass about 53 percent of California's population, and the South Coast AQMD accounts for 44 percent. The remaining 3 percent of the State's population must comply with the U.S. EPA's national rule for architectural coatings.

4. What are the districts' goals for reducing architectural coating emissions?

Six districts in two federal ozone nonattainment areas included control measures for architectural coatings in their draft or final 2007 Ozone SIPs. Table 1 lists the 2012 emission reduction commitments for architectural coatings for each of these districts. The numbers in this table represent the districts' goals for emission reductions from architectural coatings. The proposed SCM will help districts surpass these goals by achieving greater reductions than are listed in the districts' SIPs.

Table 1 2007 Ozone SIP Commitments for VOC Emission Reductions from Architectural Coating Measures				
District	**Implementation Year**	**2012 ROG Planning Inventory[1] (tpd)**	**Emission Reductions in 2012 (tpd)**	**% Reductions**
El Dorado County AQMD[2]	2012	0.38	0.06	16%
Feather River AQMD	Pre-2012	0.02	0.003	15%
Placer County APCD[3]	2013	0.89	0.13	15%
Sacramento Metropolitan AQMD	2012	4.12	0.62	15%
San Joaquin Valley Unified APCD	2012	9.7	2.0	21%
Yolo-Solano County AQMD	2011	0.96	0.14	15%
TOTAL:		16.1	2.95	18%

1. The 2012 ROG Planning Inventory is based on ARB's 2001 Architectural Coating Survey and does not reflect the data from ARB's 2005 Survey that were used to develop the proposed SCM.
2. El Dorado County had not adopted the 2000 SCM limits when the draft 2007 SIP was developed. This table reflects the 2007 SCM commitment.
3. For Placer County, values represent the 2018 ROG Planning Inventory and Emission Reductions.

C. EMISSIONS AND REDUCTIONS

1. What are the VOC emissions from architectural coatings?

VOC emissions from the use of architectural coatings in California are estimated to be about 118 tons per day (tpd) in 2004. This includes 95 tpd from coatings, and about 23 tpd from associated cleanup solvents, thinners, and additives. Total emissions from architectural coatings and associated materials represent almost 10 percent of the VOC emissions from stationary and area sources, and almost 5 percent of the total VOC emissions statewide. The VOC emissions from architectural coatings are more than the combined VOC emissions from petroleum refining and marketing, and are comparable to the emissions from approximately 5 million passenger cars.

Emissions from architectural coatings are estimated from surveys of architectural coatings sales in California. ARB has conducted eight surveys over the past 30 years which collected sales and emissions data for coatings sold in California in 1975, 1980, 1984, 1988, 1990, 1996, 2000, and 2004.

In 2005, ARB conducted a survey to collect data on architectural coatings sold during calendar year 2004 (ARB, 2006a). Almost 900 survey packages were mailed to companies that potentially sold architectural coating products in California. A total of 197 companies submitted data. To ensure that these data were representative of the California market, ARB staff compared the sales from our survey to nationwide census and sales data. Since California represents 12 percent of the nationwide population, staff assumed that California sales would be about 12 percent of the nationwide sales for architectural coatings.

Our survey data indicate that California's sales of architectural coatings exceed the estimated sales based on nationwide census and sales data. Therefore, staff believes the survey captures virtually all of the California sales of architectural coatings.

Based on survey data, the sales volume for architectural coatings increased from more than 98 million gallons in 2000, to more than 110 million gallons in 2004. However, the total VOC emissions for architectural coatings decreased from 110 to 95 tpd from 2000 to 2004, due to the implementation of rules with lower VOC limits. Please note that these VOC emissions do not include emissions from thinning solvents, cleanup solvents, or additives.

The survey data also indicate that architectural coatings in California are continuing to shift toward waterborne products. From 2000 to 2004, the percent of total sales volume attributed to waterborne coatings increased from 83 to 88 percent. During this same time period, the architectural coating emissions per capita and the average amount of VOCs per gallon of coating decreased more than 20 percent. These decreases occurred despite the fact that California's population increased 7 percent from 2000 to 2004.

2. What are the estimated emission reductions from the proposed SCM?

Because the proposed SCM is intended for districts outside of the South Coast AQMD, the estimated emission reductions exclude the South Coast AQMD. In addition, emission reductions are only calculated for large containers, because small containers (one liter or less) are exempt from the proposed VOC limits. In 2004, these small containers only represented three percent of architectural coating sales volume in California.

The baseline for determining emission reductions is the 2004 data from ARB's survey. For architectural coatings, the 95 tpd of statewide VOC emissions are apportioned to districts based on population. Districts outside of the South Coast AQMD represent 56 percent of the State's population which equates to 53 tpd of VOC emissions, including small containers. This does not include VOC emissions from cleanup solvents, thinners, or additives.

As shown in Table 2, the proposed SCM is expected to achieve 15.2 tpd in VOC emission reductions outside of the South Coast AQMD. This represents a 28 percent overall emission reduction. Table 2 only lists categories for which staff is proposing lower VOC limits. Although there are emission reductions from 19 categories, 95 percent of the emission reductions are from nine categories, which account for 80 percent of the emissions. These nine categories are highlighted in boldface in Table 2.

Table 2
VOC Emission Reductions For Categories with Proposed Lower VOC Limits
(Large containers only, excluding the South Coast AQMD)

Coating Category	Existing VOC Limit (g/l)	Proposed VOC Limit (g/l)	Complying Marketshare (%)	Emission Reductions (excluding SCAQMD) (tons/day)
Aluminum Roof	500	400	31	0.19
Bituminous Roof	300	50	90	0.17
Concrete/Masonry Sealer	**250-400[1]**	**100**	**41**	**0.54**
Driveway Sealer	100	50	100	0.00
Dry Fog	**400**	**150**	**42**	**0.31**
Flat	**100**	**50**	**7**	**3.12**
Floor	250	100	85	0.07
Mastic Texture	300	100	79	0.10
Nonflat - High Gloss	**250**	**150**	**28**	**0.91**
Nonflat	**150**	**100**	**28**	**2.77[2]**
Primers, Sealers, and Undercoaters	**200**	**100**	**36**	**1.12**
Reactive Penetrating Sealer	250-400[1]	350	93	0.00
Roof	250	50	83	0.07
Rust Preventative	**400**	**250**	**3**	**1.57**
Specialty Primers, Sealers, and Undercoaters	**350**	**100**	**22**	**2.62**
Traffic Marking	150	100	74	0.09
Waterproofing Membranes	250-400[1]	250	68	0.09
Wood Coatings	**250-680[1]**	**275**	**50**	**1.41**
Zinc-Rich Primer	500	340	54	0.01
Total				**15.2**

1. This is a proposed new category that includes coatings from various categories in the 2000 SCM. The "Existing VOC Limit" for this category represents the range of VOC limits for the coatings that were combined into this new category.
2. Upon the effective date of this rule, the Fire Retardant coating categories are eliminated and coatings with fire retardant properties will be subject to the VOC limit of their primary category (e.g., Flat, Nonflat, etc.). To estimate emission reductions, it was assumed that Fire Retardant would be classified as Nonflat with a VOC limit of 100 g/l, because the majority of the reported coatings were nonflat.
3. Boldface indicates the nine categories that account for 95 percent of the VOC emission reductions.

For the six districts listed in Table 1, adoption of the proposed SCM would provide 4 tpd of VOC emission reductions, which exceeds their 3 tpd SIP commitments. Under the proposed SCM, these emission reductions would be achieved by 2012.

3. Does the proposed SCM incorporate the use of reactivity-based limits?

Traditionally, VOC limits for coatings have been based on the total VOC content in the coating, regardless of the chemical composition of the VOCs. Although a few compounds are excluded from the VOC content because they are designated as "exempt compounds", all other VOCs are treated equally when determining the VOC content of a coating. Mass-based VOC limits have been successfully used for many years to achieve VOC emission reductions.

However, VOCs don't necessarily behave the same when they are emitted into the atmosphere. Since VOCs have differing molecular structures, they may form ozone through varying chemical reactions at varying rates. This characteristic is called reactivity. In 2000, ARB staff used reactivity to develop the statewide aerosol coatings regulation, which includes reactivity-based limits instead of mass-based limits. This reactivity-based approach was implemented because ARB staff determined that aerosol coatings had achieved the maximum reductions technically feasible with a mass-based approach. This approach was supported by the aerosol coatings industry and the regulation is being implemented and enforced by ARB staff. Since aerosol coatings are subject to a statewide ARB regulation, all of the aerosol coatings in California must comply with the same limits and the same requirements. For architectural coatings, this is not the case. The districts are responsible for controlling VOC emissions from architectural coatings, and three different sets of VOC limits apply in California, depending on which district has jurisdiction.

When the Board approved the SCM in 2000, they directed staff to investigate the use of a reactivity-based approach for architectural coatings. ARB staff has conducted detailed analyses to explore the potential for including reactivity-based limits in the SCM. Staff has published reports on reactivity analyses using the 2000 survey data and the 2004 survey data (ARB, 2005; ARB, 2007).

In the Summer of 2006, ARB staff met with the districts and the U.S. EPA to discuss a potential reactivity-based approach. Since districts are responsible for architectural coatings rules, district personnel would be responsible for enforcing reactivity-based limits. Districts expressed concerns that implementation of a reactivity-based rule would require additional resources for enforcement. If district personnel wanted to determine the reactivity of a product for enforcement purposes, they would need to obtain detailed chemical formulation data to identify all of the volatile ingredients contained in the product. They would then need to identify the appropriate maximum incremental reactivity (MIR) value for each of these ingredients, so they could calculate the overall reactivity for the product. District personnel would also need to develop a system for updating MIR values to accommodate changes that result from research studies. Verifying compliance with a mass-based limit requires fewer resources, because it only involves a relatively simple measurement of total VOCs. Many districts do not have the resources to enforce a reactivity-based architectural coatings rule.

The South Coast AQMD staff in particular commented that they did not support reactivity-based architectural coating limits at this time, citing the increased resources and their belief that more research needs to be done. They also commented that reactivity-based limits are premature at this time. They believe that such limits should only be explored for achieving ozone reductions beyond their mass-based limits, which in some cases are more stringent than those in the proposed SCM (SCAQMD, 2006).

Only some industry representatives have been supportive of a reactivity-based approach. ARB staff met with industry groups in the Spring and Fall of 2006 to discuss reactivity. In addition, ARB conducted several meetings with individual coating manufacturers and raw material suppliers to discuss their concerns. No consensus regarding reactivity-based limits could be achieved among coating manufacturers.

Another option that ARB staff considered was a rule that contained mass-based VOC limits, but included a flexibility option based on reactivity. In Spring 2007, the National Paint and Coatings Association (NPCA) suggested that an Innovative Product Exemption (IPE) for reactivity be included in the SCM. ARB's consumer products regulation contains an IPE for mass-based VOC limits, but this regulation is implemented and enforced by ARB staff. If an IPE flexibility provision were included in an architectural coating rule, district personnel would be responsible for implementation and enforcement.

NPCA proposed language for an IPE exemption in July 2007. Under the NPCA proposal, coating manufacturers could sell products that exceed mass-based VOC limits, if the products had a lower reactivity than a representative product that complied with the mass-based VOC limit. For each product submitted for an exemption, district personnel would need to determine the reactivity of the noncompliant product, identify a representative compliant product, and compare the reactivity of the two products. District personnel would also need to develop enforceable conditions for each exemption (e.g., laboratory test methods, reporting requirements, etc.). The U.S. EPA expressed concerns about how a reactivity-based IPE provision would be enforced, and about potential complications that could result from case-by-case, reactivity-based limits that might be adopted by one air district and not a neighboring district.

ARB staff concluded that many districts have insufficient resources to implement and enforce reactivity-based limits or the IPE provision, and that the U.S. EPA had concerns regarding the implementation and enforcement of the IPE provision. Based upon the lack of district resources, U.S. EPA's response, and the lack of industry consensus, staff decided to propose mass-based VOC limits. The proposed mass-based limits provide significant emission reductions and will be easier for the districts to implement and enforce. In addition, the districts have existing variance rules that can provide flexibility for coating manufacturers.

Even though staff is not proposing a reactivity-based approach at this time, the staff recognizes that reactivity-based regulations for this category may play a role in the future. Consequently, ARB staff will continue to work with industry, districts, and other stakeholders to explore a reactivity-based approach for architectural coatings.

D. PROPOSED SUGGESTED CONTROL MEASURE (SCM)

The proposed SCM is not an ARB regulation. It is a model rule that districts can follow when adopting and amending their local architectural coatings rules. If districts adopt the VOC limits in the proposed SCM, district personnel are responsible for enforcing the limits.

The proposed SCM controls VOC emissions by establishing limits on the VOC content of various architectural coating categories. These VOC limits are expressed in grams of VOC per liter of coating, less water and exempt compounds. To establish the limits in the proposed SCM, ARB staff conducted a detailed assessment of each coating category to determine the maximum emission reductions that are technically feasible and cost-effective. In general, manufacturers will comply with the VOC limits by reformulating their products to replace some of the VOC solvent with water or exempt compounds. Manufacturers may also modify their formulations by increasing the amount of resin and pigment solids contained in the coatings. However, many manufacturers already have large volumes of complying products, and no reformulation is required.

1. What are the proposed VOC limits for architectural coatings?

As shown in Table 3 below, the proposed SCM (see Appendix A) will establish VOC content limits for more than 40 categories of architectural coatings. Items in boldface indicate VOC limits that are more stringent than the previous SCM (see Appendix B). Compared to the 47 categories in the 2000 SCM, 15 categories were eliminated, ten were added, and the limits for 19 categories were lowered.

With the exception of the Low Solids category, the VOC limits are expressed in terms of VOC Regulatory, which is also referred to as "VOC, Less Water, Less Exempt Compounds" or "Coating VOC". For the Low Solids category, the VOC limit is expressed in terms of VOC Actual, which is also referred to as "Material VOC".

Table 3
Proposed VOC Limits – SCM for Architectural Coatings

	Current VOC Limit (g/l)	**Proposed VOC Limit (g/l)**	
Coating Category		Effective Date 1/1/2010	Effective Date 1/1/2012
Aluminum Roof [1]	**500**	**400**	
Antenna Coatings (Deleted effective 1/1/2010)	530	N/A	
Antifouling Coatings (Deleted effective 1/1/2010)	400	N/A	
Basement Specialty Coatings [2]	400	400	
Bituminous Roof Coatings	**300**	**50**	

Table 3 Proposed VOC Limits – SCM for Architectural Coatings			
	Current VOC Limit (g/l)	Proposed VOC Limit (g/l)	
Coating Category		Effective Date 1/1/2010	Effective Date 1/1/2012
Bituminous Roof Primers	350	350	
Bond Breakers	350	350	
Clear Wood Coatings (Deleted effective 1/1/2010) [3] • Clear Brushing Lacquers • Lacquers (including lacquer sanding sealers) • Sanding Sealers (other than lacquer sanding sealers) • Varnishes	 680 550 350 350	 N/A N/A N/A N/A	
Concrete Curing Compounds	350	350	
Concrete/Masonry Sealer [4]	**250-400**	**100**	
Driveway Sealer [5]	**100**	**50**	
Dry Fog Coatings	**400**	**150**	
Faux Finishing Coatings	350	350	
Fire Resistive Coatings	350	350	
Fire Retardant Coatings: (Deleted effective 1/1/2010) [6] • Clear • Opaque	 650 350	 N/A N/A	
Flat Coatings	**100**	**50**	
Floor Coatings	**250**	**100**	
Flow Coatings (Deleted effective 1/1/2010)	420	N/A	
Form-Release Compounds	250	250	
Graphic Arts Coatings (Sign Paints)	500	500	
High Temperature Coatings	420	420	
Industrial Maintenance Coatings	250	250	
Low Solids Coatings	120 [7]	120 [7]	
Magnesite Cement Coatings	450	450	
Mastic Texture Coatings	**300**	**100**	
Metallic Pigmented Coatings	500	500	
Multi-Color Coatings	250	250	
Nonflat Coatings	**150**	**100**	
Nonflat - High Gloss Coatings	**250**	**150**	
Pre-Treatment Wash Primer	420	420	
Primers, Sealers, and Undercoaters	**200**	**100**	
Quick Dry Enamels (Deleted effective 1/1/2010)	250	N/A	
Quick Dry Primers, Sealers, and Undercoaters (Deleted effective 1/1/2010)	200	N/A	
Reactive Penetrating Sealer [8]	**250-400**	**350**	
Recycled	250	250	
Roof	**250**	**50**	
Rust Preventative	**400**		**250**
Shellacs: • Clear • Opaque	 730 550	 730 550	
Specialty Primers, Sealers, and Undercoaters	**350**		**100**

Table 3 Proposed VOC Limits – SCM for Architectural Coatings			
	Current VOC Limit (g/l)	Proposed VOC Limit (g/l)	
Coating Category		Effective Date 1/1/2010	Effective Date 1/1/2012
Stains	250	250	
Stone Consolidant[9]	NA	450	
Swimming Pool Coatings	340	340	
Swimming Pool Repair and Maintenance Coatings (Deleted effective 1/1/2010)	340	N/A	
Temperature Indicator Safety Coatings (Deleted effective 1/1/2010)	550	N/A	
Traffic Marking	**150**	**100**	
Tub and Tile Refinish [10]	NA	420	
Waterproofing Membranes [11]	**250-400**	**250**	
Waterproofing Sealers (Deleted effective 1/1/2010)	250	N/A	
Waterproofing Concrete/Masonry Sealers (Deleted effective 1/1/2010)	400	N/A	
Wood Coatings [12]	**250-680**	**275**	
Wood Preservatives	350	350	
Zinc-Rich Primer [13]	**500**	**340**	

1. Aluminum Roof is a proposed new category that was formerly covered by Metallic Pigmented.
2. Basement Specialty Coatings is a proposed new category that was formerly covered by Waterproofing Sealer and Waterproofing Concrete/Masonry Sealer.
3. It is proposed that all Clear Wood Coatings be combined under the new "Wood Coatings" category, upon the effective date of this rule.
4. Concrete/Masonry Sealer is a proposed new category that was formerly covered by Waterproofing Sealer, Waterproofing Concrete/Masonry Sealer, and other categories. The "Existing VOC Limit" for this category represents the range of VOC limits for the coatings that were combined into this new category.
5. Driveway Sealer is a proposed new category that was formerly covered by the default VOC limits.
6. Upon the effective date of this rule, the Fire Retardant coating categories are eliminated and coatings with fire retardant properties will be subject to the VOC limit of their primary category (e.g., Flat, Nonflat, etc.)
7. The VOC Limit for Low Solids Coatings is expressed as "VOC, including water and exempt compounds" (i.e., Material VOC or VOC Actual).
8. Reactive Penetrating Sealer is a proposed new category that was formerly covered by Waterproofing Sealer and Waterproofing Concrete/Masonry Sealer.
9. Stone Consolidant is a proposed new category that was formerly covered by the default VOC limits and Waterproofing Concrete/Masonry Sealer.
10. Tub and Tile Refinish is a proposed new category that was formerly covered by the default VOC limits and Nonflat – High Gloss.
11. Waterproofing Membrane is a proposed new category that was formerly covered by Waterproofing Sealer and Waterproofing Concrete/Masonry Sealer.
12. Wood Coatings is a proposed new category that was formerly covered by Clear Brushing Lacquers, Lacquers, Sanding Sealers, Waterproofing Sealers, Varnishes, and other categories.
13. Zinc-Rich Primer is a proposed new category that was formerly covered by Metallic Pigmented.

2. Who must comply with the proposed SCM?

If adopted by the districts, the proposed SCM would apply to anyone who supplies, sells, offers for sale, or manufactures architectural coatings for use in those districts. It would also apply to anyone who applies or solicits the application of architectural coatings for use in those districts. Those who are subject to the SCM include, but are not limited to, the following:

- Manufacturers
- Distributors
- Retailers
- Importers
- Paint Contractors
- Construction Workers
- Maintenance Staff
- Public Works Personnel

3. What exemptions are in the proposed SCM?

Since the SCM will become a district rule, it only applies to architectural coatings that are used within districts that have adopted the SCM. Architectural coatings that are manufactured in a district that has adopted the SCM are not subject to the SCM if they are sold and used in a district that has not adopted the SCM. If a district doesn't have a local rule, architectural coatings must comply with the U.S. EPA's national rule for architectural coatings. Aerosol coatings are exempt from the proposed SCM because they are not defined as architectural coatings, and are covered by the ARB's aerosol coatings regulation. Architectural coatings sold in small containers (one liter or less) are exempt from the VOC limits and most of the provisions of the proposed SCM. However, coatings in small containers are subject to the reporting requirements in Section 7 of the SCM.

4. What definitions have changed in the proposed SCM?

To help clarify and enforce the proposed SCM, Section 4 provides new or revised definitions for terms that are not self-explanatory.

The following definitions are added for new product categories:

- Aluminum Roof
- Basement Specialty Coating
- Concrete/Masonry Sealer
- Driveway Sealer
- Reactive Penetrating Sealer
- Stone Consolidant
- Tub and Tile Refinish
- Waterproofing Membrane
- Zinc-Rich Primer
- Wood Coatings

Some definitions are deleted because the categories are no longer listed in the table of VOC limits. Categories were deleted because they were replaced by new categories or were unnecessary. Products from deleted categories are included in other categories in the proposed SCM. Definitions were deleted for the following categories:

- Antenna Coating
- Antifouling Coating
- Clear Brushing Lacquers
- Flow Coating
- Lacquer
- Quick Dry Enamel
- Quick Dry Primer, Sealer, and Undercoater
- Sanding Sealer
- Swimming Pool Repair and Maintenance
- Temperature Indicator Safety Coating
- Varnish
- Waterproofing Concrete/Masonry Sealer
- Waterproofing Sealer

In some cases, staff is proposing revised definitions for categories, either for clarification or to limit the types of products that qualify for inclusion in a category. Revised definitions are proposed for the following categories:

- Bituminous Roof Primer
- Concrete Curing Compound
- Faux Finishing Coating
- Fire-Resistive Coating
- Fire-Retardant Coating
- Floor Coating
- Graphic Arts
- Industrial Maintenance
- Low Solids Coating
- Metallic Pigmented
- Multi-Color Coating
- Nonflat – High Gloss
- Primers, Sealers, and Undercoaters
- Recycled Coating
- Roof Coating
- Rust Preventative Coating
- Shellac
- Specialty Primers, Sealers, and Undercoaters
- Stain
- Swimming Pool Coating

5. What happens if an architectural coating is marketed for more than one category in the proposed SCM?

If a coating is marketed for more than one coating category, the lowest, or most restrictive, VOC limit will apply. However, there are exceptions to the most restrictive limit requirement. The Most Restrictive Limit section of the proposed SCM was revised to include a table to clarify the situations where the most restrictive limit is not applicable. For example, consider a coating that is marketed for use on concrete floors in industrial environments and is resistant to acids and other corrosive chemicals. This coating could be categorized as a Concrete/Masonry Sealer (VOC limit = 100 g/l) or an Industrial Maintenance Coating (VOC limit = 250 g/l). However, because the coating is designed to perform functions that require a higher VOC content for industrial environments, it meets the Industrial Maintenance Coating definition and should be classified as such. It is because of these types of situations that Industrial Maintenance is one of the categories that is exempt from the most restrictive limit requirement.

6. Does the proposed SCM contain new reporting requirements?

The proposed SCM contains a new requirement to submit sales data. Although this is a new requirement in the SCM, it is intended to implement existing practices. Since 1975, ARB has conducted surveys to collect sales data for architectural coatings. Collection of these data is authorized in the California Health and Safety Code which requires submission of data to estimate emissions. Prior to conducting a survey, ARB staff works with industry representatives to identify appropriate time periods for submittal of survey data. While most manufacturers submit data promptly, some take more than a year to submit survey data. This delay in obtaining the survey data inhibits ARB's efforts to analyze the data and provide it to the districts in a timely fashion.

Several states in the Ozone Transport Commission have adopted rules that are based on the 2000 SCM, but they contain an added provision which requires submittal of survey data. This provision appears to be an effective method of encouraging prompt submittal of survey data. Therefore, the proposed SCM includes a similar provision that is intended to expedite the collection of survey data for architectural coatings. Under this provision, survey data must be provided within 180 days. Failure to do so could result in the issuance of a Notice of Violation or a Notice to Comply from the district.

7. How is compliance with the proposed SCM verified?

The proposed SCM designates acceptable methods for determining compliance with the requirements. The proposed SCM contains revisions to the section that describes how to determine VOC content. For clarification purposes, there is new text to explain that VOC content must reflect the amount of recommended thinning solvent.

Traditionally, U.S. EPA Method 24 has been designated as the official way of verifying the VOC content for architectural coatings. ARB is currently funding a research project to develop an expanded test method that is intended to improve the accuracy for laboratory tests involving waterborne coatings, multi-component coatings, and others that may be difficult to analyze with Method 24. Since this research is not yet completed, it has not been included in the proposed SCM. However, it is ARB's intent that districts allow for the use of the expanded method under development, if the research data indicate that it is a valid alternative. The proposed SCM allows for the use of alternative test methods, but manufacturers must first obtain written approval from the district, ARB, and the U.S. EPA. If an alternative test method is approved, the results of the alternative method will govern, if there are discrepancies between the results of the alternative method and formulation data. Similarly, if there are discrepancies between VOC content based on formulation data and the results of a Method 24 test, Method 24 test results will prevail.

8. What other requirements are contained in the proposed SCM?

The proposed SCM includes several other requirements which are similar to those found in existing district architectural coatings rules. These requirements include the following:

- container labeling requirements regarding the date of manufacture, VOC content, thinning recommendations, and labeling specific to selected coating categories;
- a "painting practices" provision designed to limit VOC emissions from open paint containers;
- a thinning provision specifying allowable thinning practices; and

- a "sell-through" provision allowing three years to sell products manufactured prior to the effective date of a VOC limit.

9. What requirements have been deleted from the proposed SCM?

The proposed SCM deletes several provisions included in the 2000 SCM. They include:

- The proposed SCM deletes the petition process which allows for the use of 340 g/l Industrial Maintenance Coatings in areas with persistent fog and cold temperatures. This petition process was eliminated because it was only used once and ARB staff determined that it was no longer necessary.
- The 2000 SCM specifically prohibited the use of Rust Preventative Coatings for industrial use, unless they complied with the 250 g/l VOC limit for Industrial Maintenance Coatings. Since Rust Preventative and Industrial Maintenance Coatings have the same proposed VOC limit, it is no longer necessary to maintain the prohibition provision and it is proposed for elimination.
- The 2000 SCM contained a special provision for Lacquers where a person could add VOC to a lacquer to avoid blushing of the finish, if certain conditions were met. In the proposed SCM, products that were formerly classified as Lacquers would be included in the new Wood Coatings category and the VOC limit was lowered from 550 g/l to 275 g/l. ARB staff has evaluated formulations and manufacturer information for Lacquers that comply with the proposed 275 g/l limit and staff has determined that the lacquer blushing provision is no longer necessary. Therefore, it has been proposed for elimination.
- The 2000 SCM contained an averaging compliance option, which expired in 2005 and was administered by ARB staff. Based on staff's experience with the averaging program, we believe that many districts do not have sufficient resources to manage an averaging program. In addition, while averaging is a viable option for a few large businesses, it is difficult for small businesses to participate because they have fewer products. Therefore, ARB staff does not believe that it is appropriate or necessary to include an averaging program in the proposed SCM. ARB staff has worked extensively with stakeholders to develop categories and VOC limits that are technologically feasible, without the need for an averaging program.
- Annual reports have been deleted for the following: Clear Brushing Lacquers; Rust Preventative Coatings; Specialty Primers, Sealers, and Undercoaters; Toxic Exempt Compounds (perchloroethylene and methylene chloride); Recycled Coatings; Bituminous Roof Coatings; and Bituminous Roof Primers.
- In the proposed SCM, the test method has been deleted for determining drying times, because the Quick Dry categories have been proposed for elimination and there is no need to verify drying times. In addition, the

test method for determining surface chalkiness has been deleted, because chalkiness has been removed from the criteria in the Specialty Primers, Sealers, and Undercoaters category.

E. PROCESS FOR DEVELOPING PROPOSED SCM

1. What process was used to develop the proposed SCM?

In 2005, ARB staff initiated activities to develop the proposed SCM. These activities have included:

- Conducting a survey of architectural coatings;
- Meeting with district and U.S. EPA Region IX representatives;
- Hosting public workshops;
- Meeting with industry trade groups and individual manufacturers;
- Meeting with essential public services agencies;
- Evaluating the South Coast AQMD's Rule 1113 and the U.S. EPA's National Architectural Coatings Rule;
- Conducting technology assessments of all the coating categories;
- Evaluating durability and performance research for several coating categories;
- Preparing an environmental impact analysis; and
- Conducting an economic impacts survey and preparing an economic analysis.

In October 2006, ARB and district personnel established a District Working Group to discuss the update of the 2000 SCM including: district SIP commitments for emission reductions from architectural coatings; findings of the 2005 architectural coatings survey; the possibility of a reactivity-based approach; specific SCM language; the environmental impact analysis; and flexibility options for manufacturers to comply with the SCM. The U.S. EPA was also involved in some of the district meetings. In addition to meeting with the District Working Group, ARB staff participated in meetings with California Air Pollution Control Officers' Association (CAPCOA) committees.

Also in October 2006, ARB and coating industry representatives established an Industry Working Group, similar to the District Working Group, to discuss items including: revisions of coating category definitions; proposed VOC limits; the possibility of a reactivity-based approach; the use of tertiary butyl acetate (TBAc); and flexibility options for manufacturers to comply with the SCM.

In addition to the meetings with the Industry Working Group, ARB hosted meetings with industry trade groups. ARB also had meetings and conference calls with individual manufacturers about their particular concerns and to share data. About 40 such meetings with manufacturers or trade groups occurred.

ARB staff conducted three public workshops and meetings with individual manufacturers and other interested parties in Sacramento on December 12, 2006; March 13, 2007; and June 6, 2007. The first workshop focused on general discussions regarding the SCM update, the project timeline, and the technical approach. At the second workshop, ARB staff presented draft VOC limits and revised definitions for several major coating categories. At the third workshop, ARB staff presented draft regulatory language for the entire SCM.

2. How does the proposed SCM compare to South Coast AQMD Rule 1113?

While developing the proposed SCM, ARB staff considered the feasibility of proposing the Rule 1113 VOC limits that are scheduled to be fully implemented by 2008. In many cases, ARB staff determined that the final South Coast AQMD limits would be feasible for implementation beyond the South Coast AQMD. However, there are some categories for which staff determined that a higher VOC limit would be more appropriate at this time. The most significant of these categories are Aluminum Roof Coatings, Industrial Maintenance Coatings, Nonflat Coatings, Nonflat-High Gloss Coatings, Rust Preventative Coatings, and Exterior Stains. The primary reasons for having a higher limit in the proposed SCM include the following:

- The proposed SCM needs to be suitable for a variety of climates. As South Coast AQMD staff has said in public meetings, some of the VOC limits in their rule, specifically for Nonflat and Nonflat-High Gloss Coatings, are not intended necessarily for areas outside of the South Coast AQMD. There are concerns with freeze/thaw stability and dirt pick up due to removal of VOCs to meet the lower limits. This concern also applies in varying degrees to the other categories mentioned above;
- The proposed SCM does not contain an averaging provision. In the South Coast AQMD, coating manufacturers can sell products that exceed the VOC limits, if they demonstrate that the excess emissions are offset by emissions from overcomplying products. Participants in the averaging program must prepare detailed plans and reports to verify their emissions data. Management of an averaging program can require significant staff resources for detailed recordkeeping and auditing. All of the categories mentioned above are allowed to be averaged;
- The proposed SCM does not contain an exemption for TBAc due to concerns about its toxicity. Rule 1113 contains a TBAc exemption for Industrial Maintenance Coatings only. Under this exemption, manufacturers do not have to include TBAc when calculating the VOC content of Industrial Maintenance coatings;
- The proposed SCM does not contain a small business exemption. Rule 1113 allows small businesses in certain categories to be exempt from VOC limits or to have additional time to comply with VOC limits;

- The proposed SCM does not contain an exemption for high elevations. Under Rule 1113, stains and lacquers do not have to comply with the rule's VOC limits if they are used at an elevation of 4,000 feet or greater above sea level; and
- The proposed SCM needs to be enforceable by small districts with limited resources. Accordingly, the proposed SCM does not contain an averaging provision or the exemptions mentioned above, all of which require resources for recordkeeping and auditing.

Table 4 contains a comparison between South Coast AQMD's Rule 1113 and the proposed SCM VOC limits for the coatings with differing limits.

Table 4
Comparison Between South Coast AQMD Rule 1113 and Proposed SCM

South Coast Rule 1113 Category	Rule 1113 Ceiling Limit [1] (g/l)	Rule 1113 VOC Limit (g/l)	Corresponding Categories in Proposed SCM	Proposed SCM VOC Limit (g/l)
Concrete-Curing Compounds	350	100	Concrete Curing Compounds	350
Floor Coatings	420	50	Floor Coatings	100
Industrial Maintenance Coatings	420	100 [2]	Industrial Maintenance Coatings	250
Zinc-Rich IM Primers	420	100	Zinc-Rich Primers	340
Mastic Coatings	300	300	Mastic Texture Coatings	100
Nonflat Coatings	250	50	Nonflat Coatings	100
Nonflat High Gloss	250	50	Nonflat - High Gloss	150
Quick-Dry Enamels	400	50	Nonflat - High Gloss	150
Roof Coatings, Aluminum	500	100	Aluminum Roof Coatings	400
Rust Preventative Coatings	420	100	Rust Preventative Coatings	250
Stains (Exterior)	350	100	Stains	250
Traffic Coatings	250	100	Traffic Marking Coatings Driveway Sealers	100 50
Waterproofing Sealers	400	100	Concrete/Masonry Sealers Wood Coatings Basement Specialty Coatings Reactive Penetrating Sealer Waterproofing Membranes	100 275 400 350 250
Waterproofing Concrete/Masonry Sealers	400	100	Concrete/Masonry Sealers Basement Specialty Coatings Reactive Penetrating Sealer Stone Consolidant Waterproofing Membranes	100 400 350 450 250
Default	NA	250	Form-Release Compounds Stone Consolidant Tub and Tile Refinish Default	250 450 420 50-150

1. Ceiling Limit: The maximum allowable VOC content for coatings that are included in the Rule 1113 averaging program.
2. For Industrial Maintenance Coatings, Rule 1113 allows for the use of TBAc as an exempt solvent to help achieve the 100 g/l VOC limit.

Traditionally, architectural coating rules have contained an exemption for products sold in small containers ("one liter or less"). This exemption has served as a safety valve for small volume, niche applications that may need a higher VOC product. Based on data from several ARB surveys, small containers have consistently accounted for a very small percentage of architectural coating sales. In 2004, small containers only accounted for three percent of the total sales volume, and less than half of those sales exceeded the VOC limits for large containers. Therefore, ARB staff does not believe that the small container exemption needs to be amended or deleted.

In December 2003, South Coast AQMD revised their small container exemption to eliminate the exemption for varnishes, sanding sealers, clear lacquers, and pigmented lacquers, effective July 1, 2006, and to require manufacturers to submit an annual report to document sales of products sold in small containers. The proposed SCM does not contain a requirement for annual reporting, because ARB already conducts periodic surveys that gather data on coating sales volumes. The proposed SCM also retains the small container exemption for wood coatings, because staff has found it to be an effective way of addressing niche applications and providing flexibility without a significant loss of emission reductions.

3. How did staff determine that the proposed SCM was feasible?

To ensure that the proposed SCM is technically and commercially feasible, ARB staff conducted a technology assessment for all of the coating categories. Details of these assessments are provided in Chapter 5 of the Technical Support Document. Based on their technical analyses, staff has concluded that the overall performance of the currently complying and reformulated products in each category is similar to the performance of their higher VOC counterparts. To confirm this analysis, ARB staff will conduct technology reviews for the proposed VOC limits that are lower than current limits, prior to their effective dates.

When evaluating technological feasibility for low-VOC coatings, ARB staff reviewed laboratory testing data that compared the performance characteristics for low- and high-VOC coatings. ARB staff also reviewed confidential test data provided by some coating manufacturers. Descriptions of testing results are contained in Chapter 5 of the Staff Report for the applicable categories.

F. ENVIRONMENTAL IMPACTS

1. How did staff evaluate potential environmental impacts?

Both the California Environmental Quality Act (CEQA) and ARB policy require ARB to evaluate the potential adverse environmental impacts of proposed projects. For the 2000 SCM, staff prepared a formal environmental impact report

(EIR), which is incorporated by reference herein (ARB, 2000). The EIR included an analysis of environmental impacts that could potentially result from the implementation of the 2000 SCM throughout California (excluding the South Coast AQMD). Staff investigated the potential for environmental impacts in six main areas: air quality; water demand and quality; public services; transportation and circulation; solid and hazardous waste; and health hazards. The analysis concluded that implementing the 2000 SCM would have no significant adverse impacts, but would have a net air quality benefit.

For the proposed SCM, staff has addressed potential environmental impacts in Chapter 6 of the Technical Support Document. Staff believes that districts can use the Technical Support Document and the EIR from the 2000 SCM to support their environmental impact analyses when they adopt local rules based on the proposed SCM. Provided below is a summary of ARB's environmental impact analysis.

2. How does the proposed SCM impact air quality?

The adoption and implementation of the proposed SCM is expected to produce substantial long-term VOC emission reductions, and staff has concluded that adverse air quality impacts associated with this SCM will be insignificant. Adverse air quality impacts are considered to be significant if the proposed SCM would: conflict with or obstruct implementation of the applicable air quality plan; violate any air quality standard or contribute to an existing or projected air quality violation; expose sensitive receptors to substantial pollutant concentrations; expose off-site receptors to significant concentrations of hazardous air pollutants; result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment; diminish an existing air quality rule or future compliance requirement resulting in a significant increase in air pollutants; or create objectionable odors affecting a substantial number of people. No significant adverse air quality impacts are anticipated; therefore, no mitigation measures are necessary.

Based on the analysis of potential direct and indirect air quality effects of implementing this SCM, it is concluded that the proposed SCM will result in a VOC emission reduction of approximately 15 tons per day by the year 2012.

Historically, some members of industry identified seven areas of potential concern that they believe could result in increased indirect VOC emissions due to a requirement to lower the VOC content of architectural coatings. These are:

- The use of lower-VOC coatings will result in a thicker film coating;
- The use of lower-VOC coatings will result in excessive thinning of the coating;
- The use of lower-VOC coatings requires the use of additional primer for proper adhesion to the substrate;

- Lower-VOC coatings will require the use of more coats;
- The use of lower-VOC coatings will require more frequent recoating, touch-up, and repair work;
- The use of lower-VOC coatings will result in product substitution by end-users; and
- The use of lower-VOC coatings may result in coatings with higher reactivity.

ARB staff evaluated manufacturers' product data sheets and available testing data for low-VOC coatings. Staff found that these coatings had substrate preparation, coverage rates, and performance similar to their higher VOC counterparts without the need for excessive thinning. In addition, there are compliant coatings available and rule provisions to avoid substitution. Our analysis shows that the total reactivity of the lower-VOC architectural coatings will be less than the reactivity of the higher-VOC architectural coatings. Thus, ARB staff concluded that the indirect increased VOC emissions, if any, from these areas of concern would be insignificant.

3. What are the expected impacts on human health?

It is expected that future compliant coatings will contain less hazardous materials, or nonhazardous materials, as compared to solventborne coatings, resulting in a net benefit. The human health impacts analysis performed in the Final Program Environmental Impact Report (EIR) for the 2000 SCM examined the potential increased long-term (carcinogenic and chronic) and short-term (acute) human health impacts associated with the use of various replacement solvents in compliant coating formulations (ARB, 2000). It was concluded that the general public and coating applicators would not be exposed to either long-term or short-term health risks due to the application of compliant coatings as a result of the SCM.

Staff is not proposing to exempt tertiary-butyl acetate (TBAc) in the proposed SCM. California's Office of Environmental Health Hazard Assessment (OEHHA) is concerned that long-term toxicity data are lacking for TBAc, and that TBAc is metabolized into tert-butanol. After analyzing a National Toxicology Program bioassay for tert-butanol, OEHHA has concluded that the data are sufficient to conclude that tert-butanol is an animal carcinogen, and may be considered to pose a potential cancer risk to humans (ARB, 2006b). However, districts may exempt TBAc for certain applications and ARB staff encourages districts to conduct their own analyses to determine whether or not the use of TBAc would pose unacceptable exposures.

4. What are the expected impacts on water resources?

The proposed SCM is not expected to adversely impact water quality since the use of less toxic exempt solvents is expected to result in equivalent or lesser water quality impacts than currently used solvents. Water resources impacts are

considered significant if they cause changes in the course of water movements or of drainage or surface runoff patterns; substantially degrade water quality; deplete water resources; significantly increase toxic inflow to public waste water treatment facilities; or interfere with groundwater recharge efforts. No significant adverse water resource impacts are anticipated; therefore, no mitigation measures are necessary.

5. What are the expected impacts on hazardous waste disposal?

The Department of Toxic Substances Control (DTSC) is the lead agency in California for hazardous waste management. DTSC enforces California's Hazardous Waste Control laws, issues permits to hazardous waste facilities, and mitigates contaminated hazardous waste sites. In California, leftover liquid waterborne and solventborne coatings are considered a hazardous waste and must be disposed at a facility that is registered with DTSC. Hazardous materials as defined in 40 CFR 261.20 and California Title 22 Article 9 (including listed substances, 40 CFR 261.30) are disposed of in Class I landfills.

After collection at household hazardous waste collection sites, waterborne coatings may be consolidated for reuse or recycle. Consolidation of waterborne paint is a key way to reuse waterborne paint that is in good condition, and may effectively reduce the volume of waterborne paint for disposal by as much as 50 percent. Solventborne paint is generally not a good candidate for reuse because of complexity and incompatibility as well as other paint formulation considerations. Solventborne coatings require the use of additional hazardous materials (paint thinner, mineral spirits or turpentine) for cleanup and thinning, and thus generate more hazardous waste for disposal. Additionally, solventborne coatings and their associated cleaners and thinners are fire hazards due to their flammability, and rags used to remove solventborne paints can easily catch fire, or even spontaneously combust, if stored improperly.

The solid waste/hazardous waste analysis performed for the June 2000 EIR examined increased disposal of compliant coatings due to the possibility of shorter shelf or pot lives or lesser freeze/thaw capabilities. It was concluded that adverse solid waste/hazardous waste impacts associated with the SCM will be insignificant.

6. What alternatives did staff consider?

As alternatives to the proposed SCM, ARB staff evaluated taking no action and delaying the effective dates. ARB staff determined that neither of these alternatives would be as effective at reducing VOC emissions from architectural coatings as the proposed SCM. The no action alternative was rejected because it would not achieve emission reductions necessary to attain the State and federal ambient air quality standards. The delayed effective date alternative was

rejected because compliant coatings are currently available or will be available before the proposed effective dates of the SCM.

G. ECONOMIC IMPACTS

1. How did staff evaluate potential economic impacts?

Chapter 7 of the Technical Support Document discusses the economic impacts ARB anticipates from implementation of the proposed SCM. ARB staff quantified the economic impacts to the extent feasible, but economic impact analyses can be inherently imprecise by nature. Therefore, some projections are necessarily qualitative or semi-quantitative, based on general observations about the architectural coatings industry. The economic impacts analysis for the proposed SCM provides a general picture of the economic impacts that typical businesses might encounter, but staff recognizes that individual companies may experience impacts different than those projected in this analysis.

2. What is the annual cost and cost-effectiveness of the proposed SCM?

In this analysis, each proposed limit was analyzed as a separate, stand-alone regulation. This means the annual costs and the cost-effectiveness of each limit are calculated. ARB staff believes treating each proposed limit as a separate regulation is appropriate since this approach prevents very cost-effective limits (e.g., those with large emission reductions coupled with low costs) from "masking" relatively cost-ineffective limits.

The total cost of the proposed limits is estimated to be 12.3 million dollars per year in 2007 dollars. As shown in Table 5, the cost-effectiveness of individual limits ranges from a net savings to a net cost of $13.90 per pound of VOC reduced. The $13.90 per pound value for Floor Coatings is due to the fact that a large number of noncomplying products are sold in small volumes. Because the complying marketshare for Floor Coatings is 85 percent, many manufacturers have already reformulated their coatings to meet the proposed VOC limit. Therefore, staff believes that it is appropriate for the remaining manufacturers to reformulate their products to meet the proposed limit.

The overall average cost-effectiveness of the proposed limits is estimated to be $1.12 per pound of VOC reduced. This compares favorably with the cost-effectiveness of similar regulations.

Table 5 Cost-Effectiveness and Maximum Per-Gallon Cost Increases			
Coating Category	**Individual Cost-Effectiveness for Each Limit (Dollars per Pound VOC Reduced)**	**Calculated Cost per Gallon to Consumers [1] (Dollars per Gallon)**	**Cost Increase Per Gallon to Consumers (Dollars per Gallon)**
Aluminum Roof	$0.41	$14.63	$1.16
Bituminous Roof	$1.02	$11.84	$6.43
Concrete Masonry Sealer	-$0.36	$14.09	-$0.88
Dry Fog	-$0.52	$34.86	-$3.96
Flat	-$0.69	$17.81	-$0.33
Floor	$13.90	$16.96	$27.30
Mastic Texture	$2.38	$17.72	$8.61
Non Flat	$7.03	$19.44	$4.40
Non Flat High Gloss	-$1.38	$23.96	-$3.39
PSU	$2.73	$16.90	$2.51
Roof	$1.38	$29.94	$1.95
Rust Preventative	-$0.46	$30.30	-$2.51
Specialty PSU	-$0.71	$25.19	-$6.32
Traffic Marking	$4.76	$14.18	$4.00
Waterproofing Membrane	$6.55	$33.38	$17.00
Wood Coatings	-$1.13	$38.70	-$6.34
	Cost-Effectiveness ($ Per Lb VOC Reduced)	**Cost per Gallon ($ Per Gallon)**	**Cost Increase ($ Per Gallon)**
OVERALL RESULTS	**$1.12**	**$19.20**	**$1.21**

1. Costs per gallon were calculated based on raw material costs, and do not necessarily reflect actual retail prices.

3. What are the expected economic impacts on businesses?

California businesses manufactured 56 percent of the architectural coatings sold in the State during 2004. Typical California businesses are affected by the proposed SCM to the extent that the additional costs imposed by the proposed requirements would change their profitability. Staff estimated profitability impacts by calculating the decline in the return on owner's equity (ROE). Assuming that coating manufacturers will have to absorb all of the costs associated with the SCM, the proposed SCM is expected to result in an average ROE decline of 2.1 percent, which is not considered to be a significant impact on the profitability of affected businesses.

Companies which supply resins, solvents, other chemicals and equipment for use in reformulating architectural coatings would potentially benefit from the proposed SCM as they experience an increase in demand for their products. On the other hand, those companies that supply raw materials for existing noncompliant coatings may experience a decline in demand for their products.

The employment in the paint and coating industry is unlikely to change significantly as a result of the proposed SCM. Most affected manufacturers or

marketers would be able to absorb the reformulation costs with no significant impact on their profitability.

The staff's analysis shows that most affected businesses would be able to absorb the costs of the proposed SCM with no significant adverse impacts on their profitability. However, the proposed SCM may impose economic hardship on some businesses with small or no margin of profitability. Because the proposed amendments would not alter significantly the profitability of most businesses, staff does not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California.

4. What are the expected economic impacts on consumers?

If businesses are unable to reduce their costs of doing business, they would pass their cost increases on to consumers. Staff estimates an average potential increase of about $1.21 per gallon, if all costs were passed on to the consumer. Currently, the average cost per gallon for consumers is about $19.20. Therefore, the maximum increase in the cost per gallon could be about six percent.

It should be noted that consumers who do not wish to purchase these reformulated coatings would still be able to buy the currently available complying coatings at current prices. These products will still be available with no expected price increase. The competition from these existing compliant coatings will likely constrain any price increases for the reformulated coatings. In other words, most manufacturers would not be able to pass on all their costs to the consumers as we assumed in this analysis, thereby making the actual retail price increases likely to be less than our projections.

H. FUTURE PLANS

1. When will ARB conduct another architectural coating survey?

Staff currently plans to conduct another architectural coatings survey in 2011 to gather data from calendar year 2010. Staff expects the survey to be similar to the survey conducted in 2005 to gather data from calendar year 2004. This survey will reflect the products that have been reformulated to meet the VOC limits effective in the South Coast AQMD from 2005 to 2008, and the proposed SCM limits that take effect in 2010.

2. Will ARB perform technology assessments?

Yes. ARB staff plans to conduct technology assessments for each coating category with a lower proposed VOC limit. These assessments will be

conducted one year prior to the effective date of the lowered limits. The affected categories include:

- Aluminum Roof
- Bituminous Roof
- Concrete/Masonry Sealer
- Driveway Sealer
- Dry Fog
- Flat
- Floor
- Mastic Texture
- Nonflat
- Nonflat – High Gloss
- Primers, Sealers, and Undercoaters
- Reactive Penetrating Sealer
- Roof
- Rust Preventative
- Specialty PSU
- Traffic Marking
- Waterproofing Membrane
- Wood Coatings
- Zinc Rich Primer

Staff believes the proposed VOC limits are feasible based on all of the evidence that we examined. Staff is committing to these technology assessments because it is standard practice for the ARB to ensure that unanticipated problems do not arise.

3. Will ARB investigate reactivity-based limits?

Staff expects to explore the feasibility of reactivity-based limits in the future. Successful development of such limits relies heavily on receiving detailed, product-specific ingredient data from the next architectural coatings survey.

4. Will an alternative VOC test method be available by 2010?

In 2005, the ARB contracted with the California Polytechnic State University at San Luis Obispo, California (Cal Poly) to develop an improved volatile organic compound (VOC) test method for architectural coatings. Currently, the U.S. Environmental Protection Agency's Method 24 is used to test the VOC content of coatings. It is widely accepted that Method 24 is not reliable for the analysis of low VOC waterborne coatings, nor is it suitable for determining the VOC content of solventborne coatings with high levels of exempt compounds. In both cases, Method 24 is unreliable because it indirectly measures VOCs in these coatings.

For several of the solventborne types of coatings, Method 24 works well. For the remaining coatings, Cal Poly will be developing a direct VOC test method, or methods, most likely based on ASTM D6886, a test method that Cal Poly developed.

Staff anticipates the project to be completed in 2008. Cal Poly has collected samples from manufacturers representing many of the various types and categories of coatings described above. Cal Poly will continue to develop and refine the test method(s) in 2007. Several air quality districts, other agencies,

and industry laboratories have volunteered to participate in "shadowing" Cal Poly's testing, to help validate the method(s). Staff expects that to occur in 2007, with a final report to ARB in 2008.

I. RECOMMENDATION

Staff recommends that the Board approve the proposed architectural coatings suggested control measure.

J. REFERENCES

Air Resources Board. "Final Program Environmental Impact Report." June, 2000. (ARB, 2000)

Air Resources Board. "2001 Architectural Coatings Survey, Final Reactivity Analysis." March, 2005. (ARB, 2005)

Air Resources Board. "2005 Architectural Coatings Survey, Draft Report." September, 2006. (ARB, 2006a)

Air Resources Board. "Environmental Impact Assessment of Tertiary-Butyl Acetate". January, 2006. (ARB, 2006b)

Air Resources Board. "2005 Architectural Coatings Survey, Draft Reactivity Analysis." January, 2007. (ARB, 2007)

South Coast Air Quality Management District. E-mail from Dr. Laki Tisopulos, Assistant Deputy Executive Officer, SCAQMD, to Jim Nyarady, ARB. September 12, 2006. (SCAQMD, 2006)

APPENDIX A:

PROPOSED AMENDMENTS TO THE SUGGESTED CONTROL MEASURE FOR ARCHITECTURAL COATINGS

California Air Resources Board (ARB)
Suggested Control Measure for Architectural Coatings

1. APPLICABILITY

1.1 Except as provided in subsection 3 ~~1.2~~, this rule is applicable to any person who supplies, sells, offers for sale, or manufactures any architectural coating for use within the District, as well as any person who applies or solicits the application of any architectural coating within the District.

2. SEVERABILITY

2.1 Each provision of this rule shall be deemed severable, and in the event that any provision of this rule is held to be invalid, the remainder of this rule shall continue in full force and effect.

3. EXEMPTIONS

3.1~~1.2~~ This rule does not apply to:

3.1.1 ~~1.2.1~~ Any architectural coating that is supplied, sold, offered for sale, or manufactured for use outside of the District or for shipment to other manufacturers for reformulation or repackaging.

3.1.2 ~~1.2.2~~ Any aerosol coating product.

~~1.2.3 Any architectural coating that is sold in a container with a volume of one liter (1.057 quart) or less.~~

3.2 With the exception of section 7, this rule does not apply to any architectural coating that is sold in a container with a volume of one liter (1.057 quart) or less.

4 ~~2~~. DEFINITIONS

4.1 ~~2.0~~ Adhesive: Any chemical substance that is applied for the purpose of bonding two surfaces together other than by mechanical means.

4.2 ~~2.1~~ Aerosol Coating Product: A pressurized coating product containing pigments or resins that dispenses product ingredients by means of a propellant, and is packaged in a disposable can for hand-held application, or for use in specialized equipment for ground traffic/marking applications.

4.3 Aluminum Roof Coating: A coating labeled and formulated exclusively for application to roofs and containing at least 84 grams of elemental aluminum pigment per liter of coating (at least 0.7 pounds per gallon).

Pigment content shall be determined in accordance with SCAQMD Method 318-95, incorporated by reference in subsection 8.5.4.

~~2.2 Antenna Coating: A coating labeled and formulated exclusively for application to equipment and associated structural appurtenances that are used to receive or transmit electromagnetic signals.~~

~~2.3 Antifouling Coating: A coating labeled and formulated for application to submerged stationary structures and their appurtenances to prevent or reduce the attachment of marine or freshwater biological organisms. To qualify as an antifouling coating, the coating must be registered with both the U.S. EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Section 136, *et seq.*) and with the California Department of Pesticide Regulation.~~

4.4 ~~2.4~~ Appurtenance: Any accessory to a stationary structure coated at the site of installation, whether installed or detached, including but not limited to: bathroom and kitchen fixtures; cabinets; concrete forms; doors; elevators; fences; hand railings; heating equipment, air conditioning equipment, and other fixed mechanical equipment or stationary tools; lampposts; partitions; pipes and piping systems; rain gutters and downspouts; stairways, fixed ladders, catwalks, and fire escapes; and window screens.

4.5 ~~2.5~~ Architectural Coating: A coating to be applied to stationary structures or their appurtenances at the site of installation, to portable buildings at the site of installation, to pavements, or to curbs. Coatings applied in shop applications or to non-stationary structures such as airplanes, ships, boats, railcars, and automobiles, and adhesives are not considered architectural coatings for the purposes of this rule.

4.6 Basement Specialty Coating: A clear or opaque coating that is labeled and formulated for application to concrete and masonry surfaces to provide a hydrostatic seal for basements and other below-grade surfaces. Basement Specialty Coatings must meet the following criteria:

4.6.1 Coating must be capable of withstanding at least 10 psi of hydrostatic pressure, as determined in accordance with ASTM D7088-04, which is incorporated by reference in subsection 8.5.12; and

4.6.2 Coating must be resistant to mold and mildew growth and must achieve a microbial growth rating of 8 or more, as determined in accordance with ASTM D3273-00 and ASTM D3274-95, incorporated by reference in subsection 8.5.19.

4.7 ~~2.6~~ Bitumens: Black or brown materials including, but not limited to, asphalt, tar, pitch, and asphaltite that are soluble in carbon disulfide, consist mainly of hydrocarbons, and are obtained from natural deposits or as

residues from the distillation of crude petroleum or coal.

4.8 ~~2.7~~ Bituminous Roof Coating: A coating which incorporates bitumens that is labeled and formulated exclusively for roofing.

4.9 ~~2.8~~ Bituminous Roof Primer: A primer which incorporates bitumens that is labeled and formulated exclusively for roofing and intended for the purpose of preparing a weathered or aged surface or improving the adhesion of subsequent surfacing components.

4.10~~2.9~~ Bond Breaker: A coating labeled and formulated for application between layers of concrete to prevent a freshly poured top layer of concrete from bonding to the layer over which it is poured.

~~2.10 Clear Brushing Lacquers: Clear wood finishes, excluding clear lacquer sanding sealers, formulated with nitrocellulose or synthetic resins to dry by solvent evaporation without chemical reaction and to provide a solid, protective film, which are intended exclusively for application by brush, and which are labeled as specified in subsection 4.1.5.~~

~~2.11 Clear Wood Coating: Clear and semi-transparent coatings, including lacquers and varnishes, applied to wood substrates to provide a transparent or translucent solid film.~~

4~~2~~.11 Coating: A material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains.

4~~2~~.12 Colorant: A concentrated pigment dispersion in water, solvent, and/or binder that is added to an architectural coating after packaging in sale units to produce the desired color.

4~~2~~.13 Concrete Curing Compound: A coating labeled and formulated for application to freshly poured concrete to perform one or more of the following functions:
4.13.1 R~~r~~etard the evaporation of water; or
4.13.2 Harden or dustproof the surface of freshly poured concrete.

4.14 Concrete/Masonry Sealer: A clear or opaque coating that is labeled and formulated primarily for application to concrete and masonry surfaces to perform one or more of the following functions:
4.14.1 Prevent penetration of water; or
4.14.2 Provide resistance against abrasion, alkalis, acids, mildew, staining, or ultraviolet light; or
4.14.3 Harden or dustproof the surface of aged or cured concrete.

4.15 Driveway Sealer: A coating labeled and formulated for application to worn asphalt driveway surfaces to perform one or more of the following functions:
4.15.1 Fill cracks; or
4.15.2 Seal the surface to provide protection; or
4.15.3 Restore or preserve the appearance.

4.162.15 Dry Fog Coating: A coating labeled and formulated only for spray application such that overspray droplets dry before subsequent contact with incidental surfaces in the vicinity of the surface coating activity.

4.172.16 Exempt Compound: A compound identified as exempt under the definition of Volatile Organic Compound (VOC), subsection 4.632.60. Exempt compounds content of a coating shall be determined by U.S. EPA Method 24 or South Coast Air Quality Management District (SCAQMD) Method 303-91 (Revised February 1993), incorporated by reference in subsection 8.5.86.5.10.

4.182.17 Faux Finishing Coating: A coating labeled and formulated to meet one or more of the following criteria:
4.18.1 as a stain or A glaze or textured coating used to create artistic effects including, but not limited to,; dirt, suede, old age, smoke damage, and simulated marble and wood grain.; or
4.18.2 A decorative coating used to create a metallic, iridescent, or pearlescent appearance that contains at least 48 grams of pearlescent mica pigment or other iridescent pigment per liter of coating as applied (at least 0.4 pounds per gallon); or
4.18.3 A decorative coating used to create a metallic appearance that contains less than 48 grams of elemental metallic pigment per liter of coating as applied (less than 0.4 pounds per gallon), when tested in accordance with SCAQMD Method 318-95, incorporated by reference in subsection 8.5.4; or
4.18.4 A decorative coating used to create a metallic appearance that contains greater than 48 grams of elemental metallic pigment per liter of coating as applied (greater than 0.4 pounds per gallon) and which requires a clear topcoat to prevent the degradation of the finish under normal use conditions. The metallic pigment content shall be determined in accordance with SCAQMD Method 318-95, incorporated by reference in subsection 8.5.4; or
4.18.5 A clear topcoat to seal and protect a Faux Finishing coating that meets the requirements of subsection 4.18.1, 4.18.2, 4.18.3, or 4.18.4. These clear topcoats must be sold and used solely as part of a Faux Finishing coating system, and must be labeled in accordance with subsection 6.1.4.

4.192.18 Fire-Resistive Coating: A coating labeled and formulated to protect the structural integrity by increasing the fire endurance of interior or exterior steel and other structural materials. The Fire Resistive category includes sprayed fire resistive materials and intumescent fire resistive coatings that are used to bring structural materials , that has been fire tested and rated by a testing agency approved by building code officials for use in bringing assemblies of structural materials into compliance with federal, state, and local building code requirements. The fire-resistive coating and the testing agency must be approved by building code officials. The fire-resistant coating Fire Resistive coatings shall be tested in accordance with ASTM Designation E 119-98 07, incorporated by reference in subsection 86.5.2. Fire Resistive coatings and testing agencies must be approved by building code officials.

4.202.19 Fire-Retardant Coating: A coating labeled and formulated to retard ignition and flame spread, that has been fire tested and rated by a testing agency approved by building code officials for use in bringing building and construction materials into compliance with federal, state and local building code requirements. The fire-retardant coating and the testing agency must be approved by building code officials. The fire-retardant coating shall be tested in accordance with ASTM Designation E 84-07, incorporated by reference in subsection 86.5.1.

Effective January 1, 2010, the Fire Retardant coating category is eliminated and coatings with fire retardant properties will be subject to the VOC limit of their primary category (e.g., Flat, Nonflat, etc.).

4.212.20 Flat Coating: A coating that is not defined under any other definition in this rule and that registers gloss less than 15 on an 85-degree meter or less than 5 on a 60-degree meter according to ASTM Designation D 523-89 (1999), incorporated by reference in subsection 86.5.3.

4.222.21 Floor Coating: An opaque coating that is labeled and formulated for application to flooring, including, but not limited to, decks, porches, steps, garage floors, and other horizontal surfaces which may be subject to foot traffic.

2.22 Flow Coating: A coating labeled and formulated exclusively for use by electric power companies or their subcontractors to maintain the protective coating systems present on utility transformer units.

4.232.23 Form-Release Compound: A coating labeled and formulated for application to a concrete form to prevent the freshly poured concrete from bonding to the form. The form may consist of wood, metal, or some material other than concrete.

4.24 Gonioapparent: A change in appearance with a change in the angle of illumination or the angle of view, as defined according to ASTM E-284-06b, incorporated by reference in subsection 8.5.13.

4.25~~2.24~~ Graphic Arts Coating or Sign Paint: A coating labeled and formulated for hand-application by artists using brush, airbrush, or roller techniques to indoor and outdoor signs (excluding structural components) and murals including lettering enamels, poster colors, copy blockers, and bulletin enamels.

4.26~~2.25~~ High-Temperature Coating: A high performance coating labeled and formulated for application to substrates exposed continuously or intermittently to temperatures above 204°C (400°F).

4.27~~2.26~~ Industrial Maintenance Coating: A high performance architectural coating, including primers, sealers, undercoaters, intermediate coats, and topcoats, formulated for application to substrates, including floors, exposed to one or more of the following extreme environmental conditions listed in subsections 4.27.1 ~~2.26.1~~ through 4.27.5 ~~2.26.5~~, and labeled as specified in subsection 6.1.5 ~~4.1.4~~:

4.27.1 ~~2.26.1~~ Immersion in water, wastewater, or chemical solutions (aqueous and non-aqueous solutions), or chronic exposure of interior surfaces to moisture condensation; or

4.27.2 ~~2.26.2~~ Acute or chronic exposure to corrosive, caustic or acidic agents, or to chemicals, chemical fumes, or chemical mixtures or solutions; or

4.27.3 ~~2.26.3 Repeated~~ Frequent exposure to temperatures above 121°C (250°F); or

4.27.4 ~~2.26.4 Repeated (f~~Frequent~~)~~ heavy abrasion, including mechanical wear and ~~repeated (~~frequent~~)~~ scrubbing with industrial solvents, cleansers, or scouring agents; or

4.27.5 ~~2.26.5~~ Exterior exposure of metal structures and structural components.

~~2.27 Lacquer: A clear or opaque wood coating, including clear lacquer sanding sealers, formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and to provide a solid, protective film.~~

4.28~~2.28~~ Low Solids Coating: A coating containing 0.12 kilogram or less of solids per liter (1 pound or less of solids per gallon) of coating material as recommended for application by the manufacturer. The VOC content for Low Solids Coatings shall be calculated in accordance with subsection 4.64.

4.292.29 Magnesite Cement Coating: A coating labeled and formulated for application to magnesite cement decking to protect the magnesite cement substrate from erosion by water.

4.30 Manufacturer's Maximum Thinning Recommendation: The maximum recommendation for thinning that is indicated on the label or lid of the coating container.

4.312.30 Mastic Texture Coating: A coating labeled and formulated to cover holes and minor cracks and to conceal surface irregularities, and is applied in a single coat of at least 10 mils (at least 0.010 inch) dry film thickness.

4.32 Medium Density Fiberboard (MDF): A composite wood product, panel, molding, or other building material composed of cellulosic fibers (usually wood) made by dry forming and pressing of a resinated fiber mat.

4.33 Metallic: Similar to the appearance of a gonioapparent material, as defined herein, containing metal flakes.

4.342.31 Metallic Pigmented Coating: A coating that is labeled and formulated to provide a metallic appearance. Metallic Pigmented coatings must contain ~~containing~~ at least 48 grams of elemental metallic pigment (excluding zinc) per liter of coating as applied (at least 0.4 pounds per gallon), when tested in accordance with SCAQMD Method 318-95, incorporated by reference in subsection 86.5.4. The Metallic Pigmented Coating category does not include coatings applied to roofs or Zinc-Rich Primers.

4.352.32 Multi-Color Coating: A coating that is packaged in a single container and that is labeled and formulated to exhibits more than one color when applied in a single coat.

4.362.33 Nonflat Coating: A coating that is not defined under any other definition in this rule and that registers a gloss of 15 or greater on an 85-degree meter and 5 or greater on a 60-degree meter according to ASTM Designation D 523-89 (1999), incorporated by reference in subsection 86.5.3.

4.372.34 Nonflat - High Gloss Coating: A nonflat coating that registers a gloss of 70 or ~~above~~ greater on a 60-degree meter according to ASTM Designation D 523-89 (1999), incorporated by reference in subsection 86.5.3. Nonflat – High Gloss coatings must be labeled in accordance with subsection 6.1.10.

~~2.35 Nonindustrial Use: Nonindustrial use means any use of architectural coatings except in the construction or maintenance of any of the following:~~

~~facilities used in the manufacturing of goods and commodities; transportation infrastructure, including highways, bridges, airports and railroads; facilities used in mining activities, including petroleum extraction; and utilities infrastructure, including power generation and distribution, and water treatment and distribution systems.~~

4.38 Particleboard: A composite wood product panel, molding, or other building material composed of cellulosic material (usually wood) in the form of discrete particles, as distinguished from fibers, flakes, or strands, which are pressed together with resin.

4.39 Pearlescent: Exhibiting various colors depending on the angles of illumination and viewing, as observed in mother-of-pearl.

4.40 Plywood: A panel product consisting of layers of wood veneers or composite core pressed together with resin. Plywood includes panel products made by either hot or cold pressing (with resin) veneers to a platform.

4.41~~2.36~~ Post-Consumer Coating: ~~A finished coating that would have been disposed of in a landfill, having completed its usefulness to a consumer, and does not include manufacturing wastes.~~ Finished coatings generated by a business or consumer that have served their intended end uses, and are recovered from or otherwise diverted from the waste stream for the purpose of recycling.

4.42~~2.37~~ Pre-Treatment Wash Primer: A primer that contains a minimum of 0.5 percent acid, by weight, when tested in accordance with ASTM Designation D 1613-06, incorporated by reference in subsection ~~8~~6.5.5, that is labeled and formulated for application directly to bare metal surfaces to provide corrosion resistance and to promote adhesion of subsequent topcoats.

~~2.38 Primer: A coating labeled and formulated for application to a substrate to provide a firm bond between the substrate and subsequent coats.~~

4.43 Primer, Sealer, and Undercoater: A coating labeled and formulated for one or more of the following purposes:

4.43.1. To provide a firm bond between the substrate and the subsequent coatings; or

4.43.2. To prevent subsequent coatings from being absorbed by the substrate; or

4.43.3. To prevent harm to subsequent coatings by materials in the substrate; or

4.43.4. To provide a smooth surface for the subsequent application of coatings; or

4.43.5. To provide a clear finish coat to seal the substrate; or
4.43.6. To block materials from penetrating into or leaching out of a substrate.

~~2.39 Quick-Dry Enamel: A nonflat coating that is labeled as specified in subsection 4.1.8 and that is formulated to have the following characteristics:~~

~~2.39.1 Is capable of being applied directly from the container under normal conditions with ambient temperatures between 16 and 27°C (60 and 80°F);~~
~~2.39.2 When tested in accordance with ASTM Designation D 1640-95, incorporated by reference in subsection 6.5.6, sets to touch in 2 hours or less, is tack free in 4 hours or less, and dries hard in 8 hours or less by the mechanical test method; and~~
~~2.39.3 Has a dried film gloss of 70 or above on a 60 degree meter.~~

~~2.40 Quick-Dry Primer, Sealer, and Undercoater: A primer, sealer, or undercoater that is dry to the touch in 30 minutes and can be recoated in 2 hours when tested in accordance with ASTM Designation D 1640-95, incorporated by reference in subsection 6.5.6.~~

4.44 Reactive Penetrating Sealer: A clear or pigmented coating that is labeled and formulated for application to above-grade concrete and masonry substrates to provide protection from water and waterborne contaminants, including but not limited to, alkalis, acids, and salts. Reactive Penetrating Sealers must penetrate into concrete and masonry substrates and chemically react to form covalent bonds with naturally occurring minerals in the substrate. Reactive Penetrating Sealers line the pores of concrete and masonry substrates with a hydrophobic coating, but do not form a surface film. Reactive Penetrating Sealers must meet all of the following criteria:

4.44.1 The Reactive Penetrating Sealer must improve water repellency at least 80 percent after application on a concrete or masonry substrate. This performance must be verified on standardized test specimens, in accordance with one or more of the following standards, incorporated by reference in subsection 8.5.20: ASTM C67-07, or ASTM C97-02, or ASTM C140-06; and
4.44.2 The Reactive Penetrating Sealer must not reduce the water vapor transmission rate by more than 2 percent after application on a concrete or masonry substrate. This performance must be verified on standardized test specimens, in accordance with ASTM E96/E96M-05, incorporated by reference in subsection 8.5.21; and
4.44.3 Products labeled and formulated for vehicular traffic surface chloride screening applications must meet the performance criteria listed

in the National Cooperative Highway Research Report 244 (1981), incorporated by reference in subsection 8.5.22; and

Reactive Penetrating Sealers must be labeled in accordance with subsection 6.1.8.

4.452.41 Recycled Coating: An architectural coating formulated such that ~~not less than 50 percent of the total weight consists of secondary and post-consumer coating, with not less than 10 percent of the total weight consisting of post-consumer coating.~~ it contains a minimum of 50% by volume post-consumer coating, with a maximum of 50% by volume secondary industrial materials or virgin materials.

4.462.42 Residential: ~~Residence~~ Areas where people reside or lodge, including, but not limited to, single and multiple family dwellings, condominiums, mobile homes, apartment complexes, motels, and hotels.

4.472.43 Roof Coating: A non-bituminous coating labeled and formulated ~~exclusively~~ for application to roofs for the primary purpose of preventing water penetration, ~~of the substrate by water or~~ reflecting ~~heat and~~ ultraviolet light, or reflecting solar radiation. ~~Metallic pigmented roof coatings which qualify as metallic pigmented coatings shall not be considered to be in this category, but shall be considered to be in the metallic pigmented coatings category~~.

4.482.44 Rust Preventative Coating: A coating formulated ~~exclusively for nonindustrial use~~ to prevent the corrosion of metal surfaces for one or more of the following applications: ~~and labeled as specified in subsection 4.1.6.~~

4.48.1 Direct-to-metal coating; or
4.48.2 Coating intended for application over rusty, previously coated surfaces.

The Rust Preventative category does not include the following:
4.48.3 Coatings that are required to be applied as a topcoat over a primer; or
4.48.4 Coatings that are intended for use on wood or any other non-metallic surface.

Rust Preventative coatings are for metal substrates only and must be labeled as such, in accordance with the labeling requirements in subsection 6.1.6.

~~2.45 Sanding Sealer: A clear or semi-transparent wood coating labeled and formulated for application to bare wood to seal the wood and to provide a~~

~~coat that can be abraded to create a smooth surface for subsequent applications of coatings. A sanding sealer that also meets the definition of a lacquer is not included in this category, but is included in the lacquer category.~~

~~2.46 Sealer: A coating labeled and formulated for application to a substrate for one or more of the following purposes: to prevent subsequent coatings from being absorbed by the substrate, or to prevent harm to subsequent coatings by materials in the substrate.~~

4.49~~2.47~~ Secondary ~~Coating (Rework)~~ Industrial Materials: ~~A fragment of a finished coating or a finished coating from a manufacturing process that has converted resources into a commodity of real economic value, but does not include excess virgin resources of the manufacturing process.~~ Products or by-products of the paint manufacturing process that are of known composition and have economic value but can no longer be used for their intended purpose.

4.50 Semitransparent Coating: A coating that contains binders and colored pigments and is formulated to change the color of the surface, but not conceal the grain pattern or texture.

4.51~~2.48~~ Shellac: A clear or opaque coating formulated solely with the resinous secretions of the lac beetle (*Laciffer lacca*), ~~thinned with alcohol,~~ and formulated to dry by evaporation without a chemical reaction.

4.52~~2.49~~ Shop Application: Application of a coating to a product or a component of a product in or on the premises of a factory or a shop as part of a manufacturing, production, or repairing process (e.g., original equipment manufacturing coatings).

4.53~~2.50~~ Solicit: To require for use or to specify, by written or oral contract.

4.54~~2.51~~ Specialty Primer, Sealer, and Undercoater: A coating ~~labeled as specified in subsection 4.1.7 and~~ that is formulated for application to a substrate to ~~seal~~ block water-soluble stains resulting from: fire damage;~~,~~ smoke damage; or water damage.~~; to condition excessively chalky surfaces, or to block stains. An excessively chalky surface is one that is defined as having a chalk rating of four or less as determined by ASTM Designation D 4214-98, incorporated by reference in subsection 6.5.7.~~

Specialty Primers, Sealers, and Undercoaters must be labeled in accordance with subsection 6.1.7.

4.55~~2.52~~ Stain: A ~~clear,~~ semitransparent~~,~~ or opaque coating labeled and formulated to change the color of a surface but not conceal the grain

pattern or texture.

4.56 Stone Consolidant: A coating that is labeled and formulated for application to stone substrates to repair historical structures that have been damaged by weathering or other decay mechanisms. Stone Consolidants must penetrate into stone substrates to create bonds between particles and consolidate deteriorated material. Stone Consolidants must be specified and used in accordance with ASTM E2167-01, incorporated by reference in subsection 8.5.23.

Stone Consolidants are for professional use only and must be labeled as such, in accordance with the labeling requirements in subsection 6.1.9.

4.572.53 Swimming Pool Coating: A coating labeled and formulated to coat the interior of swimming pools and to resist swimming pool chemicals. Swimming pool coatings include coatings used for swimming pool repair and maintenance.

~~2.54 Swimming Pool Repair and Maintenance Coating: A rubber based coating labeled and formulated to be used over existing rubber based coatings for the repair and maintenance of swimming pools.~~

~~2.55 Temperature Indicator Safety Coating: A coating labeled and formulated as a color changing indicator coating for the purpose of monitoring the temperature and safety of the substrate, underlying piping, or underlying equipment, and for application to substrates exposed continuously or intermittently to temperatures above 204°C (400°F).~~

4.582.57 Tint Base: An architectural coating to which colorant is added after packaging in sale units to produce a desired color.

4.592.58 Traffic Marking Coating: A coating labeled and formulated for marking and striping streets, highways, or other traffic surfaces including, but not limited to, curbs, berms, driveways, parking lots, sidewalks, and airport runways.

4.60 Tub and Tile Refinish Coating: A clear or opaque coating that is labeled and formulated exclusively for refinishing the surface of a bathtub, shower, sink, or countertop. Tub and Tile Refinish coatings must meet all of the following criteria:

4.60.1 The coating must have a scratch hardness of 3H or harder and a gouge hardness of 4H or harder. This must be determined on bonderite 1000, in accordance with ASTM D3363-05, incorporated by reference in subsection 8.5.15.; and
4.60.2 The coating must have a weight loss of 20 milligrams or less after

1000 cycles. This must be determined with CS-17 wheels on bonderite 1000, in accordance with ASTM D4060-07, incorporated by reference in subsection 8.5.16; and

4.60.3 The coating must withstand 1000 hours or more of exposure with few or no #8 blisters. This must be determined on unscribed bonderite, in accordance with ASTM D4585-99, and ASTM D714-02e1, incorporated by reference in subsection 8.5.17; and

4.60.4 The coating must have an adhesion rating of 4B or better after 24 hours of recovery. This must be determined on unscribed bonderite, in accordance with ASTM D4585-99 and ASTM D3359-02, incorporated by reference in subsection 8.5.14.

~~2.58 Undercoater: A coating labeled and formulated to provide a smooth surface for subsequent coatings.~~

~~2.59 Varnish: A clear or semi-transparent wood coating, excluding lacquers and shellacs, formulated to dry by chemical reaction on exposure to air. Varnishes may contain small amounts of pigment to color a surface, or to control the final sheen or gloss of the finish.~~

4.61 Veneer: Thin sheets of wood peeled or sliced from logs for use in the manufacture of wood products such as plywood, laminated veneer lumber, or other products.

4.62 Virgin Materials: Materials that contain no post-consumer coatings or secondary industrial materials.

4.63~~2.60~~ Volatile Organic Compound (VOC): Any volatile compound containing at least one atom of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding the following:

4.63.1~~2.60.1~~ methane;

methylene chloride (dichloromethane);
1,1,1-trichloroethane (methyl chloroform);
trichlorofluoromethane (CFC-11);
dichlorodifluoromethane (CFC-12);
1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113);
1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114);
chloropentafluoroethane (CFC-115);
chlorodifluoromethane (HCFC-22);
1,1,1-trifluoro-2,2-dichloroethane (HCFC-123);
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);
1,1-dichloro-1-fluoroethane (HCFC-141b);
1-chloro-1,1-difluoroethane (HCFC-142b);
trifluoromethane (HFC-23);
pentafluoroethane (HFC-125);

1,1,2,2-tetrafluoroethane (HFC-134);
1,1,1,2-tetrafluoroethane (HFC-134a);
1,1,1-trifluoroethane (HFC-143a);
1,1-difluoroethane (HFC-152a);
cyclic, branched, or linear completely methylated siloxanes;
the following classes of perfluorocarbons:
4.63.1.1~~(A)~~ cyclic, branched, or linear, completely fluorinated alkanes;
4.63.1.2~~(B)~~ cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
4.63.1.3~~(C)~~ cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
4.63.1.4~~(D)~~ sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds only to carbon and fluorine; and

4.63.2~~2.60.2~~ the following low-reactive organic compounds which have been exempted by the U.S. EPA:
acetone;
ethane;
parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene);
perchloroethylene; and
methyl acetate.

4.64 VOC Actual: VOC Actual is the weight of VOC per volume of coating and it is calculated with the following equation:

$$\text{VOC Actual} = \frac{(W_s - W_w - W_{ec})}{(V_m)}$$

Where:

VOC Actual	=	the grams of VOC per liter of coating (also known as "Material VOC")
W_s	=	weight of volatiles, in grams
W_w	=	weight of water, in grams
W_{ec}	=	weight of exempt compounds, in grams
V_m	=	volume of coating, in liters

4.65~~2.61~~ VOC Content: The weight of VOC per volume of coating~~, calculated according to the procedures specified in subsection 6.1~~. VOC Content is VOC Regulatory, as defined in subsection 4.66, for all coatings except those in the Low Solids category. For coatings in the Low Solids category, the VOC Content is VOC Actual, as defined in subsection 4.64. If the coating is a multi-component product, the VOC content is VOC Regulatory as mixed or catalyzed. If the coating contains silanes, siloxanes, or other ingredients that generate ethanol or other VOCs during the curing process, the VOC content must include the VOCs emitted

during curing.

4.66 VOC Regulatory: VOC Regulatory is the weight of VOC per volume of coating, less the volume of water and exempt compounds. It is calculated with the following equation:

$$\text{VOC Regulatory} = \frac{(Ws - Ww - Wec)}{(Vm - Vw - Vec)}$$

Where:

VOC Regulatory = grams of VOC per liter of coating, less water and exempt compounds (also known as "Coating VOC")

W_s = weight of volatiles, in grams

W_w = weight of water, in grams

W_{ec} = weight of exempt compounds, in grams

V_m = volume of coating, in liters

V_w = volume of water, in liters

V_{ec} = volume of exempt compounds, in liters

~~2.62 Waterproofing Sealer: A coating labeled and formulated for application to a porous substrate for the primary purpose of preventing the penetration of water.~~

~~2.63 Waterproofing Concrete/Masonry Sealer: A clear or pigmented film-forming coating that is labeled and formulated for sealing concrete and masonry to provide resistance against water, alkalis, acids, ultraviolet light, and staining.~~

4.67 Waterproofing Membrane: A clear or opaque coating that is labeled and formulated for application to concrete and masonry surfaces to provide a seamless waterproofing membrane that prevents any penetration of liquid water into the substrate. Waterproofing Membranes are intended for the following waterproofing applications: below-grade surfaces, between concrete slabs, inside tunnels, inside concrete planters, and under flooring materials. Waterproofing Membranes must meet the following criteria:

4.67.1 Coating must be applied in a single coat of at least 25 mils (at least 0.025 inch) dry film thickness; and

4.67.2 Coatings must meet or exceed the requirements contained in ASTM C836-06, incorporated by reference in subsection 8.5.18.

The Waterproofing Membrane category does not include topcoats that are included in the Concrete/Masonry Sealer category (e.g., parking deck topcoats, pedestrian deck topcoats, etc.).

4.68 Wood Coatings: Coatings labeled and formulated for application to wood substrates only. The Wood Coatings category includes the following clear

and semitransparent coatings: lacquers; varnishes; sanding sealers; penetrating oils; clear stains; wood conditioners used as undercoats; and wood sealers used as topcoats. The Wood Coatings category also includes the following opaque wood coatings: opaque lacquers; opaque sanding sealers; and opaque lacquer undercoaters. The Wood Coatings category does not include the following: clear sealers that are labeled and formulated for use on concrete/masonry surfaces; or coatings intended for substrates other than wood.

Wood Coatings must be labeled "For Wood Substrates Only", in accordance with subsection 6.1.11.

4.692.64 Wood Preservative: A coating labeled and formulated to protect exposed wood from decay or insect attack, that is registered with both the U.S. EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 United States Code (U.S.C.) Section 136, *et seq.*) and with the California Department of Pesticide Regulation.

4.70 Wood Substrate: A substrate made of wood, particleboard, plywood, medium density fiberboard, rattan, wicker, bamboo, or composite products with exposed wood grain. Wood Products do not include items comprised of simulated wood.

4.71 Zinc-Rich Primer: A coating that meets all of the following specifications:

4.71.1 Coating contains at least 65 percent metallic zinc powder or zinc dust by weight of total solids; and

4.71.2 Coating is formulated for application to metal substrates to provide a firm bond between the substrate and subsequent applications of coatings; and

4.71.3 Coating is intended for professional use only and is labeled as such, in accordance with the labeling requirements in subsection 6.1.12.

53. STANDARDS

53.1 **VOC Content Limits:** Except as provided in subsections 53.2, or 53.3, 3.8, 3.9, and 3.10, no person shall:

5.1.1(i) manufacture, blend, or repackage for sale within the district;

5.1.2(ii) supply, sell, or offer for sale within the district; or

5.1.3(iii) solicit for application or apply within the district, any architectural coating with a VOC content in excess of the corresponding limit specified in Table 1, after the specified effective date in Table 1. Limits are expressed as VOC Regulatory, thinned to the manufacturer's maximum thinning recommendation, excluding any colorant added to tint bases.

53.2 **Most Restrictive VOC Limit:** ~~If anywhere on the container of any architectural coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature supplied by a manufacturer or anyone acting on their behalf, any representation is made that indicates that the coating meets the definition of or is recommended for use for more than one of the coating categories listed in Table 1, then the most restrictive VOC content limit shall apply.~~ If a coating is recommended for use in more than one of the specialty coating categories listed in Table 1, the most restrictive (or lowest) VOC content limit shall apply. This requirement applies to: usage recommendations that appear anywhere on the coating container, anywhere on any label or sticker affixed to the container, or in any sales, advertising, or technical literature supplied by a manufacturer or anyone acting on their behalf. This provision does not apply to the specialty coating categories specified in Table 2 ~~subsections 3.2.1 through 3.2.15.~~

~~3.2.1 Lacquer coatings (including lacquer sanding sealers).~~
~~3.2.2 Metallic pigmented coatings.~~
~~3.2.3 Shellacs.~~
~~3.2.4 Fire-retardant coatings.~~
~~3.2.5 Pretreatment wash primers.~~
~~3.2.6 Industrial maintenance coatings.~~
~~3.2.7 Low-solids coatings.~~
~~3.2.8 Wood preservatives.~~
~~3.2.9 High temperature coatings.~~
~~3.2.10 Temperature-indicator safety coatings.~~
~~3.2.11 Antenna coatings.~~
~~3.2.12 Antifouling coatings.~~
~~3.2.13 Flow coatings.~~
~~3.2.14 Bituminous roof primers.~~
~~3.2.15 Specialty primers, sealers, and undercoaters.~~

53.3 **Sell-Through of Coatings:** A coating manufactured prior to the effective date specified for that coating in Table 1 may be sold, supplied, or offered for sale for up to three years after the specified effective date. In addition, a coating manufactured before the effective date specified for that coating in Table 1 may be applied at any time, both before and after the specified effective date, so long as the coating complied with the standards in effect at the time the coating was manufactured. This subsection 53.3 does not apply to any coating that does not display the date or date-code required by subsection 64.1.1.

53.4 **Painting Practices:** All architectural coating containers used to apply the contents therein to a surface directly from the container by pouring, siphoning, brushing, rolling, padding, ragging or other means, shall be closed when not in use. These architectural coating containers include,

but are not limited to, drums, buckets, cans, pails, trays or other application containers. Containers of any VOC-containing materials used for thinning and cleanup shall also be closed when not in use.

53.5 **Thinning:** No person who applies or solicits the application of any architectural coating shall apply a coating that is thinned to exceed the applicable VOC limit specified in Table 1.

~~3.6 **Rust Preventative Coatings:** Effective January 1, 2004, no person shall apply or solicit the application of any rust preventative coating for industrial use, unless such a rust preventative coating complies with the industrial maintenance coating VOC limit specified in Table 1.~~

5.63.7 **Coatings Not Listed in Table 1:** For any coating that does not meet any of the definitions for the specialty coatings categories listed in Table 1, the VOC content limit shall be determined by classifying the coating as a Flat ~~coating or a~~, Nonflat, or Nonflat – High Gloss coating, based on its gloss, as defined in subsections 4.21, 4.36, and 4.372.20, 2.33, and 2.34 and the corresponding Flat, ~~or~~ Nonflat, or Nonflat – High Gloss VOC limit in Table 1 shall apply.

~~3.8 **Industrial Maintenance Coatings:**~~

~~3.8.1 After January 1, 2004, a manufacturer, seller, or user may petition the APCO to apply an industrial maintenance coating with a VOC content up to 340 g/l if all of the following conditions are met:~~

~~3.8.1.1 The industrial maintenance coating is to be applied in a district located within the North Central Coast, San Francisco Bay Area, or North Coast Air Basins.~~

~~3.8.1.2 The petition submitted to the APCO contains the following information, as applicable: job requirements and description, volume of coating, maximum VOC content, and a certification that a complying coating meeting the job performance requirements is not available.~~

~~3.8.1.3 If the APCO grants written approval, such approval shall contain volume and VOC limit conditions. Until written approval is granted by the APCO and received by the petitioner, all provisions of this rule shall apply.~~

~~3.8.2 The APCO shall not approve any petition under subsection 3.8.1 if the approvals previously granted by the APCO during the calendar year, when combined with the petition under consideration, would result in excess VOC emissions for that calendar year which would be greater than 5 percent of the annual emission reduction achieved within the district from implementing the January 1, 2004,~~

~~VOC limit for industrial maintenance coatings.~~

~~3.8.3 Coatings subject to this provision shall be sold only if an approved petition (or a copy of it) is provided prior to the sale. Coatings subject to this provision shall not be available to the general public.~~

~~3.9 **Lacquers:** Notwithstanding the provisions of subsection 3.1, a person or facility may add up to 10 percent by volume of VOC to a lacquer to avoid blushing of the finish during days with relative humidity greater than 70 percent and temperature below 65°F, at the time of application, provided that the coating contains acetone and no more than 550 grams of VOC per liter of coating, less water and exempt compounds, prior to the addition of VOC.~~

~~3.10 **Averaging Compliance Option:** On or after January 1, 2003, in lieu of compliance with the specified limits in Table 1 for floor coatings; industrial maintenance coatings; primers, sealers, and undercoaters; quick-dry primers, sealers, and undercoaters; quick-dry enamels; roof coatings; rust preventative coatings; stains; waterproofing sealers, as well as flats and non-flats (excluding recycled coatings), manufacturers may average designated coatings such that their actual cumulative emissions from the averaged coatings are less than or equal to the cumulative emissions that would have been allowed under those limits over a compliance period not to exceed one year. Such manufacturers must also comply with the averaging provisions contained in Appendix A, as well as maintain and make available for inspection records for at least three years after the end of the compliance period. This subsection 3.10 and Appendix A shall cease to be effective on January 1, 2005, after which averaging will no longer be allowed.~~

64. CONTAINER LABELING REQUIREMENTS

64.1 Each manufacturer of any architectural coating subject to this rule shall display the information listed in subsections 64.1.1 through 64.1.~~8~~12 on the coating container (or label) in which the coating is sold or distributed.

64.1.1 **Date Code:** The date the coating was manufactured, or a date code representing the date, shall be indicated on the label, lid, or bottom of the container. If the manufacturer uses a date code for any coating, the manufacturer shall file an explanation of each code with the Executive Officer of the ARB.

64.1.2 **Thinning Recommendations:** A statement of the manufacturer's recommendation regarding thinning of the coating shall be indicated on the label or lid of the container. This requirement does not apply to the thinning of architectural coatings with water. If

thinning of the coating prior to use is not necessary, the recommendation must specify that the coating is to be applied without thinning.

64.1.3 **VOC Content:** ~~Each container of any coating subject to this rule shall display either the maximum or the actual~~ specific ~~VOC content of the coating, as supplied, including the maximum thinning as recommended by the manufacturer. VOC content shall be displayed in grams of VOC per liter of coating. VOC content displayed shall be calculated using product formulation data, or shall be determined using the test methods in subsection 6.2. The equations in subsection 6.1 shall be used to calculate VOC content.~~

Each container of any coating subject to this rule shall display one of the following values in grams of VOC per liter of coating:

6.1.3.1 Maximum VOC Content as determined from all potential product formulations; or
6.1.3.2 VOC Content as determined from actual formulation data; or
6.1.3.3 VOC Content as determined using the test methods in subsection 8.2.

If the manufacturer does not recommend thinning, the container must display the VOC Content, as supplied. If the manufacturer recommends thinning, the container must display the VOC Content including the maximum amount of thinning solvent recommended by the manufacturer. If the coating is a multi-component product, the container must display the VOC content as mixed or catalyzed. If the coating contains silanes, siloxanes, or other ingredients that generate ethanol or other VOCs during the curing process, the VOC content must include the VOCs emitted during curing. VOC Content shall be determined as defined in subsections 4.64, 4.65, and 4.66.

6.1.4 **Faux Finishing Coatings:** Effective January 1, 2010, the labels of all Faux Finishing coatings shall prominently display the statement "This product can only be sold or used as part of a Faux Finishing coating system".

6.1.5~~4.1.4~~**Industrial Maintenance Coatings:** ~~In addition to the information specified in subsection 4.1.1, 4.1.2, and 4.1.3, each manufacturer of any industrial maintenance coating subject to this rule~~ The labels of all Industrial Maintenance coatings shall prominently display the statement "For industrial use only" or "For

professional use only". ~~on the label or lid of the container in which the coating is sold or distributed one or more of the descriptions listed in subsections 4.1.4.1 through 4.1.4.3.~~

~~4.1.4.1 "For industrial use only."~~
~~4.1.4.2 "For professional use only."~~
~~4.1.4.3 "Not for residential use or Not intended for residential use."~~

~~4.1.5 **Clear Brushing Lacquers:** Effective January 1, 2003, the labels of all clear brushing lacquers shall prominently display the statements "For brush application only," and "This product must not be thinned or sprayed."~~

6.1.6~~4.1.6~~ **Rust Preventative Coatings:** ~~Effective January 1, 2003,~~ The ~~the~~ labels of all rust preventative coatings shall prominently display the statement "For Metal Substrates Only."

6.1.7~~4.1.7~~ **Specialty Primers, Sealers, and Undercoaters:** ~~Effective January 1, 2003,~~ Until January 1, 2012, the labels of all specialty primers, sealers, and undercoaters shall prominently display one or more of the descriptions listed in subsection 6.1.7.1~~4.1.7.1~~ through 6.1.7.3~~4.1.7.5~~.

~~4.1.7.1 For blocking stains.~~
6.1.7.1~~4.1.7.2~~ For fire-damaged substrates.
6.1.7.2~~4.1.7.3~~ For smoke-damaged substrates.
6.1.7.3~~4.1.7.4~~ For water-damaged substrates.
~~4.1.7.5 For excessively chalky substrates.~~

~~4.1.8 **Quick Dry Enamels:** Effective January 1, 2003, the labels of all quick-dry enamels shall prominently display the words "Quick Dry" the dry hard time.~~

6.1.8 **Reactive Penetrating Sealers:** Effective January 1, 2010, the labels of all Reactive Penetrating Sealers shall prominently display the statement "Reactive Penetrating Sealer".

6.1.9 **Stone Consolidants:** Effective January 1, 2010, the labels of all Stone Consolidants shall prominently display the statement "Stone Consolidant - For Professional Use Only".

6.1.10~~4.1.9~~ **Nonflat - High Gloss Coatings:** ~~Effective January 1, 2003,~~ The ~~the~~ labels of all Nonflat - High Gloss coatings shall prominently display the words "High Gloss."

6.1.11 **Wood Coatings:** Effective January 1, 2010, the labels of all Wood Coatings shall prominently display the statement "For Wood Substrates Only".

6.1.12 **Zinc Rich Primers**: Effective January 1, 2010, the labels of all Zinc Rich Primers shall prominently display the statement "For Professional Use Only".

~~7~~5. REPORTING REQUIREMENTS

~~5.1 **Clear Brushing Lacquers:** Each manufacturer of clear brushing lacquers shall, on or before April 1 of each calendar year beginning in the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall specify the number of gallons of clear brushing lacquers sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.~~

~~5.2 **Rust Preventative Coatings:** Each manufacturer of Rust Preventative coatings shall, on or before April 1 of each calendar year beginning in the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall specify the number of gallons of Rust Preventative coatings sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.~~

~~5.3 **Specialty Primers, Sealers, and Undercoaters:** Each manufacturer of Specialty Primers, Sealers, and Undercoaters shall, on or before April 1 of each calendar year beginning in the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall specify the number of gallons of Specialty Primers, Sealers, and Undercoaters sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.~~

~~5.4 **Toxic Exempt Compounds:** For each architectural coating that contains perchloroethylene or methylene chloride, the manufacturer shall, on or before April 1 of each calendar year beginning with the year 2004, report to the Executive Officer of the ARB the following information for products sold in the State during the preceding year:~~

~~5.4.1 the product brand name and a copy of the product label with legible usage instructions;~~
~~5.4.2 the product category listed in Table 1 to which the coating belongs;~~
~~5.4.3 the total sales in California during the calendar year to the nearest gallon;~~
~~5.4.4 the volume percent, to the nearest 0.10 percent, of perchloroethylene and methylene chloride in the coating.~~

~~5.5 **Recycled Coatings:** Manufacturers of Recycled coatings must submit a letter to the Executive Officer of the ARB certifying their status as a Recycled Paint Manufacturer. The manufacturer shall, on or before April 1 of each calendar year beginning with the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall include, for all Recycled coatings, the total number of gallons distributed in the State during the preceding year, and shall describe the method used by the manufacturer to calculate State distribution.~~

~~5.6 **Bituminous Coatings:** Each manufacturer of Bituminous Roof coatings or Bituminous Roof Primers shall, on or before April 1 of each calendar year beginning with the year 2004, submit an annual report to the Executive Officer of ARB. The report shall specify the number of gallons of Bituminous Roof coatings or Bituminous Roof Primers sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.~~

7.1 **Sales Data:** A responsible official from each manufacturer shall upon request of the Executive Officer of the ARB, or his or her delegate, provide data concerning the distribution and sales of architectural coatings. The responsible official shall within 180 days provide information including, but not limited to:

7.1.1 the name and mailing address of the manufacturer;

7.1.2 the name, address and telephone number of a contact person;

7.1.3 the name of the coating product as it appears on the label and the applicable coating category;

7.1.4 whether the product is marketed for interior or exterior use or both;

7.1.5 the number of gallons sold in California in containers greater than one liter (1.057 quart) and equal to or less than one liter (1.057 quart);

7.1.6 the VOC Actual content and VOC Regulatory content in grams per liter. If thinning is recommended, list the VOC Actual content and VOC Regulatory content after maximum recommended thinning. If containers less than one liter have a different VOC content than containers greater than one liter, list separately. If the coating is a multi-component product, provide the VOC content as mixed or catalyzed;

7.1.7 the names and CAS numbers of the VOC constituents in the product;

7.1.8 the names and CAS numbers of any compounds in the product specifically exempted from the VOC definition, as listed in subsection 4.63.1 or 4.63.2;

7.1.9 whether the product is marketed as solventborne, waterborne, or 100% solids;

7.1.10 description of resin or binder in the product;

7.1.11 whether the coating is a single-component or multi-component product;
7.1.12 the density of the product in pounds per gallon;
7.1.13 the percent by weight of: solids, all volatile materials, water, and any compounds in the product specifically exempted from the VOC definition, as listed in subsection 4.63.1 or 4.63.2; and
7.1.14 the percent by volume of: solids, water, and any compounds in the product specifically exempted from the VOC definition, as listed in subsection 4.63.1 or 4.63.2.

7.2 All sales data listed in subsections 7.1.1 to 7.1.14 shall be maintained by the responsible official for a minimum of three years. Sales data submitted by the responsible official to the Executive Officer of the ARB may be claimed as confidential, and such information shall be handled in accordance with the procedures specified in Title 17, California Code of Regulations Sections 91000-91022.

8~~6~~ COMPLIANCE PROVISIONS AND TEST METHODS

8~~6~~.1 **Calculation of VOC Content:** For the purpose of determining compliance with the VOC content limits in Table 1, the VOC content of a coating shall be determined as defined in subsection 4.64, 4.65, or 4.66 ~~by using the procedures described in subsection 6.1.1 or 6.1.2, as appropriate~~. The VOC content of a tint base shall be determined without colorant that is added after the tint base is manufactured. If the manufacturer does not recommend thinning, the VOC Content must be calculated for the product as supplied. If the manufacturer recommends thinning, the VOC Content must be calculated including the maximum amount of thinning solvent recommended by the manufacturer. If the coating is a multi-component product, the container must display the VOC content as mixed or catalyzed. If the coating contains silanes, siloxanes, or other ingredients that generate ethanol or other VOCs during the curing process, the VOC content must include the VOCs emitted during curing.

~~6.1.1 With the exception of low solids coatings, determine the VOC content in grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, excluding the volume of any water and exempt compounds. Determine the VOC content using equation 1 as follows:~~

$$\text{VOC Content} = \frac{(W_s - W_w - W_{ec})}{(V_m - V_w - V_{ec})} \qquad (1)$$

~~Where:~~
~~VOC Content = grams of VOC per liter of coating~~
~~W_s = weight of volatiles, in grams~~
~~W_w = weight of water, in grams~~

~~W_{ec} = weight of exempt compounds, in grams~~
~~V_m = volume of coating, in liters~~
~~V_w = volume of water, in liters~~
~~V_{ec} = volume of exempt compounds, in liters~~

~~6.1.2 For low solids coatings, determine the VOC content in units of grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, including the volume of any water and exempt compounds. Determine the VOC content using equation 2 as follows:~~

~~$$\text{VOC Content}_{ls} = \frac{(Ws - Ww - Wec)}{(Vm)} \qquad (2)$$~~

~~Where:~~
~~VOC Content_{ls} = the VOC content of a low solids coating in grams of VOC per liter of coating~~
~~W_s = weight of volatiles, in grams~~
~~W_w = weight of water, in grams~~
~~W_{ec} = weight of exempt compounds, in grams~~
~~V_m = volume of coating, in liters~~

8~~6~~.2 **VOC Content of Coatings:** To determine the physical properties of a coating in order to perform the calculations in subsection 4.64 or 4.66 ~~6.1~~, the reference method for VOC content is U.S. EPA Method 24, incorporated by reference in subsection 8.5.9~~6.5.11~~, except as provided in subsections 8~~6~~.3 and 8~~6~~.4. An alternative method to determine the VOC content of coatings is SCAQMD Method 304-91 (Revised ~~February~~ 1996), incorporated by reference in subsection 8.5.10~~6.5.12~~. The exempt compounds content shall be determined by SCAQMD Method 303-91 (Revised ~~August 1996~~ 1993), BAAQMD Method 43 (Revised 1996), or BAAQMD Method 41 (Revised 1995), as applicable, incorporated by reference in subsections 8.5.8~~6.5.10~~, 8.5.6, and 8.5.7, respectively. To determine the VOC content of a coating, the manufacturer may use U.S. EPA Method 24, or an alternative method as provided in subsection 8~~6~~.3, formulation data, or any other reasonable means for predicting that the coating has been formulated as intended (e.g., quality assurance checks, record keeping). However, if there are any inconsistencies between the results of a Method 24 test and any other means for determining VOC content, the Method 24 test results will govern, except when an alternative method is approved as specified in subsection 8~~6~~.3. The District Air Pollution Control Officer (APCO) may require the manufacturer to conduct a Method 24 analysis.

8~~6~~.3 **Alternative Test Methods:** Other test methods demonstrated to provide results that are acceptable for purposes of determining compliance with

subsection 86.2, after review and approved in writing by the staffs of the District, the ARB, and the U.S. EPA, may also be used.

86.4 **Methacrylate Traffic Marking Coatings:** Analysis of methacrylate multicomponent coatings used as traffic marking coatings shall be conducted according to a modification of U.S. EPA Method 24 (40 CFR 59, subpart D, Appendix A), incorporated by reference in subsection 8.5.116.5.13. This method has not been approved for methacrylate multicomponent coatings used for other purposes than as traffic marking coatings or for other classes of multicomponent coatings.

86.5 **Test Methods:** The following test methods are incorporated by reference herein, and shall be used to test coatings subject to the provisions of this rule:

86.5.1 **Flame Spread Index:** The flame spread index of a fire-retardant coating shall be determined by ASTM Designation E 84-07, "Standard Test Method for Surface Burning Characteristics of Building Materials" (see section 24, Fire-Retardant Coating).

86.5.2 **Fire Resistance Rating:** The fire resistance rating of a fire-resistive coating shall be determined by ASTM Designation E 119-07, "Standard Test Methods for Fire Tests of Building Construction Materials" (see section 24, Fire-Resistive Coating).

86.5.3 **Gloss Determination:** The gloss of a coating shall be determined by ASTM Designation D 523-89 (1999), "Standard Test Method for Specular Gloss" (see section 24, Flat Coating, Nonflat Coating, and Nonflat - High Gloss Coating, and Quick-Dry Enamel).

86.5.4 **Metal Content of Coatings:** The metallic content of a coating shall be determined by SCAQMD Method 318-95, "Determination of Weight Percent Elemental Metal in Coatings by X-Ray Diffraction," *SCAQMD Laboratory Methods of Analysis for Enforcement Samples* (see section 24, Aluminum Roof, Faux Finishing, and Metallic Pigmented Coating).

86.5.5 **Acid Content of Coatings:** The acid content of a coating shall be determined by ASTM Designation D 1613-06, "Standard Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products" (see section 24, Pre-treatment Wash Primer).

6.5.6 **Drying Times:** The set-to-touch, dry-hard, dry-to-touch, and dry-to-recoat times of a coating shall be determined by ASTM Designation D 1640-95, "Standard Test Methods for Drying, Curing, or Film

~~Formation of Organic Coatings at Room Temperature" (see section 2, Quick-Dry Enamel and Quick-Dry Primer, Sealer, and Undercoater). The tack-free time of a quick-dry enamel coating shall be determined by the Mechanical Test Method of ASTM Designation D 1640-95.~~

~~6.5.7 **Surface Chalkiness:** The chalkiness of a surface shall be determined using ASTM Designation D 4214-98, "Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films" (see section 2, Specialty Primer, Sealer, and Undercoater).~~

8.5.6~~6.5.8~~ **Exempt Compounds--Siloxanes:** Exempt compounds that are cyclic, branched, or linear completely methylated siloxanes, shall be analyzed as exempt compounds for compliance with section ~~6~~8 by BAAQMD Method 43, "Determination of Volatile Methylsiloxanes in Solvent-Based Coatings, Inks, and Related Materials," *BAAQMD Manual of Procedures*, Volume III, adopted 11/6/96 (see section ~~2~~4, Volatile Organic Compound, and subsection ~~6~~8.2).

8.5.7~~6.5.9~~ **Exempt Compounds--Parachlorobenzotrifluoride (PCBTF)**: The exempt compound parachlorobenzotrifluoride, shall be analyzed as an exempt compound for compliance with section ~~6~~8 by BAAQMD Method 41, "Determination of Volatile Organic Compounds in Solvent Based Coatings and Related Materials Containing Parachlorobenzotrifluoride," *BAAQMD Manual of Procedures*, Volume III, adopted 12/20/95 (see section~~2~~4, Volatile Organic Compound, and subsection ~~6~~8.2).

8.5.8~~6.5.10~~ **Exempt Compounds:** The content of compounds exempt under U.S. EPA Method 24 shall be analyzed by SCAQMD Method 303-91 (Revised 1993), "Determination of Exempt Compounds," *SCAQMD Laboratory Methods of Analysis for Enforcement Samples* (see section ~~2~~4, Volatile Organic Compound, and subsection ~~6~~8.2).

8.5.9~~6.5.11~~ **VOC Content of Coatings:** The VOC content of a coating shall be determined by U.S. EPA Method 24 as it exists in appendix A of 40 *Code of Federal Regulations* (CFR) part 60, "Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings" (see subsection ~~6~~8.2).

8.5.10~~6.5.12~~ **Alternative VOC Content of Coatings:** The VOC content of coatings may be analyzed either by U.S. EPA Method 24 or SCAQMD Method 304-91 (Revised 1996), "Determination of

Volatile Organic Compounds (VOC) in Various Materials," *SCAQMD Laboratory Methods of Analysis for Enforcement Samples* (see subsection ~~6~~8.2).

8.5.11~~6.5.13~~ **Methacrylate Traffic Marking Coatings:** The VOC content of methacrylate multicomponent coatings used as traffic marking coatings shall be analyzed by the procedures in 40 CFR part 59, subpart D, appendix A, "Determination of Volatile Matter Content of Methacrylate Multicomponent Coatings Used as Traffic Marking Coatings" ~~(September 11, 1998)~~ (see subsection ~~6~~8.4).

8.5.12 **Hydrostatic Pressure for Basement Specialty Coatings**: ASTM D7088-04, "Standard Practice for Resistance to Hydrostatic Pressure for Coatings Used in Below Grade Applications Applied to Masonry" (see section 4, Basement Specialty Coating).

8.5.13 **Gonioapparent Characteristics for Coatings**: ASTM E-284-07, "Standard Terminology of Appearance" (see section 4, Gonioapparent).

8.5.14 **Tub and Tile Refinish Coating Adhesion:** ASTM D 4585-99, "Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation" and ASTM D3359-02, "Standard Test Methods for Measuring Adhesion by Tape Test" (see section 4, Tub and Tile Refinish Coating).

8.5.15 **Tub and Tile Refinish Coating Hardness**: ASTM D 3363-05, "Standard Test Method for Film Hardness by Pencil Test" (see section 4, Tub and Tile Refinish Coating).

8.5.16 **Tub and Tile Refinish Coating Abrasion Resistance**: ASTM D 4060-07, "Standard Test Methods for Abrasion Resistance of Organic Coatings by the Taber Abraser" (see section 4, Tub and Tile Refinish Coating).

8.5.17 **Tub and Tile Refinish Coating Water Resistance**: ASTM D 4585-99, "Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation" and ASTM D714-02e1, "Standard Test Method for Evaluating Degree of Blistering of Paints" (see section 4, Tub and Tile Refinish Coating).

8.5.18 **Waterproofing Membrane**: ASTM C836-06, "Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course" (see section 4, Waterproofing Membrane).

8.5.19 **Mold and Mildew Growth for Basement Specialty Coatings:** ASTM D3273-00, "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber" and ASTM D3274-95, "Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation" (see section 4, Basement Specialty Coating).

8.5.20 **Reactive Penetrating Sealer Water Repellency:** ASTM C67-07, "Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile"; or ASTM C97-02, "Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone"; or ASTM C140-06, "Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units" (see section 4, Reactive Penetrating Sealer).

8.5.21 **Reactive Penetrating Sealer Water Vapor Transmission:** ASTM E96/E96M-05, "Standard Test Method for Water Vapor Transmission of Materials" (see section 4, Reactive Penetrating Sealer).

8.5.22 **Reactive Penetrating Sealer - Chloride Screening Applications:** National Cooperative Highway Research Report 244 (1981), "Concrete Sealers for the Protection of Bridge Structures" (see section 4, Reactive Penetrating Sealer).

8.5.23 **Stone Consolidants:** ASTM E2167-01, "Standard Guide for Selection and Use of Stone Consolidants" (see section 4, Stone Consolidant).

Table 1
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS

Limits are expressed as VOC Regulatory, ~~in grams of VOC per liter[a] of coating~~ thinned to the manufacturer's maximum thinning recommendation, excluding ~~the volume of any water, exempt compounds, or~~ any colorant added to tint bases. ~~"Manufacturer's maximum recommendation" means the maximum recommendation for thinning that is indicated on the label or lid of the coating container.~~

Coating Category	~~Effective 1/1/2003~~	~~Effective 1/1/2004~~	Effective 1/1/2010	Effective 1/1/2012
Flat Coatings	~~100~~		50	
Nonflat Coatings	~~150~~		100	
Nonflat - High Gloss Coatings	~~250~~		150	
Specialty Coatings				
Aluminum Roof Coatings			400	
~~Antenna Coatings~~	~~530~~			
~~Antifouling Coatings~~	~~400~~			
Basement Specialty Coatings			400	
Bituminous Roof Coatings	~~300~~		50	
Bituminous Roof Primers	~~350~~		350	
Bond Breakers	~~350~~		350	
~~Clear Wood Coatings~~ • ~~Clear Brushing Lacquers~~ • ~~Lacquers (including lacquer sanding sealers)~~ • ~~Sanding Sealers (other than lacquer sanding sealers)~~ • ~~Varnishes~~	 ~~680~~ ~~550~~ ~~350~~ ~~350~~			
Concrete Curing Compounds	~~350~~		350	
Concrete/Masonry Sealers			100	
Driveway Sealers			50	
Dry Fog Coatings	~~400~~		150	
Faux Finishing Coatings	~~350~~		350	
Fire Resistive Coatings	~~350~~		350	
~~Fire Retardant Coatings:~~ • ~~Clear~~ • ~~Opaque~~	 ~~650~~ ~~350~~			
Floor Coatings	~~250~~		100	

Table 1
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS

Limits are expressed as VOC Regulatory, ~~in grams of VOC per liter[a] of coating~~ thinned to the manufacturer's maximum thinning recommendation, excluding ~~the volume of any water, exempt compounds, or~~ any colorant added to tint bases. ~~"Manufacturer's maximum recommendation" means the maximum recommendation for thinning that is indicated on the label or lid of the coating container.~~

Coating Category	~~Effective 1/1/2003~~	~~Effective 1/1/2004~~	Effective 1/1/2010	Effective 1/1/2012
~~Flow Coatings~~	~~420~~			
Form-Release Compounds	~~250~~		250	
Graphic Arts Coatings (Sign Paints)	~~500~~		500	
High Temperature Coatings	~~420~~		420	
Industrial Maintenance Coatings		~~250~~	250	
Low Solids Coatings[ab]	~~120~~		120	
Magnesite Cement Coatings	~~450~~		450	
Mastic Texture Coatings	~~300~~		100	
Metallic Pigmented Coatings	~~500~~		500	
Multi-Color Coatings	~~250~~		250	
Pre-Treatment Wash Primers	~~420~~		420	
Primers, Sealers, and Undercoaters	~~200~~		100	
~~Quick-Dry Enamels~~	~~250~~			
~~Quick-Dry Primers, Sealers, and Undercoaters~~	~~200~~			
Reactive Penetrating Sealers			350	
Recycled Coatings	~~250~~		250	
Roof Coatings	~~250~~		50	
Rust Preventative Coatings	~~400~~			250
Shellacs: • Clear • Opaque	 ~~730~~ ~~550~~		 730 550	
Specialty Primers, Sealers, and Undercoaters	~~350~~			100
Stains	~~250~~		250	
Stone Consolidants			450	
Swimming Pool Coatings	~~340~~		340	
~~Swimming Pool Repair and Maintenance Coatings~~	~~340~~			
~~Temperature Indicator Safety Coatings~~	~~550~~			

Table 1
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS

Limits are expressed as VOC Regulatory, ~~in grams of VOC per liter[a] of coating~~ thinned to the manufacturer's maximum thinning recommendation, excluding ~~the volume of any water, exempt compounds, or~~ any colorant added to tint bases. ~~"Manufacturer's maximum recommendation" means the maximum recommendation for thinning that is indicated on the label or lid of the coating container.~~

Coating Category	~~Effective 1/1/2003~~	~~Effective 1/1/2004~~	Effective 1/1/2010	Effective 1/1/2012
Traffic Marking Coatings	~~150~~		100	
Tub and Tile Refinish Coatings			420	
Waterproofing Membranes			250	
~~Waterproofing Sealers~~	~~250~~			
~~Waterproofing Concrete/Masonry Sealers~~	~~400~~			
Wood Coatings			275	
Wood Preservatives	~~350~~		350	
Zinc-Rich Primers			340	

~~a Conversion factor: one pound VOC per gallon (U.S.) = 119.95 grams VOC per liter.~~

ab. Limit is expressed as VOC Actual. ~~Units are grams of VOC per liter (pounds of VOC per gallon) of coating, including water and exempt compounds.~~

Table 2
MOST RESTRICTIVE LIMIT EXCEPTIONS FOR SPECIALTY COATINGS

Coatings That Meet the Definitions in Section 4 for This Category and That Are Used as Provided in the Applicable Definition	Are Not Subject to the Most Restrictive VOC Limit Requirement When They Are Also Recommended for These Uses
Aluminum Roof Coatings	Bituminous Roof Primers; Bituminous Roof Coatings; Industrial Maintenance Coatings; or Roof Coatings
Basement Specialty Coatings	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Bituminous Roof Primers	Bituminous Roof; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Roof Coatings; or Specialty Primers, Sealers, and Undercoaters

Table 2
MOST RESTRICTIVE LIMIT EXCEPTIONS FOR SPECIALTY COATINGS

Coatings That Meet the Definitions in Section 4 for This Category and That Are Used as Provided in the Applicable Definition	Are Not Subject to the Most Restrictive VOC Limit Requirement When They Are Also Recommended for These Uses
Concrete Curing Compounds	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; or Primers, Sealers, and Undercoaters
Concrete/Masonry Sealers	Driveway Sealers
Faux Finishing Coatings	Primers, Sealers, and Undercoaters; Stains; or Wood Coatings
Fire Resistive Coatings	Industrial Maintenance; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Floor Coatings	Driveway Sealers
Graphic Arts Coatings	Faux Finishing Coatings
High Temperature Coatings	Fire Resistive Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Rust Preventative Coatings; Specialty Primers, Sealers, and Undercoaters; or Zinc-Rich Primers
Industrial Maintenance Coatings	Concrete/Masonry Sealers; Floor Coatings; Mastic Texture Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Low Solids Coatings	All categories in Table 1
Magnesite Cement Coatings	Concrete/Masonry Sealers or Floor Coatings
Metallic Pigmented Coatings	Aluminum Roof Coatings; Bituminous Roof Coatings; Bituminous Roof Primers; Faux Finishing Coatings; Fire Resistive Coatings; High Temperature Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Roof Coatings; Rust Preventative Coatings; Specialty Primers, Sealers, and Undercoaters; or Tub and Tile Refinish Coatings
Pre-Treatment Wash Primers	Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; or Rust Preventative Coatings
Reactive Penetrating Sealer	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Recycled Coatings	Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Rust Preventative Coatings	Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Shellacs	All categories in Table 1

Table 2 MOST RESTRICTIVE LIMIT EXCEPTIONS FOR SPECIALTY COATINGS	
Coatings That Meet the Definitions in Section 4 for This Category and That Are Used as Provided in the Applicable Definition	**Are Not Subject to the Most Restrictive VOC Limit Requirement When They Are Also Recommended for These Uses**
Stone Consolidant	Concrete/Masonry Sealers; Floor Coatings; Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Reactive Penetrating Sealer; or Specialty Primers, Sealers, and Undercoaters
Swimming Pool Coatings	Concrete/Masonry Sealers; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Traffic Marking Coatings	Driveway Sealers
Tub and Tile Refinish Coatings	Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Waterproofing Membranes	Concrete/Masonry Sealers; Floor Coatings; Primers, Sealers, and Undercoaters; or Specialty Primers, Sealers, and Undercoaters
Wood Coatings	Floor Coatings; Primers, Sealers, and Undercoaters; Specialty Primers, Sealers, and Undercoaters; or Stains
Wood Preservatives	Primers, Sealers, and Undercoaters; Specialty Primers, Sealers, and Undercoaters; Stains; or Wood Coatings
Zinc-Rich Primers	Industrial Maintenance Coatings; Primers, Sealers, and Undercoaters; Rust Preventative Coatings; or Specialty Primers, Sealers, and Undercoaters

~~APPENDIX A:~~
~~AVERAGING PROVISION~~

A. AVERAGING PROVISION

A.1 The manufacturer shall demonstrate that actual emissions from the coatings being averaged are less than or equal to the allowable emissions, for the specified compliance period using the following equation:

$$\sum_{i=1}^{n} GiMi \leq \sum_{i=1}^{n} GiViLi$$

Where:

$\sum_{i=1}^{n} GiMi$ = Actual Emissions

$\sum_{i=1}^{n} GiViLi$ = Allowable Emissions

Gi = Total Gallons of Product (i) subject to Averaging;

Mi = Material VOC Content of Product (i), in pounds per gallon;

$$Mi = \frac{Ws - Ww - Wec}{Vm}$$

Vi = Percent by Volume Solids and VOC in Product (i);

$$Vi = \frac{Vm - Vw - Vec}{Vm}$$

Where: Ws, Ww, Wec, Vm, Vw, and Vec are defined in subsection 6.1, except that in this Appendix weights are in pounds and volumes are in gallons.

For Non-Zero VOC Coatings:

$$Vi = \frac{\text{Material VOC (also known as VOC Actual)}}{\text{Coating VOC (also known as VOC Regulatory)}}$$

$$\text{Where : Coating VOC} = \frac{Ws - Ww - Wec}{Vm - Vw - Vec}$$

For Zero VOC Coatings:
Vi = Percent Solids by Volume
Li = Regulatory VOC Content Limit for Product (i), in pounds per gallon

~~(as listed in Table 1)~~

~~The averaging is limited to coatings that are designated by the manufacturer. Any coating not designated in the averaging Program shall comply with the VOC limit in Table 1. The manufacturer shall not include any quantity of coatings that it knows or should have known will not be used in the State, if statewide coatings data are used. If district-specific coatings data are used, the manufacturer shall not include any quantity of coatings that it knows or should have known will not be used in the district.~~

~~A.2 AVERAGING PROGRAM (PROGRAM)~~

~~At least six months prior to the start of the compliance period, manufacturers shall submit an Averaging Program to the Executive Officer of the Air Resources Board. As used in this Appendix A, "Executive Officer" means the Executive Officer of the Air Resources Board. Averaging may not be implemented until the Program is approved in writing by the Executive Officer.~~

~~Within 45 days of submittal of a complete Program, the Executive Officer shall either approve or disapprove the Program. The Program applicant and the Executive Officer may agree to an extension of time for the Executive Officer to take action on the Program.~~

~~A.3 GENERAL REQUIREMENTS~~

~~The Program shall include all necessary information for the Executive Officer to make a determination as to whether the manufacturer may comply with the averaging requirements over the specified compliance period in an enforceable manner. Such information shall include, but is not limited to, the following:~~

~~A.3.1 An identification of the contact persons, telephone numbers, and name of the manufacturer who is submitting the Program.~~

~~A.3.2 An identification of each coating that has been selected by the manufacturer for inclusion in this program that exceeds the applicable VOC limit in Table 1, its VOC content specified in units of both VOC actual and VOC regulatory, and the designation of the coating category.~~

~~A.3.3 A detailed demonstration showing that the projected actual emissions will not exceed the allowable emissions for a single compliance period that the Program will be in effect. In addition, the demonstration shall include VOC content information for each coating that is below the compliance limit in Table 1. The demonstration shall use the equation specified in subsection A.1 of this Appendix for projecting the actual emissions and allowable~~

~~emissions during each compliance period. The demonstration shall also include all VOC content levels and projected volume within the State for each coating listed in the Program during each compliance period. The requested data can be summarized in a matrix form.~~

~~A.3.4 A specification of the compliance period(s) and applicable reporting dates. The length of the compliance period shall not be more than one year or less than six months.~~

~~A.3.5 An identification and description of all records to be made available to the Executive Officer upon request, if different than those identified under subsection A.3.6.~~

~~A.3.6 An identification and description of specific records to be used in calculating emissions for the Program and subsequent reporting, and a detailed explanation as to how those records will be used by the manufacturer to verify compliance with the averaging requirements.~~

~~A.3.7 A statement, signed by a responsible party for the manufacturer, that all information submitted is true and correct, and that records will be made available to the Executive Officer upon request.~~

~~A.4 REPORTING REQUIREMENTS~~

~~A.4.1 For every single compliance period, the manufacturer shall submit a mid-term report listing all coatings subject to averaging during the first half of the compliance period, detailed analysis of the actual and allowable emissions at the end of the mid-term, and an explanation as to how the manufacturer intends to achieve compliance by the end of the compliance period. The report shall be signed by the responsible party for the manufacturer, attesting that all information submitted is true and correct. The mid-term report shall be submitted within 45 days after the midway date of the compliance period. A manufacturer may request, in writing, an extension of up to 15 days for submittal of the mid-term report.~~

~~A.4.2 Within 60 days after the end of the compliance period or upon termination of the Program, whichever is sooner, the manufacturer shall submit to the Executive Officer a report listing all coatings subject to averaging during the compliance period, providing a detailed demonstration of the balance between the actual and allowable emissions for the compliance period, any identification and description of specific records used by the manufacturer to verify compliance with the averaging requirement, and any other information requested by the Executive Officer to determine whether the manufacturer complied with the averaging requirements over the specified compliance period. The report shall be signed by the responsible party for the manufacturer,~~

~~attesting that all information submitted is true and correct, and that records will be made available to the Executive Officer upon request. A manufacturer may request, in writing, an extension of up to 30 days for submittal of the final report.~~

~~A.5 RENEWAL OF A PROGRAM~~

~~A Program automatically expires at the end of the compliance period. The manufacturer may request a renewal of the Program by submitting a renewal request that shall include an updated Program, meeting all applicable Program requirements. The renewal request will be considered conditionally approved until the Executive Officer makes a final decision to deny or approve the renewal request based on a determination of whether the manufacturer is likely to comply with the averaging requirements. The Executive Officer shall base such determination on all available information, including but not limited to, the mid-term and the final reports of the preceding compliance period. The Executive Officer shall make a decision to deny or approve a renewal request no later than 45 days from the date of the final report submittal, unless the manufacturer and the Executive Officer agree to an extension of time for the Executive Officer to take action on the renewal request.~~

~~A.6 MODIFICATION OF A PROGRAM~~

~~A manufacturer may request a modification of the Program at any time prior to the end of the compliance period. The Executive Officer shall take action to approve or disapprove the modification request no longer than 45 days from the date of its submittal. No modification of the compliance period shall be allowed. A Program need not be modified to specify additional coatings to be averaged that are below the applicable VOC limits.~~

~~A.7 TERMINATION OF A PROGRAM~~

~~A.7.1 A manufacturer may terminate its Program at any time by filing a written notification to the Executive Officer. The filing date shall be considered the effective date of the termination, and all other provisions of this rule including the VOC limits shall immediately thereafter apply. The manufacturer shall also submit a final report 60 days after the termination date. Any exceedance of the actual emissions over the allowable emissions over the period that the Program was in effect shall constitute a separate violation for each day of the entire compliance period.~~

~~A.7.2 The Executive Officer may terminate a Program if any of the following circumstances occur:~~

~~A.7.2.1 The manufacturer violates the requirements of the approved Program, and at the end of the compliance period, the actual emissions exceed the allowable emissions.~~

~~A.7.2.2 The manufacturer demonstrates a recurring pattern of violations and has consistently failed to take the necessary steps to correct those violations.~~

~~A.8 CHANGE IN VOC LIMITS~~

~~If the VOC limits of a coating listed in the Program are amended such that its effective date is less than one year from the date of adoption, the affected manufacturer may base its averaging on the prior limits of that coating until the end of the compliance period immediately following the date of adoption.~~

~~A.9 LABELING~~

~~Each container of any coating that is included in averaging program, and that exceeds the applicable VOC limit in Table 1 shall display the following statement: "This product is subject to architectural coatings averaging provisions in California." A symbol specified by the Executive Officer may be used as a substitute.~~

~~A.10 VIOLATIONS~~

~~The exceedance of the allowable emissions for any compliance period shall constitute a separate violation for each day of the compliance period. However, any violation of the requirements of the Averaging Provision of this rule, which the violator can demonstrate, to the Executive Officer, did not cause or allow the emission of an air contaminant and was not the result of negligent or knowing activity may be considered a minor violation.~~

~~A.11 SUNSET OF AVERAGING PROVISION~~

~~The averaging provision set forth in Appendix A shall cease to be effective on~~
~~January 1, 2005, after which averaging will no longer be allowed.~~

APPENDIX B:

2000 SUGGESTED CONTROL MEASURE FOR ARCHITECTURAL COATINGS

2000 SCM

As Approved by the ARB on June 22, 2000. Also incorporates recommended changes identified in the ARB June 7, 2001 letter to all local air districts signed by Mike Kenny, ARB Executive Officer.

California Air Resources Board (ARB)
Suggested Control Measure for Architectural Coatings

1. APPLICABILITY

1.1 Except as provided in subsection 1.2, this rule is applicable to any person who supplies, sells, offers for sale, or manufactures any architectural coating for use within the District, as well as any person who applies or solicits the application of any architectural coating within the District.

1.2 This rule does not apply to:

1.2.1 Any architectural coating that is sold or manufactured for use outside of the District or for shipment to other manufacturers for reformulation or repackaging.

1.2.2 Any aerosol coating product.

1.2.3 Any architectural coating that is sold in a container with a volume of one liter (1.057 quart) or less.

2. DEFINITIONS

2.0 Adhesive: Any chemical substance that is applied for the purpose of bonding two surfaces together other than by mechanical means.

2.1 Aerosol Coating Product: A pressurized coating product containing pigments or resins that dispenses product ingredients by means of a propellant, and is packaged in a disposable can for hand-held application, or for use in specialized equipment for ground traffic/marking applications.

2.2 Antenna Coating: A coating labeled and formulated exclusively for application to equipment and associated structural appurtenances that are used to receive or transmit electromagnetic signals.

2.3 Antifouling Coating: A coating labeled and formulated for application to submerged stationary structures and their appurtenances to prevent or reduce the attachment of marine or freshwater biological organisms. To qualify as an antifouling coating, the coating must be registered with both the U.S. EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Section 136, *et seq.*) and with the California Department of Pesticide Regulation.

2.4 Appurtenance: Any accessory to a stationary structure coated at the site of installation, whether installed or detached, including but not limited to: bathroom and kitchen fixtures; cabinets; concrete forms; doors; elevators; fences; hand railings; heating equipment, air conditioning equipment, and other fixed mechanical equipment or stationary tools; lampposts; partitions; pipes and piping systems; rain gutters and downspouts; stairways, fixed ladders, catwalks, and fire escapes; and window screens.

2.5 Architectural Coating: A coating to be applied to stationary structures or their appurtenances at the site of installation, to portable buildings at the site of installation, to pavements, or to curbs. Coatings applied in shop applications or to non-stationary structures such as airplanes, ships, boats, railcars, and automobiles, and adhesives are not considered architectural coatings for the purposes of this rule.

2.6 Bitumens: Black or brown materials including, but not limited to, asphalt, tar, pitch, and asphaltite that are soluble in carbon disulfide, consist mainly of hydrocarbons, and are obtained from natural deposits or as residues from the distillation of crude petroleum or coal.

2.7 Bituminous Roof Coating: A coating which incorporates bitumens that is labeled and formulated exclusively for roofing.

2.8 Bituminous Roof Primer: A primer which incorporates bitumens that is labeled and formulated exclusively for roofing.

2.9 Bond Breaker: A coating labeled and formulated for application between layers of concrete to prevent a freshly poured top layer of concrete from bonding to the layer over which it is poured.

2.10 Clear Brushing Lacquers: Clear wood finishes, excluding clear lacquer sanding sealers, formulated with nitrocellulose or synthetic resins to dry by solvent evaporation without chemical reaction and to provide a solid, protective film, which are intended exclusively for application by brush, and which are labeled as specified in subsection 4.1.5.

2.11 Clear Wood Coatings: Clear and semi-transparent coatings, including lacquers and varnishes, applied to wood substrates to provide a transparent or translucent solid film.

2.12 Coating: A material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains.

2.13 Colorant: A concentrated pigment dispersion in water, solvent, and/or binder that is added to an architectural coating after packaging in sale units to produce the desired color.

2.14 Concrete Curing Compound: A coating labeled and formulated for application to freshly poured concrete to retard the evaporation of water.

2.15 Dry Fog Coating: A coating labeled and formulated only for spray application such that overspray droplets dry before subsequent contact with incidental surfaces in the vicinity of the surface coating activity.

2.16 Exempt Compound: A compound identified as exempt under the definition of Volatile Organic Compound (VOC), subsection 2.60. Exempt compounds

content of a coating shall be determined by U.S. EPA Method 24 or South Coast Air Quality Management
District (SCAQMD) Method 303-91 (Revised February 1993), incorporated by reference in subsection 6.5.10.

2.17 Faux Finishing Coating: A coating labeled and formulated as a stain or glaze to create artistic effects including, but not limited to, dirt, old age, smoke damage, and simulated marble and wood grain.

2.18 Fire-Resistive Coating: An opaque coating labeled and formulated to protect the structural integrity by increasing the fire endurance of interior or exterior steel and other structural materials, that has been fire tested and rated by a testing agency approved by building code officials for use in bringing assemblies of structural materials into compliance with federal, state, and local building code requirements. The fire-resistive coating and the testing agency must be approved by building code officials. The fire-resistant coating shall be tested in accordance with ASTM Designation E 119-98, incorporated by reference in subsection 6.5.2.

2.19 Fire-Retardant Coating: A coating labeled and formulated to retard ignition and flame spread, that has been fire tested and rated by a testing agency approved by building code officials for use in bringing building and construction materials into compliance with federal, state and local building code requirements. The fire-retardant coating and the testing agency must be approved by building code officials. The fire-retardant coating shall be tested in accordance with ASTM Designation E 84-99, incorporated by reference in subsection 6.5.1.

2.20 Flat Coating: A coating that is not defined under any other definition in this rule and that registers gloss less than 15 on an 85-degree meter or less than 5 on a 60-degree meter according to ASTM Designation D 523-89 (1999), incorporated by reference in subsection 6.5.3.

2.21 Floor Coating: An opaque coating that is labeled and formulated for application to flooring, including, but not limited to, decks, porches, steps, and other horizontal surfaces which may be subject to foot traffic.

2.22 Flow Coating: A coating labeled and formulated exclusively for use by electric power companies or their subcontractors to maintain the protective coating systems present on utility transformer units.

2.23 Form-Release Compound: A coating labeled and formulated for application to a concrete form to prevent the freshly poured concrete from bonding to the form. The form may consist of wood, metal, or some material other than concrete.

2.24 Graphic Arts Coating or Sign Paint: A coating labeled and formulated for hand-application by artists using brush or roller techniques to indoor and outdoor signs (excluding structural components) and murals including lettering enamels, poster colors, copy blockers, and bulletin enamels.

2.25 High-Temperature Coating: A high performance coating labeled and formulated for application to substrates exposed continuously or intermittently to temperatures above 204°C (400°F).

2.26 Industrial Maintenance Coating: A high performance architectural coating, including primers, sealers, undercoaters, intermediate coats, and topcoats, formulated for application to substrates exposed to one or more of the following extreme environmental conditions listed in subsections 2.26.1 through 2.26.5, and labeled as specified in subsection 4.1.4:

2.26.1 Immersion in water, wastewater, or chemical solutions (aqueous and non-aqueous solutions), or chronic exposure of interior surfaces to moisture condensation;
2.26.2 Acute or chronic exposure to corrosive, caustic or acidic agents, or to chemicals, chemical fumes, or chemical mixtures or solutions;
2.26.3 Repeated exposure to temperatures above 121°C (250°F);
2.26.4 Repeated (frequent) heavy abrasion, including mechanical wear and repeated (frequent) scrubbing with industrial solvents, cleansers, or scouring agents; or
2.26.5 Exterior exposure of metal structures and structural components.

2.27 Lacquer: A clear or opaque wood coating, including clear lacquer sanding sealers, formulated with cellulosic or synthetic resins to dry by evaporation without chemical reaction and to provide a solid, protective film.

2.28 Low Solids Coating: A coating containing 0.12 kilogram or less of solids per liter (1 pound or less of solids per gallon) of coating material.

2.29 Magnesite Cement Coating: A coating labeled and formulated for application to magnesite cement decking to protect the magnesite cement substrate from erosion by water.

2.30 Mastic Texture Coating: A coating labeled and formulated to cover holes and minor cracks and to conceal surface irregularities, and is applied in a single coat of at least
10 mils (0.010 inch) dry film thickness.

2.31 Metallic Pigmented Coating: A coating containing at least 48 grams of elemental metallic pigment per liter of coating as applied (0.4 pounds per gallon), when tested in accordance with SCAQMD Method 318-95, incorporated by reference in subsection 6.5.4.

2.32 Multi-Color Coating: A coating that is packaged in a single container and that exhibits more than one color when applied in a single coat.

2.33 Nonflat Coating: A coating that is not defined under any other definition in this rule and that registers a gloss of 15 or greater on an 85-degree meter and 5 or greater on a 60-degree meter according to ASTM Designation D 523-89 (1999), incorporated by reference in subsection 6.5.3.

2.34 Nonflat - High Gloss Coating: A nonflat coating that registers a gloss of 70 or above on a 60-degree meter according to ASTM Designation D 523-89 (1999), incorporated by reference in subsection 6.5.3.

2.35 Nonindustrial Use: Nonindustrial use means any use of architectural coatings except in the construction or maintenance of any of the following: facilities used in the manufacturing of goods and commodities; transportation infrastructure, including highways, bridges, airports and railroads; facilities used in mining activities, including petroleum extraction; and utilities infrastructure, including power generation and distribution, and water treatment and distribution systems.

2.36 Post-Consumer Coating: A finished coating that would have been disposed of in a landfill, having completed its usefulness to a consumer, and does not include manufacturing wastes.

2.37 Pre-Treatment Wash Primer: A primer that contains a minimum of 0.5 percent acid, by weight, when tested in accordance with ASTM Designation D 1613-96, incorporated by reference in subsection 6.5.5, that is labeled and formulated for application directly to bare metal surfaces to provide corrosion resistance and to promote adhesion of subsequent topcoats.

2.38 Primer: A coating labeled and formulated for application to a substrate to provide a firm bond between the substrate and subsequent coats.

2.39 Quick-Dry Enamel: A nonflat coating that is labeled as specified in subsection 4.1.8 and that is formulated to have the following characteristics:

2.39.1 Is capable of being applied directly from the container under normal conditions with ambient temperatures between 16 and 27°C (60 and 80°F);

2.39.2 When tested in accordance with ASTM Designation D 1640-95, incorporated by reference in subsection 6.5.6, sets to touch in 2 hours or less, is tack free in
4 hours or less, and dries hard in 8 hours or less by the mechanical test method; and

2.39.3 Has a dried film gloss of 70 or above on a 60 degree meter.

2.40 Quick-Dry Primer, Sealer, and Undercoater: A primer, sealer, or undercoater that is dry to the touch in 30 minutes and can be recoated in 2 hours when tested in accordance with ASTM Designation D 1640- 95, incorporated by reference in subsection 6.5.6.

2.41 Recycled Coating: An architectural coating formulated such that not less than 50 percent of the total weight consists of secondary and post-consumer coating, with not less than
10 percent of the total weight consisting of post-consumer coating.

2.42 Residence: Areas where people reside or lodge, including, but not limited to, single and multiple family dwellings, condominiums, mobile homes, apartment complexes, motels, and hotels.

2.43 Roof Coating: A non-bituminous coating labeled and formulated exclusively for application to roofs for the primary purpose of preventing penetration of the substrate by water or reflecting heat and ultraviolet radiation. Metallic pigmented roof coatings which qualify as metallic pigmented coatings shall not be considered to be in this category, but shall be considered to be in the metallic pigmented coatings category.

2.44 Rust Preventative Coating: A coating formulated exclusively for nonindustrial use to prevent the corrosion of metal surfaces and labeled as specified in subsection 4.1.6.

2.45 Sanding Sealer: A clear or semi-transparent wood coating labeled and formulated for application to bare wood to seal the wood and to provide a coat that can be abraded to create a smooth surface for subsequent applications of coatings. A sanding sealer that also meets the definition of a lacquer is not included in this category, but is included in the lacquer category.

2.46 Sealer: A coating labeled and formulated for application to a substrate for one or more of the following purposes: to prevent subsequent coatings from being absorbed by the substrate, or to prevent harm to subsequent coatings by materials in the substrate.

2.47 Secondary Coating (Rework): A fragment of a finished coating or a finished coating from a manufacturing process that has converted resources into a commodity of real economic value, but does not include excess virgin resources of the manufacturing process.

2.48 Shellac: A clear or opaque coating formulated solely with the resinous secretions of the lac beetle (*Laciffer lacca*), thinned with alcohol, and formulated to dry by evaporation without a chemical reaction.

2.49 Shop Application: Application of a coating to a product or a component of a product in or on the premises of a factory or a shop as part of a manufacturing, production, or repairing process (e.g., original equipment manufacturing coatings).

2.50 Solicit: To require for use or to specify, by written or oral contract.

2.51 Specialty Primer, Sealer, and Undercoater: A coating labeled as specified in subsection 4.1.7 and that is formulated for application to a substrate to seal fire, smoke or water damage; to condition excessively chalky surfaces, or to block stains. An excessively chalky surface is one that is defined as having a chalk rating of four or less as determined by ASTM Designation D 4214-98, incorporated by reference in subsection 6.5.7.

2.52 Stain: A clear, semitransparent, or opaque coating labeled and formulated to change the color of a surface but not conceal the grain pattern or texture.

2.53 Swimming Pool Coating: A coating labeled and formulated to coat the interior of swimming pools and to resist swimming pool chemicals.

2.54 Swimming Pool Repair and Maintenance Coating: A rubber based coating labeled and formulated to be used over existing rubber based coatings for the repair and maintenance of swimming pools.

2.55 Temperature-Indicator Safety Coating: A coating labeled and formulated as a color-changing indicator coating for the purpose of monitoring the temperature and safety of the substrate, underlying piping, or underlying equipment, and for application to substrates exposed continuously or intermittently to temperatures above 204°C (400°F).

2.56 Tint Base: An architectural coating to which colorant is added after packaging in sale units to produce a desired color.

2.57 Traffic Marking Coating: A coating labeled and formulated for marking and striping streets, highways, or other traffic surfaces including, but not limited to, curbs, berms, driveways, parking lots, sidewalks, and airport runways.

2.58 Undercoater: A coating labeled and formulated to provide a smooth surface for subsequent coatings.

2.59 Varnish: A clear or semi-transparent wood coating, excluding lacquers and shellacs, formulated to dry by chemical reaction on exposure to air. Varnishes may contain small amounts of pigment to color a surface, or to control the final sheen or gloss of the finish.

2.60 Volatile Organic Compound (VOC): Any volatile compound containing at least one atom of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding the following:

2.60.1 methane;
methylene chloride (dichloromethane);
1,1,1-trichloroethane (methyl chloroform);
trichlorofluoromethane (CFC-11);
dichlorodifluoromethane (CFC-12);
1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113);
1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114);
chloropentafluoroethane (CFC-115);
chlorodifluoromethane (HCFC-22);
1,1,1-trifluoro-2,2-dichloroethane (HCFC-123);
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124);
1,1-dichloro-1-fluoroethane (HCFC-141b);
1-chloro-1,1-difluoroethane (HCFC-142b);

trifluoromethane (HFC-23);
pentafluoroethane (HFC-125);
1,1,2,2-tetrafluoroethane (HFC-134);
1,1,1,2-tetrafluoroethane (HFC-134a);
1,1,1-trifluoroethane (HFC-143a);
1,1-difluoroethane (HFC-152a);
cyclic, branched, or linear completely methylated siloxanes;
the following classes of perfluorocarbons:
(A) cyclic, branched, or linear, completely fluorinated alkanes;
(B) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
(C) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
(D) sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds only to carbon and fluorine; and

2.60.2 the following low-reactive organic compounds which have been exempted by the U.S. EPA:
acetone;
ethane;
parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene);
perchloroethylene; and
methyl acetate.

2.61 VOC Content: The weight of VOC per volume of coating, calculated according to the procedures specified in subsection 6.1.

2.62 Waterproofing Sealer: A coating labeled and formulated for application to a porous substrate for the primary purpose of preventing the penetration of water.

2.63 Waterproofing Concrete/Masonry Sealer: A clear or pigmented film-forming coating that is labeled and formulated for sealing concrete and masonry to provide resistance against water, alkalis, acids, ultraviolet light, and staining.

2.64 Wood Preservative: A coating labeled and formulated to protect exposed wood from decay or insect attack, that is registered with both the U.S. EPA under the Federal Insecticide, Fungicide, and Rodenticide Act (7 United States Code (U.S.C.) Section 136, *et seq.*) and with the California Department of Pesticide Regulation.

3. STANDARDS

3.1 **VOC Content Limits:** Except as provided in subsections 3.2, 3.3, 3.8, 3.9, and 3.10, no person shall: (i) manufacture, blend, or repackage for sale within the district;
(ii) supply, sell, or offer for sale within the district; or (iii) solicit for application or apply within the district, any architectural coating with a VOC content in excess of the corresponding limit specified in Table 1, after the specified effective date in Table 1.

3.2 **Most Restrictive VOC Limit:** If anywhere on the container of any architectural coating, or any label or sticker affixed to the container, or in any sales, advertising, or technical literature supplied by a manufacturer or anyone acting on their behalf, any representation is made that indicates that the coating meets the definition of or is recommended for use for more than one of the coating categories listed in Table 1, then the most restrictive VOC content limit shall apply. This provision does not apply to the coating categories specified in subsections 3.2.1 through 3.2.15.

3.2.1 Lacquer coatings (including lacquer sanding sealers).
3.2.2 Metallic pigmented coatings.
3.2.3 Shellacs.
3.2.4 Fire-retardant coatings.
3.2.5 Pretreatment wash primers.
3.2.6 Industrial maintenance coatings.
3.2.7 Low-solids coatings.
3.2.8 Wood preservatives.
3.2.9 High temperature coatings.
3.2.10 Temperature-indicator safety coatings.
3.2.11 Antenna coatings.
3.2.12 Antifouling coatings.
3.2.13 Flow coatings.
3.2.14 Bituminous roof primers.
3.2.15 Specialty primers, sealers, and undercoaters.

3.3 **Sell-Through of Coatings:** A coating manufactured prior to the effective date specified for that coating in Table 1 may be sold, supplied, or offered for sale for up to three years after the specified effective date. In addition, a coating manufactured before the effective date specified for that coating in Table 1 may be applied at any time, both before and after the specified effective date, so long as the coating complied with the standards in effect at the time the coating was manufactured. This subsection 3.3 does not apply to any coating that does not display the date or date-code required by subsection 4.1.1.

SCM Clarification - New subsection "3.3.1"
(See June 7, 2001 letter to all districts by Mike Kenny, ARB Executive Officer)

3.3.1 A coating included in an approved Averaging Program that does not comply with the specified limit in Table 1 may be sold, supplied, or offered for sale for up to three years after the end of the compliance period specified in the approved Averaging Program. In addition, such a coating may be applied at any time, both during and after the compliance period. This subsection 3.3.1 does not apply to any coating that does not display on the container either the statement: "This product is subject to architectural coatings averaging provisions in California," or a substitute symbol specified by the Executive Officer of the ARB. This subsection 3.3.1 shall remain in effect until January 1, 2008.

3.4 **Painting Practices:** All architectural coating containers used to apply the contents therein to a surface directly from the container by pouring, siphoning, brushing, rolling, padding, ragging or other means, shall be closed when not in

use. These architectural coating containers include, but are not limited to, drums, buckets, cans, pails, trays or other application containers. Containers of any VOC-containing materials used for thinning and cleanup shall also be closed when not in use.

3.5 **Thinning:** No person who applies or solicits the application of any architectural coating shall apply a coating that is thinned to exceed the applicable VOC limit specified in
Table 1.

3.6 **Rust Preventative Coatings:** Effective January 1, 2004, no person shall apply or solicit the application of any rust preventative coating for industrial use, unless such a rust preventative coating complies with the industrial maintenance coating VOC limit specified in Table 1.

3.7 **Coatings Not Listed in Table 1:** For any coating that does not meet any of the definitions for the specialty coatings categories listed in Table 1, the VOC content limit shall be determined by classifying the coating as a flat coating or a nonflat coating, based on its gloss, as defined in subsections 2.20, 2.33, and 2.34 and the corresponding flat or nonflat VOC limit shall apply.

3.8 **Industrial Maintenance Coatings:**

3.8.1 After January 1, 2004, a manufacturer, seller, or user may petition the APCO to apply an industrial maintenance coating with a VOC content up to 340 g/l if all of the following conditions are met:

3.8.1.1 The industrial maintenance coating is to be applied in a district located within the North Central Coast, San Francisco Bay Area, or North Coast Air Basins.

3.8.1.2 The petition submitted to the APCO contains the following information, as applicable: job requirements and description, volume of coating, maximum VOC content, and a certification that a complying coating meeting the job performance requirements is not available.

3.8.1.3 If the APCO grants written approval, such approval shall contain volume and VOC limit conditions. Until written approval is granted by the APCO and received by the petitioner, all provisions of this rule shall apply.

3.8.2 The APCO shall not approve any petition under subsection 3.8.1 if the approvals previously granted by the APCO during the calendar year, when combined with the petition under consideration, would result in excess VOC emissions for that calendar year which would be greater than 5 percent of the annual emission reduction achieved within the district from implementing the January 1, 2004, VOC limit for industrial maintenance coatings.

3.8.3 Coatings subject to this provision shall be sold only if an approved petition (or a copy of it) is provided prior to the sale. Coatings subject to this provision shall not be available to the general public.

3.9 **Lacquers:** Notwithstanding the provisions of subsection 3.1, a person or facility may add up to 10 percent by volume of VOC to a lacquer to avoid blushing of the finish during days with relative humidity greater than 70 percent and temperature below 65°F, at the time of application, provided that the coating contains acetone and no more than
550 grams of VOC per liter of coating, less water and exempt compounds, prior to the addition of VOC.

3.10 **Averaging Compliance Option:** On or after January 1, 2003, in lieu of compliance with the specified limits in Table 1 for floor coatings; industrial maintenance coatings; primers, sealers, and undercoaters; quick-dry primers, sealers, and undercoaters; quick-dry enamels; roof coatings; rust preventative coatings; stains; waterproofing sealers, as well as flats and non-flats (excluding recycled coatings), manufacturers may average designated coatings such that their actual cumulative emissions from the averaged coatings are less than or equal to the cumulative emissions that would have been allowed under those limits over a compliance period not to exceed one year. Such manufacturers must also comply with the averaging provisions contained in Appendix A, as well as maintain and make available for inspection records for at least three years after the end of the compliance period. This subsection 3.10 and Appendix A shall cease to be effective on January 1, 2005, after which averaging will no longer be allowed.

4. CONTAINER LABELING REQUIREMENTS

4.1 Each manufacturer of any architectural coating subject to this rule shall display the information listed in subsections 4.1.1 through 4.1.8 on the coating container (or label) in which the coating is sold or distributed.

4.1.1 **Date Code:** The date the coating was manufactured, or a date code representing the date, shall be indicated on the label, lid, or bottom of the container. If the manufacturer uses a date code for any coating, the manufacturer shall file an explanation of each code with the Executive Officer of the ARB.

4.1.2 **Thinning Recommendations:** A statement of the manufacturer's recommendation regarding thinning of the coating shall be indicated on the label or lid of the container. This requirement does not apply to the thinning of architectural coatings with water. If thinning of the coating prior to use is not necessary, the recommendation must specify that the coating is to be applied without thinning.

4.1.3 **VOC Content:** Each container of any coating subject to this rule shall display either the maximum or the actual VOC content of the coating, as supplied, including the maximum thinning as recommended by the

manufacturer. VOC content shall be displayed in grams of VOC per liter of coating. VOC content displayed shall be calculated using product formulation data, or shall be determined using the test methods in subsection 6.2. The equations in subsection 6.1 shall be used to calculate VOC content.

4.1.4 **Industrial Maintenance Coatings:** In addition to the information specified in subsection 4.1.1, 4.1.2, and 4.1.3, each manufacturer of any industrial maintenance coating subject to this rule shall display on the label or lid of the container in which the coating is sold or distributed one or more of the descriptions listed in subsections 4.1.4.1 through 4.1.4.3.

4.1.4.1 "For industrial use only."
4.1.4.2 "For professional use only."
4.1.4.3 "Not for residential use or Not intended for residential use."

4.1.5 **Clear Brushing Lacquers:** Effective January 1, 2003, the labels of all clear brushing lacquers shall prominently display the statements "For brush application only," and "This product must not be thinned or sprayed."

4.1.6 **Rust Preventative Coatings:** Effective January 1, 2003, the labels of all rust preventative coatings shall prominently display the statement "For Metal Substrates Only."

4.1.7 **Specialty Primers, Sealers, and Undercoaters:** Effective January 1, 2003, the labels of all specialty primers, sealers, and undercoaters shall prominently display one or more of the descriptions listed in subsection 4.1.7.1 through 4.1.7.5.

4.1.7.1 For blocking stains.
4.1.7.2 For fire-damaged substrates.
4.1.7.3 For smoke-damaged substrates.
4.1.7.4 For water-damaged substrates.
4.1.7.5 For excessively chalky substrates.

4.1.8 **Quick Dry Enamels:** Effective January 1, 2003, the labels of all quick dry enamels shall prominently display the words "Quick Dry" the dry hard time.

4.1.9 **Nonflat - High Gloss Coatings:** Effective January 1, 2003, the labels of all nonflat - high gloss coatings shall prominently display the words "High Gloss."

5. REPORTING REQUIREMENTS

5.1 **Clear Brushing Lacquers:** Each manufacturer of clear brushing lacquers shall, on or before April 1 of each calendar year beginning in the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall specify the

number of gallons of clear brushing lacquers sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.

5.2 **Rust Preventative Coatings:** Each manufacturer of rust preventative coatings shall, on or before April 1 of each calendar year beginning in the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall specify the number of gallons of rust preventative coatings sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.

5.3 **Specialty Primers, Sealers, and Undercoaters:** Each manufacturer of specialty primers, sealers, and undercoaters shall, on or before April 1 of each calendar year beginning in the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall specify the number of gallons of specialty primers, sealers, and undercoaters sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.

5.4 **Toxic Exempt Compounds:** For each architectural coating that contains perchloroethylene or methylene chloride, the manufacturer shall, on or before April 1 of each calendar year beginning with the year 2004, report to the Executive Officer of the ARB the following information for products sold in the State during the preceding year:

5.4.1 the product brand name and a copy of the product label with legible usage instructions;
5.4.2 the product category listed in Table 1 to which the coating belongs;
5.4.3 the total sales in California during the calendar year to the nearest gallon;
5.4.4 the volume percent, to the nearest 0.10 percent, of perchloroethylene and methylene chloride in the coating.

5.5 **Recycled Coatings:** Manufacturers of recycled coatings must submit a letter to the Executive Officer of the ARB certifying their status as a Recycled Paint Manufacturer. The manufacturer shall, on or before April 1 of each calendar year beginning with the year 2004, submit an annual report to the Executive Officer of the ARB. The report shall include, for all recycled coatings, the total number of gallons distributed in the State during the preceding year, and shall describe the method used by the manufacturer to calculate State distribution.

5.6 **Bituminous Coatings:** Each manufacturer of bituminous roof coatings or bituminous roof primers shall, on or before April 1 of each calendar year beginning with the
year 2004, submit an annual report to the Executive Officer of ARB. The report shall specify the number of gallons of bituminous roof coatings or bituminous roof primers sold in the State during the preceding calendar year, and shall describe the method used by the manufacturer to calculate State sales.

6. COMPLIANCE PROVISIONS AND TEST METHODS

6.1 **Calculation of VOC Content:** For the purpose of determining compliance with the VOC content limits in Table 1, the VOC content of a coating shall be determined by using the procedures described in subsection 6.1.1 or 6.1.2, as appropriate. The VOC content of a tint base shall be determined without colorant that is added after the tint base is manufactured.

6.1.1 With the exception of low solids coatings, determine the VOC content in grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, excluding the volume of any water and exempt compounds. Determine the VOC content using equation 1 as follows:

$$\text{VOC Content} = \frac{(W_s - W_w - W_{ec})}{(V_m - V_w - V_{ec})} \qquad (1)$$

Where:

VOC Content = grams of VOC per liter of coating
W_s = weight of volatiles, in grams
W_w = weight of water, in grams
W_{ec} = weight of exempt compounds, in grams
V_m = volume of coating, in liters
V_w = volume of water, in liters
V_{ec} = volume of exempt compounds, in liters

6.1.2 For low solids coatings, determine the VOC content in units of grams of VOC per liter of coating thinned to the manufacturer's maximum recommendation, including the volume of any water and exempt compounds. Determine the VOC content using equation 2 as follows:

$$\text{VOC Content}_{ls} = \frac{(W_s - W_w - W_{ec})}{(V_m)} \qquad (2)$$

Where:

VOC Content_{ls} = the VOC content of a low solids coating in grams of VOC per liter of coating
W_s = weight of volatiles, in grams
W_w = weight of water, in grams
W_{ec} = weight of exempt compounds, in grams
V_m = volume of coating, in liters

6.2 **VOC Content of Coatings:** To determine the physical properties of a coating in order to perform the calculations in subsection 6.1, the reference method for VOC content is
U.S. EPA Method 24, incorporated by reference in subsection 6.5.11, except as provided in subsections 6.3 and 6.4. An alternative method to determine the VOC content of coatings is SCAQMD Method 304-91 (Revised February 1996),

incorporated by reference in subsection 6.5.12. The exempt compounds content shall be determined by SCAQMD Method 303-91 (Revised August 1996), incorporated by reference in subsection 6.5.10. To determine the VOC content of a coating, the manufacturer may use U.S. EPA Method 24, or an alternative method as provided in subsection 6.3, formulation data, or any other reasonable means for predicting that the coating has been formulated as intended (e.g., quality assurance checks, record keeping). However, if there are any inconsistencies between the results of a Method 24 test and any other means for determining VOC content, the Method 24 test results will govern, except when an alternative method is approved as specified in subsection 6.3. The District Air Pollution Control Officer (APCO) may require the manufacturer to conduct a Method 24 analysis.

6.3 **Alternative Test Methods:** Other test methods demonstrated to provide results that are acceptable for purposes of determining compliance with subsection 6.2, after review and approved in writing by the staffs of the District, the ARB, and the U.S. EPA, may also be used.

6.4 **Methacrylate Traffic Marking Coatings:** Analysis of methacrylate multicomponent coatings used as traffic marking coatings shall be conducted according to a modification of U.S. EPA Method 24 (40 CFR 59, subpart D, Appendix A), incorporated by reference in subsection 6.5.13. This method has not been approved for methacrylate multicomponent coatings used for other purposes than as traffic marking coatings or for other classes of multicomponent coatings.

6.5 **Test Methods:** The following test methods are incorporated by reference herein, and shall be used to test coatings subject to the provisions of this rule:

6.5.1 **Flame Spread Index:** The flame spread index of a fire-retardant coating shall be determined by ASTM Designation E 84-99, "Standard Test Method for Surface Burning Characteristics of Building Materials" (see section 2, Fire-Retardant Coating).

6.5.2 **Fire Resistance Rating:** The fire resistance rating of a fire-resistive coating shall be determined by ASTM Designation E 119-98, "Standard Test Methods for Fire Tests of Building Construction Materials" (see section 2, Fire-Resistive Coating).

6.5.3 **Gloss Determination:** The gloss of a coating shall be determined by ASTM Designation D 523-89 (1999), "Standard Test Method for Specular Gloss" (see section 2, Flat Coating, Nonflat Coating, Nonflat - High Gloss Coating, and Quick-Dry Enamel).

6.5.4 **Metal Content of Coatings:** The metallic content of a coating shall be determined by SCAQMD Method 318-95, "Determination of Weight Percent Elemental Metal in Coatings by X-Ray Diffraction," *SCAQMD Laboratory Methods of Analysis for Enforcement Samples* (see section 2, Metallic Pigmented Coating).

6.5.5 **Acid Content of Coatings:** The acid content of a coating shall be determined by ASTM Designation D 1613-96, "Standard Test Method for Acidity in Volatile Solvents and Chemical Intermediates Used in Paint, Varnish, Lacquer, and Related Products" (see section 2, Pre-treatment Wash Primer).

6.5.6 **Drying Times:** The set-to-touch, dry-hard, dry-to-touch, and dry-to-recoat times of a coating shall be determined by ASTM Designation D 1640-95, "Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature" (see section 2, Quick-Dry Enamel and Quick-Dry Primer, Sealer, and Undercoater). The tack-free time of a quick-dry enamel coating shall be determined by the Mechanical Test Method of ASTM Designation D 1640-95.

6.5.7 **Surface Chalkiness:** The chalkiness of a surface shall be determined using ASTM Designation D 4214-98, "Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films" (see section 2, Specialty Primer, Sealer, and Undercoater).

6.5.8 **Exempt Compounds--Siloxanes:** Exempt compounds that are cyclic, branched, or linear completely methylated siloxanes, shall be analyzed as exempt compounds for compliance with section 6 by BAAQMD Method 43, "Determination of Volatile Methylsiloxanes in Solvent-Based Coatings, Inks, and Related Materials," *BAAQMD Manual of Procedures*, Volume III, adopted 11/6/96 (see section 2, Volatile Organic Compound, and subsection 6.2).

6.5.9 **Exempt Compounds--Parachlorobenzotrifluoride (PCBTF)**: The exempt compound parachlorobenzotrifluoride, shall be analyzed as an exempt compound for compliance with section 6 by BAAQMD Method 41, "Determination of Volatile Organic Compounds in Solvent Based Coatings and Related Materials Containing Parachlorobenzotrifluoride," *BAAQMD Manual of Procedures*, Volume III, adopted 12/20/95 (see section 2, Volatile Organic Compound, and subsection 6.2).

6.5.10 **Exempt Compounds:** The content of compounds exempt under U.S. EPA Method 24 shall be analyzed by SCAQMD Method 303-91 (Revised 1993), "Determination of Exempt Compounds," *SCAQMD Laboratory Methods of Analysis for Enforcement Samples* (see section 2, Volatile Organic Compound, and subsection 6.2).

6.5.11 **VOC Content of Coatings:** The VOC content of a coating shall be determined by U.S. EPA Method 24 as it exists in appendix A of 40 *Code of Federal Regulations* (CFR) part 60, "Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings" (see subsection 6.2).

6.5.12 **Alternative VOC Content of Coatings:** The VOC content of coatings may be analyzed either by U.S. EPA Method 24 or SCAQMD Method 304-91 (Revised 1996), "Determination of Volatile Organic Compounds (VOC) in Various Materials," *SCAQMD Laboratory Methods of Analysis for Enforcement Samples* (see subsection 6.2).

6.5.13 **Methacrylate Traffic Marking Coatings:** The VOC content of methacrylate multicomponent coatings used as traffic marking coatings shall be analyzed by the procedures in 40 CFR part 59, subpart D, appendix A, "Determination of Volatile Matter Content of Methacrylate Multicomponent Coatings Used as Traffic Marking Coatings" (September 11, 1998) (see subsection 6.4).

2000 SCM

As Approved by the ARB on June 22, 2000. Also incorporates recommended changes identified in the ARB June 7, 2001 letter to all local air districts signed by Mike Kenny, ARB Executive Officer.

Table 1
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS

Limits are expressed in grams of VOC per liter[a] of coating thinned to the manufacturer's maximum recommendation, excluding the volume of any water, exempt compounds, or colorant added to tint bases. "Manufacturer's maximum recommendation" means the maximum recommendation for thinning that is indicated on the label or lid of the coating container.

Coating Category	Effective 1/1/2003	Effective 1/1/2004
Flat Coatings	100	
Nonflat Coatings	150	
Nonflat - High Gloss Coatings	250	
Specialty Coatings		
Antenna Coatings	530	
Antifouling Coatings	400	
Bituminous Roof Coatings	300	
Bituminous Roof Primers	350	
Bond Breakers	350	
Clear Wood Coatings • Clear Brushing Lacquers • Lacquers (including lacquer sanding sealers) • Sanding Sealers (other than lacquer sanding sealers) • Varnishes	 680 550 350 350	
Concrete Curing Compounds	350	
Dry Fog Coatings	400	
Faux Finishing Coatings	350	
Fire Resistive Coatings	350	
Fire-Retardant Coatings: • Clear • Opaque	 650 350	
Floor Coatings	250	
Flow Coatings	420	
Form-Release Compounds	250	
Graphic Arts Coatings (Sign Paints)	500	

2000 SCM

As Approved by the ARB on June 22, 2000. Also incorporates recommended changes identified in the ARB June 7, 2001 letter to all local air districts signed by Mike Kenny, ARB Executive Officer.

Table 1 Continued

Coating Category	Effective 1/1/2003	Effective 1/1/2004
High Temperature Coatings	420	
Industrial Maintenance Coatings		250
Low Solids Coatings[b]	120	
Magnesite Cement Coatings	450	
Mastic Texture Coatings	300	
Metallic Pigmented Coatings	500	
Multi-Color Coatings	250	
Pre-Treatment Wash Primers	420	
Primers, Sealers, and Undercoaters	200	
Quick-Dry Enamels	250	
Quick-Dry Primers, Sealers, and Undercoaters	200	
Recycled Coatings	250	
Roof Coatings	250	
Rust Preventative Coatings	400	
Shellacs: • Clear • Opaque	 730 550	
Specialty Primers, Sealers, and Undercoaters	350	
Stains	250	
Swimming Pool Coatings	340	
Swimming Pool Repair and Maintenance Coatings	340	
Temperature-Indicator Safety Coatings	550	
Traffic Marking Coatings	150	
Waterproofing Sealers	250	
Waterproofing Concrete/Masonry Sealers	400	
Wood Preservatives	350	

a Conversion factor: one pound VOC per gallon (U.S.) = 119.95 grams VOC per liter.
b Units are grams of VOC per liter (pounds of VOC per gallon) of coating, including water and exempt compounds.

2000 SCM

As Approved by the ARB on June 22, 2000. Also incorporates recommended changes identified in the ARB June 7, 2001 letter to all local air districts signed by Mike Kenny, ARB Executive Officer.

APPENDIX A:
AVERAGING PROVISION

A. AVERAGING PROVISION

A.1 The manufacturer shall demonstrate that actual emissions from the coatings being averaged are less than or equal to the allowable emissions, for the specified compliance period using the following equation:

$$\sum_{i=1}^{n} GiMi \leq \sum_{i=1}^{n} GiViLi$$

Where:

$\sum_{i=1}^{n} GiMi$ = Actual Emissions

$\sum_{i=1}^{n} GiViLi$ = Allowable Emissions

Gi = Total Gallons of Product (i) subject to Averaging;

Mi = Material VOC Content of Product (i), in pounds per gallon;

$$Mi = \frac{Ws - Ww - Wec}{Vm}$$

Vi = Percent by Volume Solids and VOC in Product (i);

$$Vi = \frac{Vm - Vw - Vec}{Vm}$$

Where: Ws, Ww, Wec, Vm, Vw, and Vec are defined in subsection 6.1, except that in this Appendix weights are in pounds and volumes are in gallons.

For Non - Zero VOC Coatings:

$$Vi = \frac{\text{Material VOC (also known as VOC Actual)}}{\text{Coating VOC (also known as VOC Regulatory)}}$$

Where: Coating VOC $= \frac{Ws - Ww - Wec}{Vm - Vw - Vec}$

For Zero VOC Coatings:

Vi = Percent Solids by Volume

Li = Regulatory VOC Content Limit for Product (i), in pounds per gallon (as listed in Table 1)

The averaging is limited to coatings that are designated by the manufacturer. Any coating not designated in the averaging Program shall comply with the VOC limit in Table 1. The manufacturer shall not include any quantity of coatings that it knows or should have known will not be used in the State, if statewide coatings data are used. If district-specific coatings data are used, the manufacturer shall not include any quantity of coatings that it knows or should have known will not be used in the district.

SCM Clarification - New Section "A.1.1"
(See June 7, 2001 letter to all districts by Mike Kenny, ARB Executive Officer)

A.1.1 In addition to the requirements specified in subsection A.1, manufacturers shall not include in an Averaging Program any coating with a VOC content in excess of the following maximum VOC contents, for the applicable categories.

Averaging Category	VOC Limit (Li)[1] grams/liter	Maximum VOC Content grams/liter
Flat	100	250
Nonflat (Excludes High Gloss)	150	250
Floor	250	400
Industrial Maintenance	250	420
Primer, Sealer, Undercoater	200	350
Quick Dry Primer, Sealer, Undercoater	200	450
Quick Dry Enamel	250	400
Roof	250	300
Bituminous Roof	300	300
Rust Preventative	400	400
Stains	250	350
Waterproofing sealers	250	400

1. As listed in Table 1. Used when determining allowable emissions in subsection A.1.

A.2 AVERAGING PROGRAM (PROGRAM)

At least six months prior to the start of the compliance period, manufacturers shall submit an Averaging Program to the Executive Officer of the Air Resources Board. As used in this Appendix A, "Executive Officer" means the Executive Officer of the Air Resources Board. Averaging may not be implemented until the Program is approved in writing by the Executive Officer.

Within 45 days of submittal of a complete Program, the Executive Officer shall either approve or disapprove the Program. The Program applicant and the Executive Officer may agree to an extension of time for the Executive Officer to take action on the Program.

A.3 GENERAL REQUIREMENTS

The Program shall include all necessary information for the Executive Officer to make a determination as to whether the manufacturer may comply with the averaging requirements over the specified compliance period in an enforceable manner. Such information shall include, but is not limited to, the following:

A.3.1 An identification of the contact persons, telephone numbers, and name of the manufacturer who is submitting the Program.

A.3.2 An identification of each coating that has been selected by the manufacturer for inclusion in this program that exceeds the applicable VOC limit in
Table 1, its VOC content specified in units of both VOC actual and VOC regulatory, and the designation of the coating category.

A.3.3 A detailed demonstration showing that the projected actual emissions will not exceed the allowable emissions for a single compliance period that the Program will be in effect. In addition, the demonstration shall include VOC content information for each coating that is below the compliance limit in Table 1. The demonstration shall use the equation specified in subsection A.1 of this Appendix for projecting the actual emissions and allowable emissions during each compliance period. The demonstration shall also include all VOC content levels and projected volume within the State for each coating listed in the Program during each compliance period. The requested data can be summarized in a matrix form.

A.3.4 A specification of the compliance period(s) and applicable reporting dates. The length of the compliance period shall not be more than one year or less than six months.

A.3.5 An identification and description of all records to be made available to the Executive Officer upon request, if different than those identified under subsection A.3.6.

A.3.6 An identification and description of specific records to be used in calculating emissions for the Program and subsequent reporting, and a detailed explanation as to how those records will be used by the manufacturer to verify compliance with the averaging requirements.

A.3.7 A statement, signed by a responsible party for the manufacturer, that all information submitted is true and correct, and that records will be made available to the Executive Officer upon request.

A.4 REPORTING REQUIREMENTS

A.4.1 For every single compliance period, the manufacturer shall submit a mid-term report listing all coatings subject to averaging during the first

half of the compliance period, detailed analysis of the actual and allowable emissions at the end of the mid-term, and an explanation as to how the manufacturer intends to achieve compliance by the end of the compliance period. The report shall be signed by the responsible party for the manufacturer, attesting that all information submitted is true and correct. The mid-term report shall be submitted within 45 days after the midway date of the compliance period. A manufacturer may request, in writing, an extension of up to 15 days for submittal of the mid-term report.

A.4.2 Within 60 days after the end of the compliance period or upon termination of the Program, whichever is sooner, the manufacturer shall submit to the Executive Officer a report listing all coatings subject to averaging during the compliance period, providing a detailed demonstration of the balance between the actual and allowable emissions for the compliance period, any identification and description of specific records used by the manufacturer to verify compliance with the averaging requirement, and any other information requested by the Executive Officer to determine whether the manufacturer complied with the averaging requirements over the specified compliance period. The report shall be signed by the responsible party for the manufacturer, attesting that all information submitted is true and correct, and that records will be made available to the Executive Officer upon request. A manufacturer may request, in writing, an extension of up to 30 days for submittal of the final report.

A.5 RENEWAL OF A PROGRAM

A Program automatically expires at the end of the compliance period. The manufacturer may request a renewal of the Program by submitting a renewal request that shall include an updated Program, meeting all applicable Program requirements. The renewal request will be considered conditionally approved until the Executive Officer makes a final decision to deny or approve the renewal request based on a determination of whether the manufacturer is likely to comply with the averaging requirements. The Executive Officer shall base such determination on all available information, including but not limited to, the mid-term and the final reports of the preceding compliance period. The Executive Officer shall make a decision to deny or approve a renewal request no later than 45 days from the date of the final report submittal, unless the manufacturer and the Executive Officer agree to an extension of time for the Executive Officer to take action on the renewal request.

A.6 MODIFICATION OF A PROGRAM

A manufacturer may request a modification of the Program at any time prior to the end of the compliance period. The Executive Officer shall take action to approve or disapprove the modification request no longer than 45 days from the date of its submittal. No modification of the compliance period shall be allowed.

A Program need not be modified to specify additional coatings to be averaged that are below the applicable VOC limits.

A.7 TERMINATION OF A PROGRAM

A.7.1 A manufacturer may terminate its Program at any time by filing a written notification to the Executive Officer. The filing date shall be considered the effective date of the termination, and all other provisions of this rule including the VOC limits shall immediately thereafter apply. The manufacturer shall also submit a final report 60 days after the termination date. Any exceedance of the actual emissions over the allowable emissions over the period that the Program was in effect shall constitute a separate violation for each day of the entire compliance period.

A.7.2 The Executive Officer may terminate a Program if any of the following circumstances occur:

A.7.2.1 The manufacturer violates the requirements of the approved Program, and at the end of the compliance period, the actual emissions exceed the allowable emissions.

A.7.2.2 The manufacturer demonstrates a recurring pattern of violations and has consistently failed to take the necessary steps to correct those violations.

A.8 CHANGE IN VOC LIMITS

If the VOC limits of a coating listed in the Program are amended such that its effective date is less than one year from the date of adoption, the affected manufacturer may base its averaging on the prior limits of that coating until the end of the compliance period immediately following the date of adoption.

A.9 LABELING

Each container of any coating that is included in averaging program, and that exceeds the applicable VOC limit in Table 1 shall display the following statement: "This product is subject to architectural coatings averaging provisions in California." A symbol specified by the Executive Officer may be used as a substitute.

A.10 VIOLATIONS

The exceedance of the allowable emissions for any compliance period shall constitute a separate violation for each day of the compliance period. However, any violation of the requirements of the Averaging Provision of this rule, which the violator can demonstrate, to the Executive Officer, did not cause or allow the emission of an air contaminant and was not the result of negligent or knowing activity may be considered a minor violation.

A.11 SUNSET OF AVERAGING PROVISION

The averaging provision set forth in Appendix A shall cease to be effective on January 1, 2005, after which averaging will no longer be allowed.