California Environmental Protection Agency

Air Resources Board

LOCATION:
Los Angeles Airport Marriott Hotel
Suites A,B, and C
5855 West Century Blvd.
Los Angeles, CA 90045

PUBLIC MEETING AGENDA

This facility is accessible by public transit. For transit information, call: Metropolitan Transit Authority (MTA) at 1-800-COMMUTE, website: www.mta.net (This facility is accessible to persons with disabilities.)

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

June 21, 2007
9:00 a.m.

Item #

07-7-1: Update the Board on a Health Update: Influence of Genetics on Respiratory Health in Asthmatic Children

Recent research has suggested that people with certain variants in genes that code for biochemicals that protect against lung injury from oxidant substances like ozone are more likely to experience adverse responses when exposed to ozone. Staff will update the Board on the findings of a recent study on the influence of these gene variants on respiratory health of asthmatic children exposed to ozone. The results suggest that asthmatic children with certain gene variants are more likely to experience lung function decrements and respiratory symptoms than children with other variants of the same genes.

07-7-2: Public Meeting to Consider Research Proposals (4)

"A Spatial Synoptic Classification Approach to Projected Heath Vulnerability in California Under Future Climate Change Scenarios," Kent State University, $182,000, Proposal No. 2631-256.

"Effect of GSTM1 Phenotype on Ozone-Induced Allergic Airway Inflammation," University of California, San Francisco, $250,000.

"Cardiovascular Health Effects of Fine and Ultrafine Particles During Freeway Travel," University of California, Los Angeles, $50,000.

"Disaggregated Estimate of Energy-related Carbon Dioxide Emissions for California," Lawrence Berkeley National Laboratory, $30,000.

07-7-3: Update the Board on the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report Summary for Policymakers

Staff will provide an update on the latest assessment of the scientific basis of climate change from the Intergovernmental Panel on Climate Change or IPCC 2007. Topics to be covered include the most important findings on the physical science basis, impacts, mitigation, and adaptation of climate change.

07-7-4: Public Meeting to Consider Approval of a List of Proposed Early Action Measures to Reduce Greenhouse Gas Emissions under the California Global Warming Solutions Act of 2006

Staff will present for the Board's consideration a set of proposed early action measures for climate change mitigation pursuant to the requirements of the California Global Warming Solutions Act of 2006. The proposed actions are suggestions for regulatory and non-regulatory strategies that, if supported by the Board, the staff will pursue as part of the State's comprehensive plan for achieving greenhouse gas emission reductions.

07-7-5: Public Hearing to Consider Proposed Amendments to the Emission Control and Smog Index Labels Regulations

Staff proposes to modify the graphics and content of the Smog Index Label and add a Global Warming Index label. The proposed smog index label will rank vehicles on a scale from 1 to 10, with 10 being the lowest emitting rank, based on their emission standard certification. In developing a global warming scoring system, staff proposes the calculations be consistent with the Motor Vehicle emissions regulations developed under AB 1493 (Pavely). Staff performed a statistical analysis on the California GHG emission data available and ranked vehicles on a scale from 1 to 10 with 10 being the lowest emitting. The label size is 4" x 6" with a Green color border containing informative text. The indexes are displayed inside the border.

07-7-6: Public Hearing to Consider Adoption of Regulations for the Certification and Testing of Gasoline Vapor Recovery Systems Using Aboveground Storage Tanks

ARB staff is proposing new vapor recovery performance standards and specifications to control standing loss and transfer emissions from aboveground storage tanks (AST). Compliance with these new standards and specifications would be verified through certification testing by ARB staff. These new standards and specifications would be applicable to new and existing installations with full compliance of the new requirements by no later than January 1, 2013. This proposal is expected to reduce reactive organic gases by nearly two tons per day.

June 22, 2007
8:30 a.m.

Item #

07-7-7: Public Meeting to Consider Approval of the Proposed State Strategy for the California's State Implementation Plan (SIP) for the Federal 8-Hour Ozone and PM2.5 Standards

ARB staff will present the State Strategy for California's 2007 SIP for Board consideration. The proposed state strategy is a comprehensive strategy that lays out the pathway to achieve federal air quality standards as quickly as possible through a combination of technologically feasible, cost effective, and far reaching measures.

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.

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

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

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

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

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

THE AGENDA ITEMS LISTED ABOVE MAY BE CONSIDERED IN A DIFFERENT ORDER AT THE BOARD MEETING. THOSE ITEMS ABOVE THAT ARE NOT COMPLETED ON JUNE 21 WILL BE HEARD BEGINNING AT 8:30 A.M. ON JUNE 22.

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

California Environmental Protection Agency

Air Resources Board

PUBLIC MEETING AGENDA

INDEX

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June 21, 2007 at 9:00 a.m.
&
June 22, 2007 at 8:30 a.m.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER APPROVAL OF A LIST OF PROPOSED EARLY ACTION MEASURES TO REDUCE GREENHOUSE GAS EMISSIONS UNDER THE CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006

The Air Resources Board (ARB or Board) will conduct a public meeting at the time and place noted below to consider the approval of a list of proposed discrete early action measures to reduce greenhouse gas emissions under the California Global Warming Solutions Act of 2006. The Board may also consider directions to staff to develop additional or different climate change mitigation strategies as the Board deems appropriate.

DATE: June 21 and June 22, 2007

TIME: 9:00 a.m.

PLACE: Los Angeles Airport Marriott
5855 West Century Blvd.
Los Angeles, CA 90045

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., Thursday, June 21, 2007, and may continue at 8:30 a.m., Friday, June 22, 2007. This item may not be considered until June 22, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before June 21, 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") 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)). Once on the list, these measures are to be developed into regulatory proposals, adopted by the Board, and made enforceable by January 1, 2010. The Act requires that measures adopted and implemented by the ARB be technologically feasible and cost-effective. The ARB staff is making 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 early action measures, additional strategies for reductions in GHGs have been identified. While staff does not believe that these strategies meet the criteria for "discrete early action measures," the staff is recommending vigorously developing all potentially viable options for mitigating GHG emissions.

The staff has identified a total of 36 ARB-specific actions to be developed into regulatory or non-regulatory measures in the 2007 – 2009 timeframe. These include three discrete early regulatory actions, 23 additional GHG reduction measures anticipated to encompass both regulations and other measures, and 10 conventional air pollution control measures that are scheduled for rulemaking by 2009 and 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 vigorously. All of these strategies are described in the staff report titled "Proposed Early Actions to Mitigate Climate Change in California."
(http://www.arb.ca.gov/cc/042307workshop/early_action_report.pdf).

At the public hearing the Board may adopt the staff recommendations or it may modify those recommendations as it deems appropriate.

Discrete ARB Early Actions Pursuant to AB 32

As indicated above, three strategies are proposed to meet the narrow statutory definition of "discrete early action greenhouse gas reduction measures" in Section 38560.5 of the Health and Safety Code (Group 1). These include the Governor's Low Carbon Fuel Standard, reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills. Collectively, these actions are estimated to reduce GHG emissions between 13 and 26 $MMTCO_2E$ annually by 2020 relative to projected levels. If approved for listing by the Board, these measures will be brought to the Board in the form of proposed regulations within in the next 12 to 18 months. A brief summary of each of the three discrete early action strategies is provided below:

1. Low Carbon Fuel Standard - Will require 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.

Staff has received and continues to receive numerous comments and suggestions from a broad spectrum of stakeholders. Comments were provided at both the January 22, 2007 and April 23, 2007 workshops on early actions as well as via submittals before and after the workshops.

The suggestions ranged from support of the measures as proposed to recommendations for additional action or modification of a proposal. Specifically, in the case of the above discrete early actions (1) and (2), staff will consider concerns expressed by the Environmental Justice Advisory Committee regarding potential disproportionate impacts on the low-income sector of the general population during the regulatory development process. Furthermore, in the case of discrete early action (2), the affected industry has put forth an alternative proposal that will be seriously evaluated as it may offer a more efficient strategy for achieving similar emission reductions. Staff is now considering this alternative and will discuss it at the June Board hearing. At this point, staff acknowledges the proactive approach of this industry for pursuing what appears to be a sensible alternative that does not erode the climate benefit of the proposed discrete early action. However staff still recommends that the proposed measure remain on the early action list. If the Board approves the proposed list of early actions, staff will carefully consider all options for achieving the emission reductions during the regulatory development process, including those suggested by the affected industry.

Other Early Actions with Direct Climate Benefits

The ARB is also initiating work on another 23 GHG emission reduction measures in the 2007-2009 time period, with rulemaking to occur as soon as possible where applicable. These GHG measures were drawn from three separate sources. Some were identified in the March 2006 Climate Action Team (CAT) Report and are already underway. This group also includes strategies ARB staff has identified since March 2006 – such as cool automobile paints and tire inflation requirements – that could be developed relatively quickly and produce significant GHG reductions. These measures also reflect several stakeholder suggestions. In total, they are expected to yield at least 20 $MMTCO_2E$ of reductions by 2020, with reductions for several measures still to be quantified.

Stakeholder suggestions have also been received concerning this group of early actions. A common denominator in those suggestions is the re-categorization of many of the proposed measures into the narrow (Group 1) list of discrete early actions. Staff has considered this suggestion carefully but is recommending no change to the proposed list of three discrete early actions, primarily due to the practical challenges of the 18-month regulation development requirement imposed by the narrow discrete early action definition. Instead, staff has committed to considering regulatory action as appropriate for the 23 additional actions with climate benefits. In this approach, an ongoing stream of rulemaking can be anticipated as individual measures are determined to meet all legal requirements under the Act.

Some of the comments regarding additional early actions have also advanced the staff's understanding of the potential for realizing additional climate benefits with expansion or refinement of some of the proposed actions. For instance, work on mitigation of emissions from the use of small disposable cans for recharging air conditioning systems revealed an opportunity for further reductions by limiting the global warming potential (GWP) of high GWP non-essential emissive use products such as hand-held horns and spray string (silly string). Staff anticipates the continued analysis of the proposed measures in the pursuit of additional abatement opportunities.

Criteria Pollutants and Air Toxics Efforts Underway With Climate Co-Benefits

Finally, ARB staff has identified 10 air pollution control measures that are scheduled for rulemaking in the 2007-2009 period. These control measures are aimed at reducing particulate matter, ozone precursors, and toxic air pollutants, but will have concurrent climate co-benefits through reductions in CO_2 or non-Kyoto pollutants (i.e., diesel particulate matter, other light-absorbing compounds and/or ozone precursors) that contribute to global warming. These measures were drawn from the ARB's annual rulemaking calendar, ARB's Diesel Risk Reduction Plan, the Goods Movement Emissions Reduction Plan, and the State Implementation Plan with actual emission reductions still being quantified.

These measures received extensive stakeholder comments, in general supporting the actions and suggesting a possible formal designation as "discrete early actions." Staff has considered this input carefully but has determined that given the remaining uncertainty in the science of the climate impact of some of the non-Kyoto GHGs, it is appropriate for these measures to be maintained as a separate category of actions to be implemented initially for their public health protection goals. As the science on their climate impacts firms up, the GHG reductions co-benefits can be integrated into the general climate protection plan if the measures meet all legal, technical and cost-effectiveness feasibility criteria.

Cumulative Early Action Emissions Reductions

The 36 measures described in this notice will reduce GHG emissions between 33-46 $MMTCO_2E$ by 2020 relative to projected levels. Existing ARB regulations will contribute an additional 30 $MMTCO_2E$ (e.g., the motor vehicle GHG standards developed in response to AB 1493). These estimates *exclude* the benefits from reducing diesel particulate matter, ozone precursors and other toxic pollutants since the science for quantifying their CO_2 equivalent emission reductions is not currently as robust as that for the pollutants explicitly identified in the Act.

Climate Action Team Early Actions

In recognition that actions by other state agencies are essential for meeting the GHG emission reduction targets of AB 32, the Governor established the Climate Action Team. The CAT has identified 13 near-term strategies that are expected to reduce and mitigate GHG emissions by about 17 $MMTCO_2E$. These measures are anticipated to be translated into regulations that would be in place by January 1, 2010. Similar to the ARB approach, the CAT has identified other actions where the January 1, 2010 enforceable regulatory deadline is not appropriate, but where efforts are already underway or expected. These additional 28 early actions by CAT members are estimated to reduce GHG emissions by about 60 $MMTCO_2E$.

The sum of the three ARB discrete early actions, ARB's existing AB 1493 regulation, and the 13 discrete early actions proposed by the CAT will make a substantial contribution of approximately 60 $MMTCO_2E$ to the overall 2020 statewide emission reduction goal. The additional early actions proposed by ARB and the CAT will deliver another 80 $MMTCO_2E$ resulting in an early action total "down payment" of more than half (140 $MMTCO_2E$) toward the approximate target of 174 $MMTCO_2E$ of GHG emission reductions by 2020.

DESCRIPTION OF PROPOSED ACTION

Staff is proposing that the Board approve the list of three recommended discrete early action measures to reduce greenhouse gas emissions, and support staff's recommendation to actively pursue an additional 33 measures during calendar years 2007, 2008 and 2009. Specifically, staff proposes that the Board:

(i) approve the list of 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 as appropriate; and

(iii) direct staff to provide status reports to the Board approximately every six months on its progress in developing these measures and strategies.

PUBLIC REVIEW AND COMMENT

The staff's request for public input on its identification of early actions resulted in a broad range of suggestions. Many stakeholder comments and suggestions were coincident with the two public workshops on early actions held in Sacramento on January 22 and April 23, 2007. Additional input was obtained during the international symposium on near-term options for GHG emission reductions that ARB staff organized in March 2007. Details on the nature and scope of the comments are included next.

The ARB received more than 70 suggestions from stakeholders for early action measures as part of the January 22, 2007 workshop. Those within ARB's purview were carefully reviewed by staff while those under the jurisdiction of other agencies were forwarded to the appropriate CAT member(s) for consideration. The suggestions covered a wide range of ideas including comments on a low carbon fuel standard (LCFS), replacement of hydrofluorocarbons (HFCs) in fire suppression systems, a green ship incentive program, waste management methods, water management methods, and renewable energy initiatives. Some of the proposed strategies require new legislation to implement, some require subsidies, some are already being developed, and some require additional effort to evaluate and quantify.

Following the release of the draft early action report, the ARB has thus far received approximately two dozen additional public comments. The ARB staff expects comments to continue to be submitted up until and at the Board hearing. The comments received thus far can be categorized broadly into: (1) comments reiterating the importance of several of the measures captured in the April 2007 early actions report; (2) new ideas for expanding and improving strategies already previously identified; and (3) comments questioning the prioritization and ranking of the early actions in the draft report.

An example of the comments in the first category is the explicit endorsement for the 36 measures in the draft report and, in particular, for the three discrete early actions. New suggestions were submitted in areas that include carpool/rideshare incentives in transportation; carbon capture and storage requirements for electricity generation, efficiency improvement in cement production, and tighter emission standards for various applications including refineries and power plants. The ARB staff plan to address as part of its presentation to the Board recent stakeholder input including additional comments expected to be submitted shortly before the June Board Hearing.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

Staff has prepared a report titled "Proposed Early Actions to Mitigate Climate Change in California" (Staff Report) that was released on April 20, 2007. Comments that have been received on this report are reflected in this notice and will be reflected in the staff presentation at the June Board Hearing.

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.

Further Inquiries concerning this matter may be directed to Alberto Ayala, Chief of the Climate Change Mitigation and Emissions Branch, at (916) 327-2952, or by email at aayala@arb.ca.gov, or Michael Robert, Air Resources Engineer, at (916) 327-0604, or by email at mrobert@arb.ca.gov.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by email 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, June 20, 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 (Govt. 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 recommendations.

CALIFORNIA AIR RESOURCES BOARD

Catherine Witherspoon
Executive Officer

Date:

California Environmental Protection Agency 15

Air Resources Board

PROPOSED EARLY ACTIONS TO MITIGATE CLIMATE CHANGE IN CALIFORNIA

April 20, 2007

GLOSSARY OF TERMS AND ACRONYMS

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

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

CO2 – carbon dioxide; a byproduct of fossil fuel combustion, cement production, and other natural processes

C/E – cost effectiveness, the dollars expended per ton of greenhouse gases reduced

CNG – compressed natural gas

E-10, E-85 – blends of gasoline and ethanol consisting of 10% ethanol (E-10) or 85% ethanol (E-85)

GHG – greenhouse gas or gases; defined in AB 32 as 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 as compared to carbon dioxide which has a GWP of 1.0.

HFC – Hydrofluorocarbons; a class of compounds typically used in air conditioning systems and as propellants

H&SC – (the California) Health and Safety Code

LCFS – Low Carbon Fuel Standard

MMTCO2E – million metric tons (of) carbon dioxide equivalent (gases)

MVAC – motor vehicle air conditioning (systems)

NMOC – non-methane organic compounds, volatile hydrocarbons that react with nitrogen oxides in the atmosphere to form ozone; also referred to as ozone precursors

NOx – oxides of nitrogen, a combustion product that reacts with volatile hydrocarbons in the atmosphere to form ozone; NOx is also a precursor to certain forms of particulate matter such as ammonium nitrate and to highly irritating substances such as nitric acid mist or droplets

PFC – perfluorocarbons, a chemical mostly used in the semi-conductor industry

PM – particulate matter

SF_6 – sulfur hexafluoride; a chemical emitted from various industrial processes

EARLY ACTIONS TO MITIGATE CLIMATE CHANGE IN CALIFORNIA

1. SUMMARY

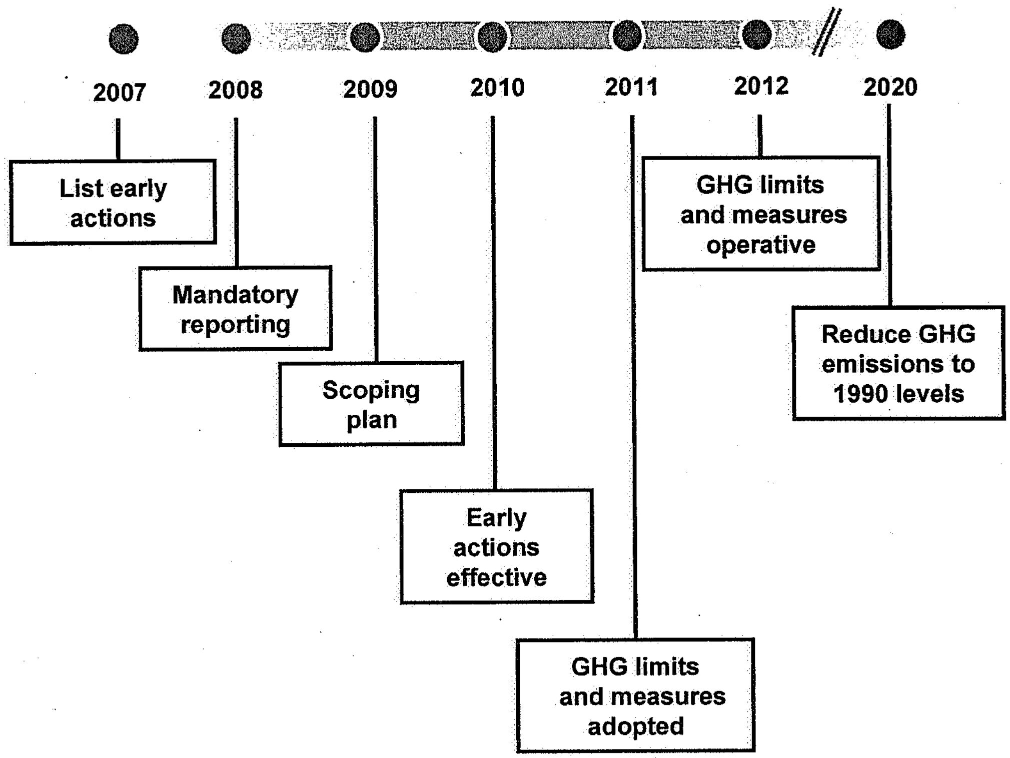
This document describes the Air Resources Board (ARB or Board) staff's analysis and recommendations for discrete early action measures to reduce global warming emissions. These measures will become part of the State's comprehensive strategy for achieving greenhouse gas (GHG) reductions under Assembly Bill 32, the California Global Warming Solutions Act of 2006 (AB 32 of the Act).

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. (see Figure 1.) The Act 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 plan to reduce GHG emissions to 1990 levels. 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 must be fully achieved by January 1, 2020. As part of this comprehensive effort, the Board is empowered to use traditional command and control methods and to adopt and implement market-based compliance mechanisms provided certain criteria are met.

Alongside this deliberate approach, AB 32 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)). Once on the list, these measures are to be developed into regulatory proposals, adopted by the Board, and made enforceable by January 1, 2010. This schedule is very accelerated compared to most regulations developed by the Board.

The ARB received more than 70 suggestions from stakeholders for early action measures. Those within ARB purview were carefully reviewed by staff. Those under the jurisdiction of other agencies were forwarded to the appropriate Climate Action Team member(s) for consideration. The suggestions covered a wide range of ideas including a low carbon fuel standard (LCFS), replacement of hydrofluorocarbons (HFCs) in fire suppression systems, a green ship incentive program, waste management methods, water management methods, and renewable energy initiatives. Some of the proposed strategies require new legislation to implement, some require subsidies, some are already being developed, and some require additional effort to evaluate and quantify. Two summary tables of stakeholder suggestions are attached (A – Stakeholder Suggestions under ARB Jurisdiction and B – Stakeholder Suggestions for the CAT Forwarded from the ARB). The ARB staff appreciates all of the suggestions that have been received so far and looks forward to additional public comments in response to this document.

Figure 1
Comprehensive Multiyear Program
Established by AB 32



Staff is proposing that ARB actively pursue 36 separate measures during calendar years 2007, 2008 and 2009 (see Figure 2 and Tables 1, 2 and 3 below).

Three new GHG-only regulations are proposed to meet the narrow legal definition of "discrete early action greenhouse gas reduction measures" in Section 38560.5 of the Health and Safety Code (see Table 1 - Group 1). These include the Governor's Low Carbon Fuel Standard, reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills. These actions are estimated to reduce GHG emissions between 13 and 26 $MMTCO_2E$ annually by 2020 relative to projected levels. If approved for listing by the Governing Board, these measures will be brought to hearing in the next 12 to 18 months and take legal effect by January 1, 2010.

ARB is *initiating* work on another 23 GHG emission reduction measures in the 2007-2009 time period, with rulemaking to occur as soon as possible where applicable (see Table 2 - Group 2). These GHG measures were drawn from three separate sources. Some were identified in the March 2006 Climate Action Team Report and are already underway. This group also includes strategies ARB staff has identified since March 2006 – such as cooler automobile paints and tire inflation requirements – that could be developed relatively quickly and produce significant GHG reductions. The Group 2 measures also reflect stakeholder input. Group 2 measures are expected to yield at least 20 $MMTCO_2E$ of reductions by 2020, with reductions for several measures still to be quantified.

Finally, ARB staff has identified 10 conventional air pollution control measures that are scheduled for rulemaking in the 2007-2009 period (Table 3 – Group 3). These control measures are aimed at criteria and toxic air pollutants, but will have concurrent climate co-benefits through reductions in CO_2 or non-Kyoto pollutants (i.e., diesel particulate matter, other light-absorbing compounds and/or ozone precursors) that contribute to global warming. These measures were drawn from ARB's annual rulemaking calendar, ARB's Diesel Risk Reduction Plan, the Goods Movement Emissions Reduction Plan, and the State Implementation Plan. Group 3 reductions in terms of $MMTCO_2E$ are still being quantified.

The Group 1, 2 and 3 measures will reduce GHG emissions between 33-46 $MMTCO_2E$ by 2020 relative to projected levels. Existing ARB regulations will contribute an additional 30 $MMTCO_2E$ (e.g., AB 1493). These estimates *exclude* the benefits from reducing diesel particulate matter, ozone precursors and other pollutants since the CO_2 equivalent effects are yet to be determined. Together, these measures will make a substantial contribution to the overall 2020 statewide emission reduction goal of approximately 174 $MMTCO_2E$.

ARB is not the only state agency undertaking early action measures. The Climate Action Team has been hard at work identifying additional GHG reduction strategies that can be accomplished or initiated in the 2007-2009 period. Those actions are briefly summarized in Section 6 of this report and will be described further in a separate Cal/EPA document.

AB 32 requires that all GHG reduction measures adopted and implemented by the Air Resources Board be technologically feasible and cost-effective. The law also requires that GHG measures have neither negative impacts on conventional pollutant controls nor any disproportionate socio-economic effects (among other criteria). ARB staff is making a presumption, based on currently best available information, that all of the measures it is proposing to pursue will meet all of the legal requirements of AB 32. 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 may also change based on public comments and/or what is learned during the regulatory development process.

Figure 2
Early Actions to Reduce Greenhouse Gas Emissions

ARB ADOPTED REGULATIONS
Vehicle Climate Change Standards Criteria and Air Toxic Controls

EARLY ACTIONS TO REDUCE GHGS CALENDAR YEARS 2007, 2008, 2009
ARB MEASURES
GROUP 1 Discrete Early Action Measures
GROUP 2 Additional Greenhouse Gas Reduction Strategies
GROUP 3 Criteria and Air Toxic Control Measures
CLIMATE ACTION TEAM MEASURES
(See separate Cal/EPA report)

Table 1
Group 1 – ARB Discrete Early Action Measures Per Health & Safety Code Section 38560.5

Number	Sector	Description	2020 Reductions (MMT CO_2E)
1-1	Transportation	Low Carbon Fuel Standard (LCFS)	10-20
1-2	Transportation	Reduction of HFC-134a emissions from non-professional servicing of motor vehicle air conditioning systems (MVACs)	1-2
1-3	Waste	Improved landfill methane capture	2-4
		Group 1 Total Reductions	**13-26**

Notes on Table 1: Measure 1-1 subsumes two prior measures from the March 2006 Climate Action Plan: "Alternative Fuels – Biodiesel Blends" and "Alternative Fuels – Ethanol in Gasoline" that were jointly estimated to achieve 4 MMTCO$_2$E by 2020.

Table 2
Group 2 – Additional GHG Reduction Measures Underway or to be Initiated by ARB in 2007-2009 Period

Number	Sector	Description	2020 Reductions (MMT CO_2E)
2-1	Agriculture	Manure management (methane digester protocol)	1
2-2	Agriculture	Electrification of stationary agricultural engines	0.1
2-3	Commercial	Specifications for commercial refrigeration	>7.3
2-4	Commercial	Reduction of perfluorocarbons (PFCs) from the semiconductor industry	0.5
2-5	Commercial	Reduction of hydrofluorocarbons (HFCs) from foam production/installation including extruded polystyrene and block foam	TBD
2-6	Education	Guidance/protocols for local governments to facilitate GHG emission reductions	TBD
2-7	Education	Guidance/protocols for businesses to facilitate GHG reductions	TBD
2-8	Electricity	Detection, repair, and recycling equipment for sulfur hexafluoride (SF_6)	0.7
2-9	Energy Efficiency	Light-covered paving, cool roofs and shade trees	TBD
2-10	Fire Suppression	Replacement of high global warming potential (GWP) gases used in fire protection systems with alternate chemical(s)	0.1
2-11	Forestry	Forestry protocol	TBD
2-12	Oil & Gas	Reduce venting/leaks from oil and gas systems	1
2-13	Transportation	Strengthen light-duty vehicle standards	4

Table 2, continued			
Number	**Sector**	**Description**	**2020 Reductions (MMT CO_2E)**
2-14	Transportation	Heavy-duty vehicle emission reductions, efficiency improvements	3
2-15	Transportation	Cool automobile paints	1.2 to 2.0
2-16	Transportation	Port Electrification	0.5
2-17	Transportation	Transportation refrigeration, electric standby	0.1
2-18	Transportation	Enforce federal ban on HFC release during service/dismantling of MVACs	0.1
2-19	Transportation	Truck stop electrification with incentives for truckers	TBD
2-20	Transportation	Tire inflation program	TBD
2-21	Transportation	Promote telework policies/incentives	TBD
2-22	Transportation	Require low GWP refrigerants for new MVACs	TBD
2-23	Transportation	Add AC leak tightness test and repair to Smog Check	TBD
		Group 2 Total Reductions	**19.6 to 20.4**

Notes on Table 2: Some of the estimated 2020 reductions listed reflect new information and/or refinements since the March 2006 Climate Action Report. Some measures from that Report have been disaggregated and others have been combined based on ARB staff's preliminary assessment of how best to proceed. Particulate matter related benefits are not included in the right-hand column since those have yet to be quantified.

Table 3
Group 3 – ARB Air Pollution Controls for 2007-2009 Adoption With Potential GHG Reductions or Other Climate Co-Benefits

Number	Sector	Description	Hearing Date
3-1	Transportation	Diesel - Commercial harbor craft rule	2007
3-2	Transportation	Diesel – Privately owned on-road trucks	2008
3-3	Transportation	Diesel – Vessel speed reductions	2007 or 2008
3-4	Transportation	Diesel – Offroad equipment (non-agricultural)	2009
3-5	Transportation	Diesel – Port trucks	2007
3-6	Transportation	Diesel – Vessel main engine fuel specifications	2008
3-7	Transportation	Standards for off-cycle driving conditions	2007
3-8	Fuels	Gasoline dispenser hose replacement	2008
3-9	Fuels	Portable outboard marine tanks	2007 or 2008
3-10	Fuels	Evaporative standards for aboveground tanks	2007

Notes on Table 3: The CO_2-equivalent emission reductions from these measures are not identified because the science to characterize the net climate effects of particulate matter and ozone precursors is still developing. There is reasonable expectation that these measures will yield some reductions of GHG emissions.

2. RECOGNITION OF VOLUNTARY EARLY EMISSION REDUCTIONS

AB 32 requires ARB to ensure that entities that have voluntarily reduced their greenhouse gas emissions prior to the implementation of GHG emission limits and GHG reduction measures receive "appropriate credit" for early voluntary reductions (see Health & Safety Code section 38562(b) (3)).

To fulfill this requirement, the ARB staff is working on methods to recognize voluntary early actions by industry, government and individuals. Staff believes that the leadership shown by many businesses and local governments needs to be acknowledged and supported. The first step in this effort is to quantify and document voluntary emission reductions that rise beyond "business as usual," but this is not trivial. This verification also needs to be based on methods that demonstrate real, permanent and surplus (relative to regulatory requirements) GHG reductions. To get started, ARB intends to officially review and approve sector-specific and project-specific emission calculation protocols as they become available. Some reporting protocols have already been published by the California Climate Action Registry and many more are in the pipeline. ARB is also working on interim guidance for quantification, documentation and verification of greenhouse gas emission reductions. Eventually, ARB will define the process for translating voluntary emission reductions into creditable reductions consistent with the broader AB 32 implementation strategy.

ARB intends to adopt rules for awarding GHG reduction credit and the process for submitting credit requests. This regulation will be developed with full opportunity for public input, starting in mid-2007 with a public workshop. Staff are already considering the criteria for receiving credit, amounts of credit given, and uses to which credits may be applied. Issues to be explored include what types of actions count (e.g., in-state only or out-of-state), how far back in time voluntary actions will be considered, the level of documentation required, and criteria for determining additionality and permanence. The parameters of the program will evolve during the regulatory development process as the ARB gathers information about voluntary measures through workshops, public comment, and hearings. While the ARB cannot provide precise details about how voluntary reductions will be credited, the staff is committed to ensuring that all parties who voluntarily reduce their GHG emissions beyond business as usual receive appropriate credit as required by AB 32.

3. PREVIOUSLY ADOPTED ARB REGULATIONS

Existing ARB regulations are expected to yield significant GHG reductions between now and 2020. These include the greenhouse gas emission standards for motor vehicles (per AB 1493, Pavley) as well as several diesel risk reduction measures. Regarding the latter, the greatest GHG reductions are expected to come from ARB's anti-idling controls and from the electrification of various diesel engines such as agricultural pumps. More detail on these measures is provided below.

3.1 VEHICLE CLIMATE CHANGE STANDARDS (AB 1493)

AB 1493, Pavley, Chapter 200, Statutes of 2002, required ARB to achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from passenger vehicles and light-duty trucks. These vehicle standards were adopted by ARB in September 2004 and are scheduled to take effect in the 2009 model year. Staff estimates an emissions savings of approximately one $MMTCO_2E$ by 2010 and 30 $MMTCO_2E$ by 2020. This analysis demonstrated that operating cost savings will more than offset the incremental costs of improved technologies, resulting in consumer savings of $5 billion annually by 2020. ARB's request for a federal waiver to implement its motor vehicle regulations is currently pending before the U.S. Environmental Protection Agency. Concurrently, ARB is defending its legal authority to impose such standards in federal court.

AB 32 requires – should the federal waiver be denied or should ARB lose the lawsuit brought against it by the automakers – that ARB adopt alternative regulations to control mobile sources of greenhouse gas emissions to achieve greater or equivalent reductions (see Health & Safety Code section 38590).

3.2 DIESEL RISK REDUCTION MEASURES

ARB has adopted numerous regulations to reduce diesel particulate matter (PM) since 2001. In addition to the direct health benefits associated with these rules, these regulations will produce important climate protection benefits. Black carbon is a major component of diesel PM and has a significant net warming effect. In addition, some of the diesel rules result in fleet modernization, fuel switching, and/or greater fuel savings, which further promote greenhouse gas emission reductions. Twenty diesel risk reduction measures have been adopted between October 2001 and November 2006, including rules for low-sulfur diesel fuels, diesel truck operational idling limits, transit bus rules, garbage truck rules, school bus replacements and retrofits, stationary diesel engine rules, agricultural engine rules, portable engine rules and border truck inspection protocols.

The scientific community has not yet determined the precise global warming potential (GWP) for diesel PM as compared to carbon dioxide. Nevertheless, reductions in PM emissions are expected to provide important near-term climate benefits. Preliminary estimates of the 100-year horizon global warming potential of diesel PM range from 500 to 1200 (relative to CO_2). This means that 1 kilogram of diesel PM contributes much more to global warming than 1 kilogram of CO_2 over the 100-year timeframe typically used to evaluate climate change impacts. This is the case even though diesel PM has a much shorter atmospheric lifetime than CO_2 (weeks versus hundreds of years) and has some components that cause cooling rather than warming of the atmosphere. Thus a comprehensive program to address climate change will need to address a suite of pollutants—CO_2 as well as other global warming pollutants. California is well positioned for that eventuality, given its aggressive control programs for criteria and toxic air pollutants.

ARB has identified and committed to additional measures that will reduce emissions of diesel PM, as shown in Table 3. These measures are not included in Group 1 (early action measures per Health and Safety Code Section 38560.5) because, as discussed previously, diesel PM does not currently have a well-defined GWP and thus is not readily incorporated into the AB 32 reduction framework. In addition, although some of the diesel PM reduction measures will have CO_2 co-benefits (particularly those that reduce total fuel combustion) it may prove to be the case that they would most effectively be implemented by entities other than the ARB. Other diesel PM reduction measures are expected to result in a small CO_2 increase. Thus, ARB determined that these measures are not appropriate for inclusion on the Group 1 list. Nonetheless, they are expected to result in a real-world climate benefits in the aggregate and should be recognized as part of ARB's overall effort.

Ozone and its precursors (oxides of nitrogen and volatile hydrocarbons) are also considered to be climate changing gases. Accordingly, ARB's efforts to control ozone should have a beneficial climate effect. However, the science to quantify the net impact of these pollutants on the global climate is still evolving and definitive estimates are not possible at this time. Instead, only qualitative assessments can be made.

4. DISCRETE EARLY ACTION MEASURES

AB 32 requires that on or before June 30, 2007, ARB shall publish and make available to the public a list of discrete early action greenhouse gas emission reduction measures that can be adopted and made enforceable before January 1, 2010. The law further requires that such measures achieve the maximum technologically feasible and cost-effective reductions in GHGs from (the pertinent) sources or categories of sources, in furtherance of achieving the statewide greenhouse gas emissions limit for 2020 (see Health & Safety Code section 38560.5.). Elsewhere in the statute, AB 32 requires that every GHG reduction measure adopted by ARB satisfy additional criteria such as no relaxation in conventional air pollutant controls. ARB staff used the latter requirements as screening criteria.

4.1 STRATEGY IDENTIFICATION

Potential Measures - To come up with a preliminary list of discrete early action measures, ARB staff considered many information sources including:

- the Climate Action Team (CAT) Report,
- stakeholder suggestions,
- strategies identified at ARB's International Symposium on Near-Term Solutions for Climate Change Mitigation held on March 5-7, 2007,
- ideas developed by ARB staff, and

- various sources of information such as the Carbon Disclosure Project, the California Climate Action Registry, projects certified by the United Nations Clean Development Mechanism, and compilations of cost-effective mitigation strategies identified by international sources including the European Commission.

Screening Criteria - To select specific measures for listing as "discrete early action measures," ARB staff applied the screening criteria below. These criteria reflect the language in AB 32 as well as additional practical considerations. ARB staff believes a common and objective basis is important for selecting early action measures. The screening criteria were:

- Whether the strategy can be adopted by ARB in calendar year 2009 or earlier.
- Whether the strategy can be legally effective by January 1, 2010.
- Whether the strategy relies on readily available mature technologies or options that have already been successfully demonstrated at an acceptable cost.
- Whether the potential lifecycle GHG emission reductions are of sufficient magnitude to warrant the resources required to adopt and implement a regulation.
- Whether the strategy can be developed and implemented with available resources.
- The potential for adverse impacts on criteria or toxic emissions.
- The potential for disproportionate impacts on low-income communities or other disadvantaged sectors.
- The potential for disproportionate impacts on small businesses.
- Significant loss of benefits due to leakage.
- Coordination opportunities with related actions that may have been taken or are planned by other entities including local agencies, the U.S. EPA, and international agencies such as the European Commission.

The most important considerations to ARB staff were the potential GHG reductions achievable by each measure and the likelihood of its being made enforceable by January 1, 2010. To the extent possible, staff considered the maturity of the enabling technology and the estimated cost per avoided ton of CO_2 equivalent emissions. GHG reduction strategies that could potentially interfere with conventional air pollution controls or have disproportionate effects were non-starters.

Technical Feasibility and Cost Effectiveness - As noted above, AB 32 requires that each GHG reduction measure adopted by ARB be technologically feasible and cost-effective.

"Technologically feasible" is not defined in the statute. The ARB's assessment of technological feasibility for GHG emission reduction strategies is expected to be similar to that which has been applied to traditional regulations: 1) a given mitigation strategy has been successfully demonstrated in the same or very similar application; 2) a mitigation strategy has been demonstrated in a related application such that technology transfer is plausible; or 3) with further advances and a sufficiently ample phase-in period, existing technologies will offer an effective mitigation strategy.

The ARB interprets "cost-effectiveness" (C/E) consistent with the statutory definition in AB 32 as the number of dollars expended per metric ton of CO_2E gases reduced. The potential cost-effectiveness of the measures assessed for early actions varies widely, both in magnitude and in terms of certainty. When fully developed, each strategy is expected to meet a yet-to-be-determined cost-effectiveness threshold that the Board must establish as necessary to achieve the overall goals of AB 32 and that is equitable relative to the GHG reduction achieved. It is premature to establish a C/E ceiling at this time. The staff's recommendation of a proposed early action measure simply indicates the staff's presumption that the selected strategy is or can be made to be a cost-effective regulatory proposal for reducing GHGs.

4.2 DESCRIPTION OF SELECTED STRATEGIES

This section describes the proposed discrete early action measures in greater detail. These measures were selected because they fully met the following criteria:

- The measure can be enforceable by January 1, 2010.
- The anticipated GHG emission reductions are of sufficient magnitude to warrant the resources needed to design and adopt the measure.
- The measure is likely to be technically feasible and cost-effective.
- The ARB is the appropriate agency to implement the measure.
- The measure is unlikely to result in adverse impacts on criteria or toxic emissions, or disproportionate impacts on low-income communities or on small businesses.

Low Carbon Fuel Standard - Will require 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.

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. 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 (GWP) Refrigerants - Would restrict the use of high GWP refrigerants for non-professional recharging of leaky automotive air conditioning systems.

Hydrofluorocarbons (HFCs) are a class of compounds that include 10 individual substances. They are used as substitutes for chlorofluorocarbons (CFC), which were identified as ozone depleting substances under the Montreal Protocol. Major applications of HFCs are in refrigeration, air conditioning, foam, solvent, aerosol propellants and fire protection. Although they may be suitable replacements for CFCs in terms of stratospheric ozone depletion, HFCs are potent GHGs. Specifically, HFC-134a, used nearly universally in motor vehicle air conditioning systems, has a GWP of 1300 as compared to CO_2 (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. 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 under evaluation by ARB staff as part of the Group 2 strategies.

The California GHG emissions inventory suggests that high-GWP GHGs constitute about 3.5 percent of the total CO_2 equivalent emissions in 2002. Reducing some of these compounds is the goal of a suite of strategies in the March 2006 Climate Action Plan. Specifically, the Climate Action Plan identified five HFC reduction measures that have total potential reductions of approximately 9 $MMTCO_2E$ in 2020. These measures are interrelated and include:

- Mitigation of impacts of refrigerant available at retail for servicing MVACS (as the proposed early action discussed in this section).
- Requirement of low-GWP refrigerants in new MVACS.
- Improvements in stationary refrigeration and air conditioning (RAC).
- Potential inclusion of a refrigerant leak test and repair in California's Smog Check Program.
- Enforcement of the federal ban on release of HFCs during servicing and dismantling of MVACS.

The discrete early action measure recommended here addresses one of the five HFC reduction measures. ARB staff is working on the remaining measures, but needs additional time and information to bring them to completion. In addition, the ARB is investigating strategies targeted at the reduction of other classes of high-GWP GHGs, namely very high-GWP ozone depleting substances, which may have significant contributions to global warming and that present opportunities for mitigation.

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

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 $MMTCO_2E$.

MSW landfills are regulated by local air district rules who 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.

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 41 landfills were identified by CIWMB as not having emissions controls. As part of the Climate Action Team's strategy for reducing GHG emissions from MSW landfills CIWMB proposed: 1) the installation of emission control systems, 2) increasing energy recovery from landfill methane, and 3) increasing landfill methane capture efficiencies. Based on the implementation of these three strategies, CIWMB estimated total GHG emissions reductions of 1.0 $MMTCO_2E$ for 2010 and 3.0 $MMTCO_2E$ for 2020.

Of the three landfill methane capture strategies mentioned above, the requirement for installing emission control systems at uncontrolled landfills is being considered for a discrete early action. In addition, ARB staff is also proposing to expand the scope of this early action 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.

The other two strategies will require more time to implement and additional investigation to resolve issues. To encourage the installation of landfill gas-to-energy (LFGTE) projects, permitting, criteria pollutant offset, and landfill gas pretreatment issues must first be addressed. In addition, 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.

4.3 PROCESS FOR GOING FORWARD

AB 32 sets two milestones for discrete early action measures. First, the Board must approve a list of such measures by July 1, 2007. Second, the measures must be legally enforceable by January 1, 2010 (see Health & Safety Code section 38560.5). The ARB staff has already conducted one public workshop on proposed discrete early action measures. A second public workshop is scheduled for April 23, 2007 in Sacramento. A final staff report responding to the last round of public comments will be released on May 22, 2007. The public hearing before ARB's Governing Board is scheduled for June 20-21, 2007 in Los Angeles (location TBD). Assuming the Board approves the proposed list, staff will immediately begin the rule development process. Staff anticipates bringing all three measures to the Board for adoption toward the end of calendar year 2008. That will ensure sufficient time for processing through the Office of Administrative Law so that the rules can be legally enforceable by January 1, 2010.

5. OTHER GHG MEASURES TO BE UNDERTAKEN IN THE 2007-2009 PERIOD

Discrete early action measures are only one part of ARB's efforts to reduce greenhouse gases and other climate changing pollutants in the near term. ARB staff is working on additional GHG regulations to be adopted in late 2009 or early 2010, which will just miss the January 1, 2010 enforceability date for "discrete early action measures" in AB 32. In addition, ARB staff are working on several non-regulatory measures such as guidance documents and protocols to spur the public, local government and businesses into positive action. These activities have been categorized as "Group 2" measures.

Group 2 strategies include the remaining ARB GHG reduction actions proposed in the Climate Action Team report that were not ready for adoption as discrete early actions, stakeholders suggestions, and new ideas identified by ARB staff. Examples of strategies in this category include port electrification, and the use of cool materials to increase vehicle and building energy efficiency. Staff anticipates bringing these measures to the Board for adoption within the next three years. Some may begin implementation as rules prior to January 2010 but many will not. Further examination by ARB staff over the next year is expected to yield additional viable candidates for regulatory adoption and possible candidates for non-regulatory actions that the ARB can promote and encourage.

6. THE ROLE OF TRADITIONAL AIR POLLUTION CONTROLS

A number of stakeholders have commented that ARB's conventional air pollution controls should also be considered early action measures, even though they do not address the specific greenhouse gases identified in AB 32. In support of this position, stakeholders point to extensive scientific evidence that black carbon and ozone have climate changing effects. Staff is aware of that information and agrees that conventional air pollution controls make an important contribution to climate protection. Accordingly, staff has listed all the pertinent ARB rulemakings for criteria and toxic air contaminants scheduled for public hearings in 2007, 2008 and 2009 as "Group 3" measures.

Group 3 consists of regulations being developed primarily for criteria or toxic pollutant control purposes, but that are also expected to have climate co-benefits. Such regulations fall into two categories. The first category includes measures under ARB's Diesel Risk Reduction Plan. Examples include proposed regulations for port trucks and proposed requirements for the use of cleaner fuels in ocean-going vessel main engines. The second category includes strategies expected to provide GHG co-benefits by reducing conventional pollutants that may also contribute to atmospheric warming.

7. EARLY ACTIONS BY OTHER STATE AGENCIES

Many other State agencies are taking proactive steps to mitigate greenhouse gas emissions. For example, the Climate Action Team report identifies near term GHG strategies for the Department of Food and Agriculture (e.g., enteric fermentation), the Public Utilities Commission (e.g., California solar initiative), the Resources Agency and Energy Commission (e.g., municipal utility combined heat and power), the Department of Transportation (e.g., congestion reduction measures), and many others. In addition, stakeholders have submitted many more suggestions for potential strategies. The proposals outside of ARB's jurisdiction were referred by ARB staff to the appropriate Climate Action Team member or members for their consideration. A summary of those suggestions and their current status are appended to this document as Attachment B. Cal/EPA is currently assembling a separate document on early actions to be undertaken by Climate Action Team members.

8. EDUCATION EFFORTS

Many stakeholders emphasized the need for expanded education and outreach efforts regarding how the public can reduce the GHGs associated with everyday activities. ARB agrees that well crafted public education efforts have the potential to achieve real world emission reductions. The results of such efforts can be difficult to quantify, and at this point ARB is not prepared to list them as "reduction measures" in the context of this report. The ARB staff will, however, actively pursue a number of public education efforts in coordination with CalEPA, the Climate Action Team, and other interested parties. Such efforts will include establishing a product labeling program and identifying best practices for consumers, developing California-specific GHG footprint calculators, and exploring the development of an eco-driver training program.

Attachment A
STAKEHOLDER SUGGESTIONS UNDER ARB JURISDICTION

ID No.	Description of Strategy	Status
A-1	Low carbon fuel standard	Assigned to Group 1
A-2	Reduction in emissions of HFC-134a from non-professional servicing of motor vehicle air conditioning systems	Assigned to Group 1
A-3	Replacement of HFCs in fire protection systems	Assigned to Group 2
A-4	Heavy-duty efficiency improvements: energy efficient tires, improved aerodynamics	Assigned to Group 2
A-5	Transportation refrigeration units - electric standby	Assigned to Group 2
A-6	Require that large truck stops provide electric infrastructure, and provide incentives for truck operators to use zero emitting technologies	Assigned to Group 2
A-7	Proposed regulation to establish allowable speeds for ocean-going vessels defined in coastal waters	Assigned to Group 3
A-8	Proposed requirements for the use of cleaner fuels in ocean-going vessel main	Assigned to Group 3
A-9	Principles of a CO2 Market : a) make the market comprehensive instead of sectoral; b) auction permits instead of giving them away to corporations; c) preserve the public trust aspect of the resource by including a per capita equity component	Deferred to Scoping Plan
A-10	Study public trust allocation of CO2 permits	Deferred to Scoping Plan
A-11	Fix price for carbon (i.e., carbon tax) and/or include high GWP GHGs in trading	Deferred to Scoping Plan
A-12	Wafflemat system for concrete slab foundations	Deferred to Scoping Plan
A-13	Change the price signal - suggest a vehicle license fee/car tax corresponding to fuel efficiency	Deferred to Scoping Plan
A-14	Demonstrate use of shoreside generators as bridge to electrical hook-up	Deferred to Scoping Plan
A-15	Green ship incentive program	Deferred to Scoping Plan
A-16	Adoption of requirements for low carbon fuel vehicle sales and low carbon fuel infrastructure for transportation fuels and light-duty vehicles	Deferred to Scoping Plan
A-17	Reduction in emissions of HFC-134a from non-professional servicing of motor vehicle air conditioning systems by setting up a financial incentive for consumers to recycle the partially-discharged refrigerant cans	Deferred to Scoping Plan
A-18	Adopt requirements and incentives for truck owners and operators to adopt "SmartWay" technology for medium and heavy-duty trucks/goods movement measures	Deferred to Scoping Plan
A-19	Anti-idling requirement for cargo handling equipment at ports	Deferred to Scoping Plan
A-20	Require the electrification of airport ground support equipment	Deferred to Scoping Plan
A-21	Require the electrification of construction equipment at urban sites	Deferred to Scoping Plan
A-22	Adopt a regulation and/or incentive program to take advantage of emerging hybrid-electric technology for medium duty delivery trucks	Deferred to Scoping Plan
A-23	Requirements for alternative fuel vehicle sales, fuel distribution	Deferred to Scoping Plan
A-24	Ethanol imports from Brazil (and bio-diesel imports), could be part of the E10/85	Deferred to Scoping Plan

Attachment B
STAKEHOLDER SUGGESTIONS FOR THE CAT FORWARDED FROM THE ARB

ID No.	Applicable Sector(s)	Description of Proposed Early Action or Strategy	Department Assigned
B-1	Cement	Relatively inexpensive energy savings measures with short pay back times for cement industry (e.g., encourage the use of cleaner blends of cement that are less carbon-intensive)	BTH
B-2	Cement	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% 1.2MMTCO$_2$E and 30-45% 1200-1800 lbs Hg per year)	BTH
B-3	Commercial	Renewable diesel fuel plant	CEC
B-4	Commercial	Efficiency standards – the CEC should adopt water efficiency standards for irrigation equipment and for new residential and nonresidential construction	CEC
B-5	Commercial	Increase building insulation standards/insulation improvements (potential incentives to solve market failures)	CEC
B-6	Commercial	Application of leak detection system for locating fugitive methane leakage from gas transmission pipes and storage device, and landfills etc.	CIWMB
B-7	Commercial	HVAC I/M to improve efficiencies of existing and new commercial buildings	CEC
B-8	Commercial	A goal to bring curbside recycling to every household (single and multi-family) by 2010	CIWMB
B-9	Commercial	A goal to require commercial enterprises to obtain recycling services by 2010	CIWMB
B-10	Commercial	Material specific disposal limits to require all Californians to limit their disposal of recyclable materials such as cardboard, paper, or construction and demolition debris, regardless of whether it is collected by a refuse company or self-hauled to the landfill	CIWMB
B-11	Commercial	Embedded Energy - The CPUC should allow investor-owned energy utilities to invest in water use efficiency measures as a way to reduce the associated energy use	CEC
B-12	Commercial	Mandatory fluorescent light bulbs (e.g., Australia)	CEC
B-13	Commercial	Ban of sales of incandescent light bulbs	CEC
B-14	Commercial	Ice Bear peak power demand shifting technology for A/C	CEC
B-15	Commercial	Free provision and installation of solar panels for residential and commercial buildings	CEC
B-16	Commercial	Biogas (anaerobic digestion) technology: capture off-gases from covered lagoons (e.g., dairies), plug flow, or complete mix operations for in-site power generation purpose	CEC
B-17	Commercial	Increase average thermostat temperature to reduce A/C use	CEC
B-18	Commercial	Urban Certification - The Department of Water Resources (DWR) should establish an urban certification program to assure compliance with urban water conservation Best Management Practices (BMPs) contained in the Memorandum of Understanding (MOU) regarding urban water conservation in California	DWR
B-19	Commercial	Water measurement - The Department of Water Resources should create a water use database and a system for reporting water deliveries and diversions	DWR
B-20	Electricity	CEC adoption of regulations to implement Senate Bill 1368's greenhouse gas emissions performance standard for new long-term commitments to baseload generation	CEC
B-21	Electricity	Renewable power	CEC/CPUC
B-22	Electricity	Better incentives for renewable energy	CEC/CPUC
B-23	Electricity	Incentivize community choice aggregation with high RPS	CPUC
B-27	Electricity	From net-metering to solar compensation	CEC
B-28	Electricity	Increased demand-side-management (DSM) for power	CEC/CPUC

Attachment B
STAKEHOLDER SUGGESTIONS FOR THE CAT FORWARDED FROM THE ARB

ID No.	Applicable Sector(s)	Description of Proposed Early Action or Strategy	Department Assigned
B-29	Electricity	Streamline/ratebase transmission investments from renewable power rich areas (Tehachapi, Imperial Valley, etc...)	**CEC/CPUC**
B-30	Forest	Forests (encourage reforestation): promote sustainable forestry, ban clear cutting, enforce higher restocking ratios, and incentivize better forest practices	**CalFire**
B-31	Forest	Thin National Forests to encourage growth and increase carbon uptake by fewer trees	**CalFire**
B-32	Forest	a) Begin the process for reviewing and adopting the Registry's forest protocols b) Recognize the early actions of Registry members c) Coordinate with other agencies with jurisdiction over forest and land-based activities to develop guidelines and accounting methods for achieving reductions from the forest sector	**CalFire/ARB**
B-33	Industry	Reduced fouling and improved efficiencies of large water-cooled systems (chemical + biocide).	**CEC**
B-34	Multiple	Water and climate - encourage local actions	**DWR**
B-35	Multiple	State support for local efforts	**ARB**
B-36	Multiple	Streamline reporting for small facilities - suggest a stepped approach to include small emitters in CA Climate Action Registry	**ARB**
B-37	Multiple	Help local agencies avoid "Death by Success"	**UNDER REVIEW BY THE CAT**
B-38	Multiple	GHGs in General Plans and CEQA	**ARB/Resources**
B-39	Other	Technology grant program for reducing GHGs	**UNDER REVIEW BY THE CAT**
B-40	Residential	Standards for stand by electric use (for appliances that are plugged in, using less electricity)	**CEC**
B-41	Residential	Water conservation	**DWR/CEC/CPUC**
B-42	Residential	Water supply planning	**DWR**
B-43	Residential	Water re-use	**DWR/SWRCB**
B-44	Transportation	Improve transportation system efficiency	**BTH/CalTrans**
B-45	Transportation	Increased public transport	**BTH**
B-46	Transportation	Transportation pricing policies	**CEC**
B-47	Transportation	CEC adoption of minimum tire efficiency standards pursuant to AB 844 for transportation fuels and light-duty vehicles	**CEC**
B-48	Transportation	Entry taxes for drivers in congested areas (e.g. London; must be coupled with good public transport)	**CEC/ARB**

* - As of March 2, 2007. The majority of the suggestions were provided at the January 22, 2007 ARB Public Workshop on Discrete Early Actions.

** - CalTrans = California Department of Transportation; CEC = California Energy Commission; CIWMB = California Integrated Waste Management Board; CPUC = California Public Utilities Commission; CDFFP = California Department of Forestry and Fire Protection; DWR = Department of Water Resources; DTSC = Department of Toxic Substances Control; OEHHA = Office of Environmental Health Hazard Assessment; WRCB = Water Resources Control Board

TITLE 13. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER PROPOSED AMENDMENTS TO THE EMISSION CONTROL AND SMOG INDEX LABELS REGULATIONS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adopting amendments to the Emission Control and Smog Index Label regulation. The proposed amendments would revise the smog index in the existing Smog Index Label and establish a global warming index to be incorporated into that label.

DATE: June 21, 2007

TIME: 9:00 a.m.

PLACE: Los Angeles Airport Marriot Hotel
5855 West Century Boulevard
Los Angeles, CA 90045

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., June 21, 2007, and may continue at 8:30 a.m., June 22, 2007. This item may not be considered until June 22, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before June 21, 2006, 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 amendments to title 13, California Code of Regulations, section 1965 (Emission Control and Smog Index Labels – 1979 and subsequent Model-Year Motor Vehicles) and to the "California Smog Index Label Specifications" adopted September 5, 2003 incorporated by reference therein, and proposed incorporation by reference in that same section 1965 of new "California Environmental Performance Label Specifications."

Background: To provide vehicle emissions information to consumers, the ARB has required a Smog Index label on new vehicles since the 1998 model year (MY). The Smog Index Label provides consumers with an indication of the relative emissions performance of new light-duty vehicles for smog forming exhaust emissions of non-methane organic gas, oxides of nitrogen, and evaporative hydrocarbons.

Over the past several years there have been a number of studies using focus groups and market research to evaluate different types of vehicle labeling and ranking programs. In these studies, respondents preferred some kind of overall environmental score that they could have faith in and would be applicable across the country and across all vehicles. Respondents stated that the information needs to be presented in a way that consumers find simple and understandable. Unfortunately, consumers do not have a clear understanding of environmental factors as they relate to car choice and tend to assign responsibility for this issue to government or industry. However, there appears to be growing public awareness of environmental issues. A recent California Field Poll indicates the majority of Californians consider global warming as a serious problem.

Consumer awareness of a vehicle's environmental footprint would help consumers make the cleanest purchasing choice possible when selecting a new vehicle. Ultimately, consumer decisions to buy cleaner cars could result in lower emissions than would be achieved from regulating vehicles alone.

In 2005 Assembly Bill (AB) 1229 was signed into law adding Health & Safety Code section 43200.1 which, among other things, requires ARB to develop a greenhouse gas index and label, and to review the existing Smog Index Label. Staff proposes amending the Smog Index Label to add a Greenhouse Gas Index, and add specific requirements to label information and presentation to enhance label appearance and consistency. These labeling requirements are prescriptive by nature and will require one label size and design to be used by all affected vehicle manufacturers.

The Proposed Amendments:

In preparing this proposal staff found noticeable differences in the way the Smog Index was presented by different manufacturers, making it difficult for consumers to compare emission or smog forming values from one vehicle to the next. As a result, staff proposes modifications to the graphics and content of the existing California Smog Index Label and is also proposing a new Global Warming Index to be included on the new label.

The current Smog Index Label uses a relative ratio to compare actual vehicle emissions to an average vehicle. Staff found inconsistencies in existing label size and presentation of content used by manufacturers which creates confusion and misunderstanding by consumers. Prior market research by the United States Environmental Protection Agency (U.S. EPA), based on consumer focus groups, recommended a simple scale from 1 -10 for both Air Pollution and Greenhouse Gas (GHG) emissions. Staff also performed market research based on consumer focus groups and determined that using a simpler scale from 1-10 represents the optimal way to present emissions information.

For the Smog Index, staff recommends using a simple scale from 1-10 where 1 represents the dirtiest vehicle available and 10 the cleanest based on vehicle emission certification standards. This scale is consistent with the U.S. EPA scale currently used

on their Green Vehicle Guide website. U.S. EPA found through focus groups that this scale was meaningful for prospective car buyers. While U.S. EPA provides these scores on its website, vehicle labeling using these scores is voluntary. Currently none of the auto manufacturers label their vehicles using U.S. EPA's program, although some manufacturers reference their vehicles' scores in product literature.

For the Global Warming Index, staff developed a scoring system also using a simple 1-10 scale. The scoring system incorporates all vehicle greenhouse gases mandated by ARB's motor vehicle greenhouse gas emission standards, which take effect for 2009 model year. Similar to Smog scores, U.S. EPA provides greenhouse gas scores on its website but does not require that scores be printed on new vehicle labels. U.S. EPA's greenhouse gas scores are based on different calculation methods and at this time are not aligned with staff's proposed scoring system.

Staff recommends that the scoring system be re-analyzed when 2012 MY California certification data become available. This new analysis is required because annual reductions in global warming emissions, as required by ARB's greenhouse gas emission standards, may alter the distribution of scores over time.

Staff recommends the new label regulations take affect for all passenger cars, light-duty trucks, and medium-duty passenger vehicles manufactured on or after October 1, 2008.

In designing the new California Environmental Performance label, staff turned to market research specialists for help and sought out consumer-based input from focus groups to provide clarity and understanding of a newly designed label. The purpose of these focus groups was to build upon the work previously done and to obtain up-to-date information from California specific consumers. As a result staff designed a new label based on this research. The label best understood by respondents is shown in figure 1.

Figure 1: Proposed California Environmental Performance

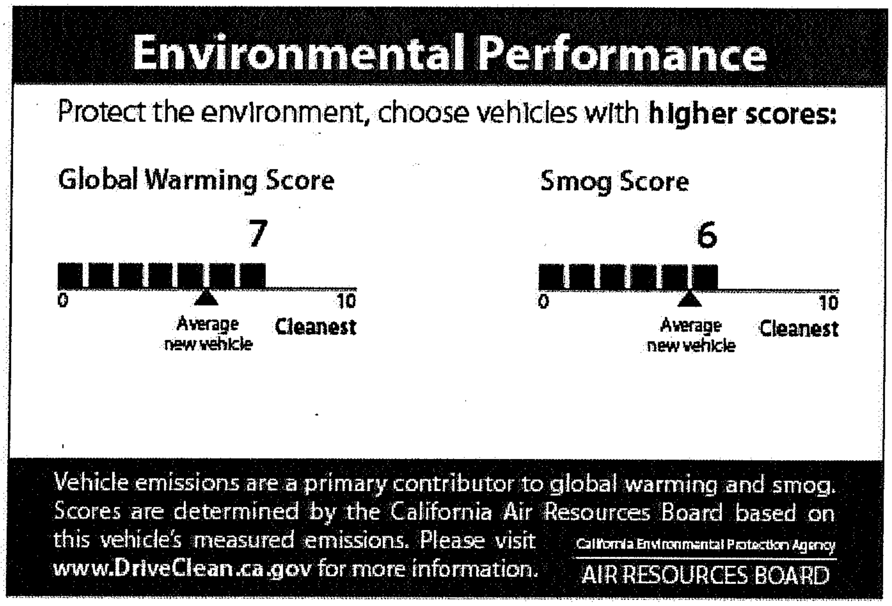


Figure 1 shows the Global Warming score on the left and the Smog Score on the right. The black boxes represent the score of the labeled vehicle. A triangle below the scale shows score of an average vehicle for comparison purposes. It was clear in the focus groups that with the word "cleanest" under the 10 and with the statement: "Protect the environment, choose vehicles with the higher scores" meant vehicles with more black boxes were cleaner vehicles. The statement at the bottom of the label describes the impact of motor vehicles on smog and global warming. It also points consumers to the ARB's www.DriveClean.ca.gov website which is a consumer oriented website with information about clean cars, alternative fuel and advanced technology vehicles.

COMPARABLE FEDERAL REGULATIONS

Currently there is no federal smog or GHG vehicle emission labeling requirements.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The Board staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulation, which includes a summary of the economic and environmental impacts of the proposal. The ISOR is entitled: "Staff Report: Initial Statement of Reasons for Rulemaking: Proposed Amendments to the Smog Index Vehicle Emissions Label."

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, or by calling (916) 322-2990.

Upon its completion after the Board hearing, 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 Mr. Craig Duehring, Air Resources Engineer, by email at cduehrin@arb.ca.gov, or by phone at (916) 323-2361, or to Mr. Gerhard Achtelik, Manager, Zero Emission Vehicle (ZEV) Infrastructure Section, by email at gachteli@arb.ca.gov or by phone at (916) 323-8973.

Further, the agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Ms. Alexa Malik, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-4011, or Ms. Amy Whiting, Regulations Coordinator, at (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/labels07/labels07.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 sections 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action would not create costs or savings to any state agency or in federal funding to the state, costs or mandate to any school district whether or not reimbursable by the state pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other nondiscretionary costs or savings to state or local agencies.

The proposed amendments would modify the existing Smog Index Label and add a global warming score to the existing label. Based on the amount of information already on the label and the fact that the new global warming score must be added, the size of label must be increased to accommodate both scales. In addition, the legislation requires using a color other than black for some portion of the label.

The total annual cost to implement this regulation is calculated as the annualized capital cost to upgrade existing printers plus the annual operating cost for increasing the label size and using color cartridges. For the industry as a whole this equates to $245,000 per year. The initial annualized capital cost for a typical manufacturer to implement this regulation is estimated to be $3,500. The annual ongoing cost for increasing label size and using color cartridges for a typical manufacturer is estimated to be $4,667. Thus, the total annual cost for a typical manufacturer is $8167. These cost estimates will vary slightly by manufacturer depending on the actual number of assembly plants, ports of entry, printers required, and vehicles produced.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons or businesses. Only businesses involved in the production of automobiles would be directly affected by the proposed amendments. Most vehicle manufacturers are located outside of California. Staff was not able to determine if the automobile manufacturer will pass on the full incremental cost of revising the Smog Index Label to the consumer.

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 would not 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. 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 not affect small businesses. There are no known small business automobile manufacturers.

In accordance with Government Code sections 11346.3(c) and 11346.5(a)(11), the Executive Officer finds that the reporting requirements of the regulation that 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

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by email 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, June 20, 2007**, and addressed as follows:

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 (Govt. 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 ten 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, 43200, and 43200.1. This action is proposed to implement, interpret and make specific sections 39002, 39003, 43000, 43013, 43018.5, 43100, 43101, 43102, 43103, 43104, 43107 43200, 43200.1, 44250, 44251, 44252, 44253, 44254, of the Health and Safety 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 approve 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

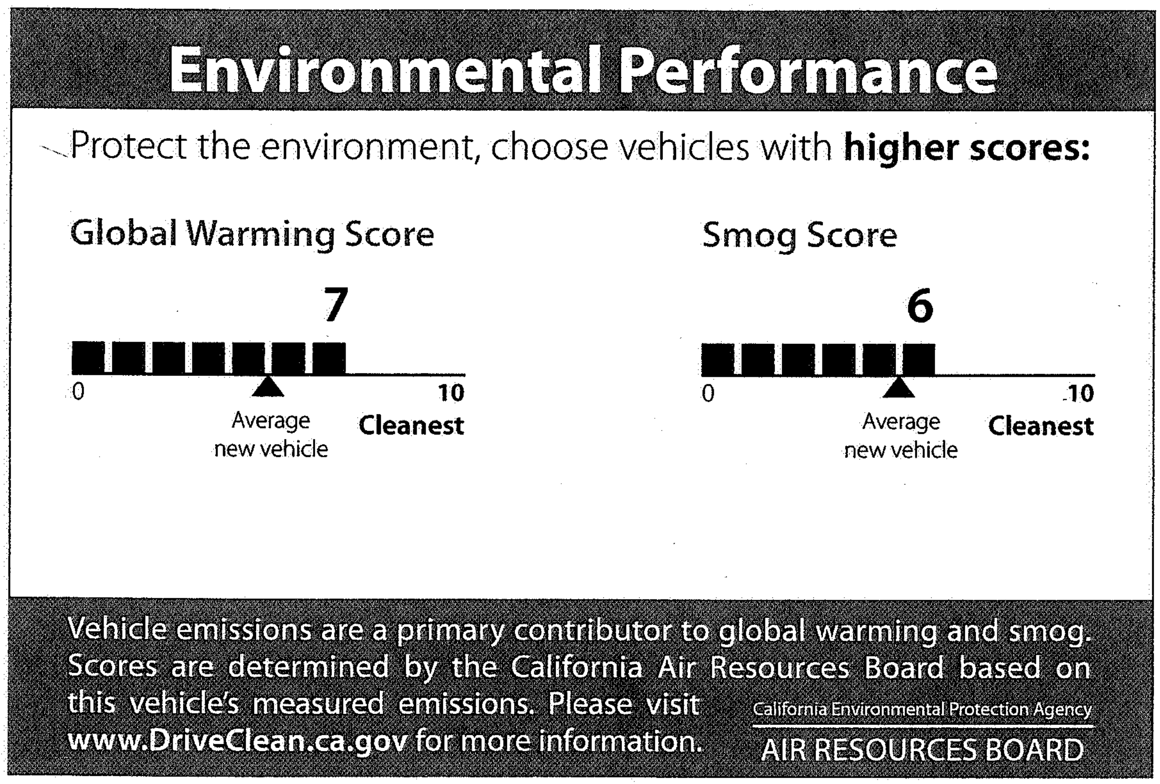
Catherine Witherspoon
Executive Officer

Date: April 24, 2007

State of California
AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR RULEMAKING

PROPOSED AMENDMENTS TO THE SMOG INDEX VEHICLE EMISSIONS LABEL



Date of Release: **May 4, 2007**
Scheduled for Consideration: **June 21, 2007**

Prepared By:

Zero Emission Vehicle Infrastructure Section
Mobile Source Control Division

Gerhard Achtelik, Manager

Contributing Staff:

Craig Duehring
Krista Eley

Acknowledgements:

Staff appreciates the time and assistance provided by the staff of the United States Environmental Protection Agency, automobile manufactures and environmental groups.

Staff also wishes to acknowledge the support and work from Sarah Carter, Melissa Meuser, Duc Nguyen, and Emily Smith with the Mobile Source Control and Operation Divisions.

Release Date: May 4, 2007
Board Hearing: June 21, 2007

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EXECUTIVE SUMMARY

California citizens purchase approximately 2 million[1] new passenger cars, light-duty trucks, and medium duty passenger vehicles each year. In addition, the California fleet of 25 million on-road vehicles travels about 900 million miles each day. This equates to 2,288 tons per day[2] of smog precursor emissions and 0.35 million tons per day[3] of global warming gas emissions. Even with the addition of cleaner vehicles to California's vehicle population, both smog forming emissions and global warming emissions from motor vehicles will continue to have a major impact on California's environment for years to come.

Over the past several years there have been a number of studies using focus groups and market research to evaluate different types of vehicle labeling and ranking programs. In these studies, respondents preferred some kind of overall environmental score that they could have faith in and would be applicable across the country and across all vehicles. Respondents stated that the information needs to be presented in a way that consumers find simple and understandable. Unfortunately, consumers do not have a clear understanding of environmental factors as they relate to car choice and tend to assign responsibility for this issue to government or industry. However, there appears to be growing public awareness of environmental issues. A recent California Field Poll indicates the majority of Californians consider global warming a serious problem.[4]

Consumer awareness of a vehicle's environmental footprint would help consumers make the cleanest purchasing choice possible when selecting a new vehicle. Ultimately, consumer decisions to buy cleaner cars could result in lower emissions than would be achieved from regulating vehicles alone.

To provide vehicle emissions information to consumers, the Air Resources Board (ARB) has required a Smog Index Label on new vehicles since the 1998 model year (MY). The Smog Index Label provides consumers with an indication of the relative emissions performance of new light-duty vehicles for smog forming exhaust emissions of non-methane organic gas, oxides of nitrogen, and evaporative hydrocarbons.

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[1] **California Air Resources Board:** *Certification Data Reported to the California Air Resources Board in 2005*
[2] **California Air Resources Board:** *2005 Estimated Annual Average Emissions*
[3] **Inventory of California Greenhouse Gas Emissions and Sinks:** *1990-1999, California Energy Commission Staff Report*
[4] **San Jose Mercury News**, *"Survey finds 81% worried about global warming," April 12, 2007.*

and design to be used by all affected vehicle manufacturers. Staff recommends the new label regulations take affect for all passenger cars, light-duty trucks, and medium-duty passenger vehicles manufactured on or after October 1, 2008.

Proposed Index Requirements

During the review staff found noticeable differences in the way the current smog index values are presented by different manufacturers, making it difficult for consumers to compare smog forming emission values from one vehicle to the next. As a result, staff proposes modifications to the graphics and content of the existing California Smog Index Label and is also proposing a new Global Warming Index to be included on the new label.

The current Smog Index Label uses a relative ratio to compare actual vehicle emissions to an average vehicle. Staff found inconsistencies in existing label size and presentation of content used by manufacturers which creates confusion and misunderstanding by consumers. Prior market research by the United States Environmental Protection Agency (U.S. EPA), based on consumer focus groups, recommended a simple scale from 1 -10 for both Air Pollution and Greenhouse Gas (GHG) emissions. Staff also performed market research based on consumer focus groups and determined that using a simpler scale from 1-10 represents the optimal way to present emissions information.

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For the global warming index, staff developed a scoring system also using a simple 1-10 scale. The scoring system incorporates all vehicle greenhouse gases mandated by the ARB greenhouse gas emission standards, which take effect for 2009 model year. Similar to Smog scores, the U.S. EPA provides greenhouse gas scores on its website but does not require scores be printed on new vehicle labels. U.S. EPA's greenhouse gas scores are based on different calculation methods and at this time are not aligned with staff's proposed scoring system.

Staff recommends that the scoring system be re-analyzed when 2012 MY California certification data becomes available. This new analysis is required because annual reductions in global warming emissions, as required by ARB's greenhouse gas emission standards, may alter the distribution of scores over time.

Label
In designing the new California Environmental Performance label, staff turned to market research specialists for help and sought out consumer-based input from focus groups to provide clarity and understanding of a newly designed label. The purpose of these focus groups was to build upon the work previously done and to obtain up-to-date information from California specific consumers. As a result staff designed a new label based on this research. The label best understood by respondents is shown in figure 1.

Figure 1: Proposed California Environmental Performance Label

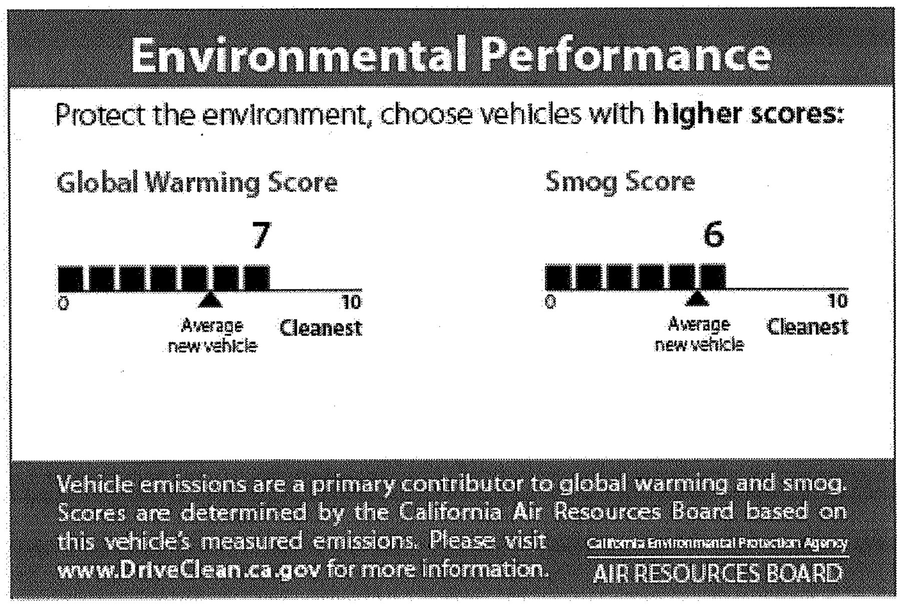


Figure 1 shows the Global Warming score on the left and the Smog Score on the right. The black boxes represent the score of the labeled vehicle. A triangle below the scale shows the score of an average vehicle for comparison purposes. It was clear in the focus groups that with the word "cleanest" under the 10 and with the statement: "Protect the environment, choose vehicles with the higher scores" meant vehicles with more black boxes were cleaner vehicles. The statement at the bottom of the label describes the impact of motor vehicles on smog and global warming. It also points consumers to the ARB's www.DriveClean.ca.gov website which is a consumer oriented website with information about clean cars, alternative fuel and advanced technology vehicles.

Economic Impacts
This regulation proposes modifications to the existing Smog Index Label and adds a global warming score to the existing label. Based on the amount of added information required and the addition of the new global warming score, the size of the label must be increased. In addition, Health and Safety Code § 43200.1 requires use of a color other than black for some portion of the label.

The total annual cost to implement this regulation is estimated to be $245,000 for the industry as a whole. The annual cost for a typical manufacturer is estimated to be $8,167. This cost estimate will vary slightly by manufacturer depending on the actual number of assembly plants, ports of entry, printers required, and vehicles produced.

Environmental Benefit

The purpose of the label is to encourage purchasers to buy new vehicles with the lowest emissions. To the extent that the label accomplishes this, vehicle emissions will decrease. Staff has no basis upon which to quantify this effect, thus no estimates of cost effectiveness have been made.

Staff Recommendation

Staff recommends the Board approves the new label. The proposed label will provide clarity for consumers and help them make environmentally beneficial choices.

I. Introduction and Background

California citizens purchase approximately 2 million[5] new passenger cars, light-duty trucks, and medium duty passenger vehicles each year. In addition, the California fleet of 25 million on-road vehicles travel about 900 million miles each day. This equates to 2,288 tons per day[6] of smog precursor emissions and 0.35 million tons per day[7] of global warming gas emissions. Even with the addition of cleaner vehicles to California's vehicle population, both smog forming emissions and global warming emissions from motor vehicles will continue to have a major impact on California's environment for years to come. Consumer awareness of a vehicle's environmental footprint would help consumers make the cleanest purchasing choice possible when selecting a new vehicle. Ultimately, consumer decisions could result in lower emissions than would result from regulated emission standard requirements alone.

The average new car purchaser is not aware of the various smog forming pollutant emission requirements that apply to new vehicles and the regulatory terms used to describe emission levels. For example, a California certified vehicle is identified as being a low-emission vehicle (LEV), ultra-low-emission vehicle (ULEV), super-ultra-low-emission vehicle (SULEV), partial zero-emission vehicle (PZEV), or zero-emission vehicle (ZEV). Likewise, in some instances, federally certified vehicles using an emissions "bin" certification level from bin 1 through bin 9a can also be sold in California. Both the U.S. EPA's Green Vehicle Guide website and the California's DriveClean website offer emission classification identifiers to aid the consumer in selecting clean vehicles. However, these vehicle classifications used across multiple information sources can differ and overlap at times, providing additional challenges for the consumer to identify cleaner new vehicles. In addition to smog forming pollutants, cars emit greenhouse gases. Consumers are only just beginning to understand the greenhouse gas emissions impacts from cars and have little or no information available about new cars on which to base an informed purchase decision.

In order to ensure that Californians are effectively informed as to the environmental impact of new vehicle purchases, Health & Safety Code § 43200.1 requires the Air Resources Board (ARB) to revise the existing Smog Index Label to include a Global Warming Index.

[5] California Air Resources Board: *Certification Data Reported to the California Air Resources Board in 2005*
[6] **California Air Resources Board:** *2005 Estimated Annual Average Emissions*
[7] **Inventory of California Greenhouse Gas Emissions and Sinks:** *1990-1999, California Energy Commission Staff Report*

II. Need for Regulatory Amendments

ARB requires that each new passenger car and light-duty truck offered for sale have a window label that includes a rating of its smog-forming emissions, called the smog index. On October 6, 2005, Assembly Bill 1229 was signed into law (Chapter 575, now Health & Safety Code § 43200.1), which directs the Air Resources Board to review and revise the existing Smog Index Label and to develop a Global Warming Index. A summary of the requirements follows.

- No later than July 1, 2007, revise regulations relating to the smog index decal, to rename the existing decal and to provide specified smog forming, and global warming emissions information.
- Label is required to be effective for model year 2009 and subsequent model year new motor vehicles.
- Label is required for all passenger cars and light-duty trucks with a gross vehicle weight of 8,500 pounds and medium-duty passenger vehicles less than 10,000 pounds.
- Global warming index shall include emissions from vehicle operation and upstream emissions.
- Label shall include projected average vehicle emissions and lowest emission vehicle reference points.
- Label shall use at least one color ink in addition to black.
- Staff shall hold at least one public workshop.
- Staff shall seek input from automotive consumers, graphic design professionals, and other relevant labeling formats.
- This bill permits the ARB to recommend to the Legislature additional sources of air pollution that emit significant amounts of global warming gases for which the disclosure of information regarding those emissions would be an effective means of educating the public about the sources of global warming and its impacts.

Health & Safety Code § 43200 requires the label to be placed on the driver's side window or, if it cannot be so placed, to the windshield. This restrictive placement of the label was unintended and could have raised safety concerns. Assembly Bill 2557 was signed into law (Chapter 419) on September 22, 2006, permitting the label to be placed on a side window to the rear of the driver, or if it cannot be so placed, to the windshield.

A review of the implementation of the existing Smog Index Label shows a lack of consistent label design used by auto manufacturers. Appendix B shows different variations of labels used by the manufacturers. Based on the requirements of Health & Safety Code 43200.1 and staff's findings regarding the existing Smog Index Label, a proposal for a new Environmental Performance Label has been developed and is presented in this report.

III. Environmental Justice and Public Outreach

The ARB is committed to ensuring that all California communities have clean, healthful air by addressing not only the regional smog that hangs over our cities but also the more localized toxic air pollution that is generated within our communities. The ARB works to ensure that all individuals in California, especially children and the elderly, can live, work and play in a healthful environment that is free from harmful exposure to air pollution.

A. Environmental Justice

On December 13, 2001, the Board approved Environmental Justice Policies and Actions, which formally established a framework for incorporating environmental justice into the ARB's programs, consistent with the directives of State law and policy[8]. "Environmental Justice" is defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. These policies apply to all communities in California but, environmental justice issues have been raised more in the context of low-income and minority communities because of past land use policies and the accumulative impact of a concentration of emitting facilities in some neighborhoods.

To achieve this goal, the ARB has established a Community Health Program and emphasized community health issues in our existing programs. ARB has published, "The Public Participation Guide to Air Quality Decision Making in California" to use as a basic tool and for information needed to understand and participate in air pollution policy planning, permitting, and regulatory decision making processes[9]. The Environmental Justice Policies are intended to promote the fair treatment of all Californians and cover the full spectrum of ARB activities. Underlying these Policies is a recognition that we need to engage community members in a meaningful way as we carry out our activities. People should have the best possible information about the air they breathe and what is being done to reduce unhealthful air pollution in their communities. The ARB recognizes its obligation to work closely with all stakeholders; communities, environmental and public health organizations, industry, business owners, other agencies, and all other interested parties to successfully implement these policies. Our outreach efforts, described below, facilitate this objective.

B. Outreach Efforts

The ARB strives to involve the widest number of affected persons in the development of its regulations. To this end, staff held informal public workshops and meetings prior to publishing the notice and staff report. Information from these workshops can be found

[8] Information for these programs can be found at **http://www.arb.ca.gov/ch/programs/ej/ejpolicies.pdf**.
[9] Information on this program can be found at **http://www.arb.ca.gov/ch/public_participation.htm**.

through the Vehicle Emissions Labeling website[10]. For this rule, staff conducted two public workshops and numerous focused meetings. Notices for the workshops were posted to Vehicle Emissions Labeling web site and e-mailed to subscribers of ARB's electronic list server. Those workshops held in Sacramento were webcast for individuals who could not travel to the meeting locations. Attendees of the workshops included representatives from auto manufacturers, environmental organizations, and other parties interested in vehicle emissions labeling. To generate additional public participation and to enhance the information flow between ARB and interested persons, staff made all documents, including workshop presentations, available via the Vehicle Emissions Labeling web site.

Table III-1: Workshop Dates and Locations

Date	Location
February 15, 2005	Sacramento
March 16, 2006	Sacramento

Outreach and public participation are important components of ARB's regulatory development process. As part of the outreach efforts, ARB staff made extensive personal contacts with auto manufacturers, environmental organizations, U.S. EPA, other state air quality agencies and other affected parties through meetings, telephone calls, and electronic list-serves. These activities included holding two public workshops, nine focused meetings and conducting more than 50 telephone conversations. Staff met with a number of the same stakeholders for focused meetings throughout the rulemaking process to receive feedback on staff's proposed regulatory amendments. Alternatives were suggested to the proposed regulation and explored by staff.

[10] More information on Vehicle Emissions Labeling Programs can be found at http://www.arb.ca.gov/msprog/labeling/labeling.htm

IV. Staff Proposal – Smog Score

A. Existing Requirements

The California Smog Index Label provides consumers with an indication of the relative contribution of new light-duty vehicles to smog formation based on exhaust non-methane organic gas (NMOG), oxides of nitrogen (NOx), and evaporative hydrocarbon (HC) emissions. The current Smog Index Label uses a relative ratio to compare the vehicle being labeled to a base vehicle as determined by the ARB. The equation for this ratio is as follows:

$$\text{Smog Index} = \frac{\text{NMOG+NOx+HC (vehicle being certified)}}{\text{NMOG+NOx+HC (base vehicle)}}$$

Where NMOG and NOx are tailpipe emissions, HC is evaporative emissions.

This smog index ratio is then displayed graphically on a label, usually as a number less then 1.0, along with the smog index of an average new vehicle for the model year of the vehicle being sold. Figure IV-1 illustrates a typical Smog Index Label:

Figure IV-1: Current Smog Index Label

<u>SMOG EMISSIONS INFORMATION</u>

The Smog Index of this vehicle is 0.34 □

The Smog Index of the average new vehicle is 0.52 □

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0......3.0

□ CLEANER

MORE POLLUTING□

Note: The Smog Index (SI) indicates the relative level of smog-forming pollutants emitted by the vehicle. The lower the SI, the lower the vehicle's emissions.

This label began appearing on new vehicles offered for sale in California in 1998 and is also appearing on vehicles sold in other states that have adopted California standards. Some vehicle manufacturers have incorporated the Smog Index information into the new vehicle's Monroney label, which provides pricing information and the vehicle's U.S. EPA fuel economy ratings.

The existing smog index regulations have allowed the manufacturers to vary the size and graphical representation of the Smog Index over time. Today, each vehicle manufacturer has its own graphical representation of the scale, some similar to the one shown above, some showing a scale from 0.0 – 2.0, and some showing a scale from 0.0 – 3.0. As the length of the scale increases from "0.0 – 1.0" to "0.0 – 2.0" and even "0.0 – 3.0," the importance of a smog index ratio whose number is typically less than 1.0 may diminish. Appendix B contains some example pictures of actual 2007 Smog Index Labels being used by various vehicle manufacturers. For this reason staff proposes prescriptive label requirements.

The U.S. EPA does not require a smog index or score to be included on new cars. On its website, it provides a rating on a scale from 1-10 (ten being lowest emitting or cleanest), as part of its Green Vehicle Guide[11]. Separate ratings are provided for vehicles certified to California new vehicle emission standards.

B. Staff Proposal

Staff is proposing to modify the graphics and content of the label to increase consumer awareness and understanding of the Smog Index Label. Staff proposes using a simple scale of 1-10 where 1 represents the dirtiest vehicle available and 10 the cleanest. This is the opposite of the current scale, where 0.0 is the cleanest. Staff proposes using this new scale for two reasons. First, consumer focus group research indicates more consumers understand 10 is well performing, and 1 is poor performing. Second, the U.S. EPA has a popular website that uses the 1-10 scale for both smog and greenhouse gas ratings of new vehicles (Green Vehicle Guide[10]). The proposed Smog scores based on the 1-10 scale are shown in Table III-1. Staff has worked with U.S. EPA and included federal standards (bins) in the ranking system, and U.S. EPA staff indicates it may change its rating to be consistent with California. A more detailed technical analysis and discussion of the new scores can be found in Appendix C: Technical Analysis.

[11] United States Environmental Protection Agency: *Green Vehicle Guide, www.epa.gov/greenvehicles*

Table IV-1: Proposed 2009 Smog Score by Certification

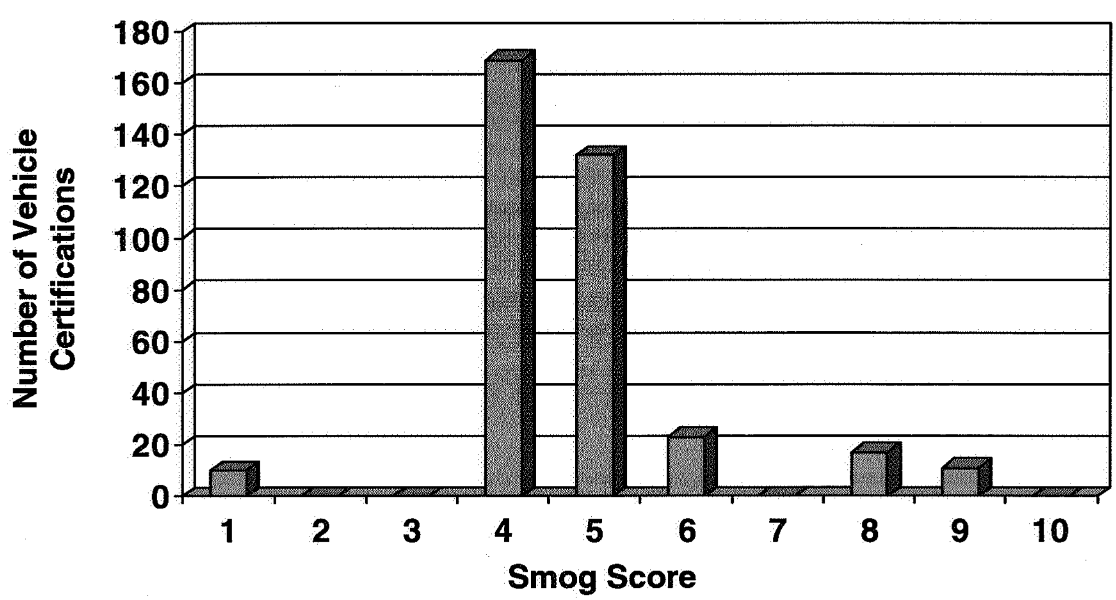
California Emissions Certification - Federal Bins	NMOG + NOx (g/mile)	2009 Smog Score
Zero Emission Vehicle (ZEV) or Bin 1	0.0	10
Partial Zero Emission Vehicle (PZEV)	0.030	9
Super Ultra Low Emission Vehicle (SULEV) or Bin 2	0.030	8
Bin 3	0.085	7
Bin 4	0.110	6
Ultra Low Emission Vehicle (ULEV)	0.125	5
Low Emission Vehicle (LEV) or Bin 5	0.160	4
Low Emission Vehicle (LEV) (option 1)* or Bin 6 and SULEV medium duty passenger vehicles	0.190 – 0.200	3
Bin 7	0.240	2
Bin 8a or ULEV (medium duty passenger vehicles)	0.325	1

* LEV (option 1) is an optional certification standard for qualifying work vehicles.

Table III-1 lists the certification levels by their California terminology or by U.S. EPA "bins," the tailpipe emission standard for NMOG and NOx and the proposed Smog Score. While the PZEV and SULEV – Bin 2 vehicles are certified to the same exhaust emission standard, PZEV certified vehicles receive a higher score due to their zero evaporative emissions and extended 150,000 mile emission warranty.

Applying this Smog scale to the 2007 MY California certification data yielded the model based distribution of Smog scores shown on Figure IV-2. This distribution is based on 2007 MY California certification data and may look different for the 2009 MY as vehicle manufacturers continue to certify to cleaner standards.

Figure IV-2: Distribution of California Certification Levels by Smog Score



Based on all 2007 MY vehicles, the average vehicle model score is closest to a 5 on the proposed scale, which correlates to an Ultra Low Emission Vehicle (ULEV) certification standard. This is a count of vehicle models however, not a sales weighted fleet average. In 2009, the fleet average emission standard would also be closest to the ULEV certification standard and receive a score of 5. Staff therefore recommends using the ULEV certification as the average and setting the Smog score of 5 to represent the average vehicle. Vehicles with a score of 1 are typically medium-duty passenger vehicles, such as the Ford E-250 Econoline.

For bi-fuel, fuel flexible, and dual-fuel vehicles, vehicles capable of operating on gasoline and an alternate fuel like ethanol propane or natural gas, the scores displayed on the label will be based on only the highest emitting fuel. The label will direct consumers to visit ARB's web site at www.DriveClean.ca.gov to find information on flexible fuel vehicles and the impact of using an alternative fuel on smog forming pollutant and greenhouse gas emissions.

V. Staff Proposal – Global Warming Score

A. Existing Consumer Information

Neither the U.S. EPA nor the ARB currently requires greenhouse gas emissions to be reported on a new vehicle label. U.S. EPA reports a vehicle's CO2 emissions in its web-based Green Vehicle Guide. The score is based on the CO2 emissions from the federal test procedure, and the fuel used. Other greenhouse gases, such as nitrous oxides, are not included in the published score. Separate ratings for California certified vehicles are provided.

B. Staff Proposal

Staff proposes to use a global warming scoring system for labeling that is based on emissions data from ARB's motor vehicle greenhouse gas emissions regulation. The motor vehicle greenhouse gas regulation bases compliance on four different sources of pollutants: (1) carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions resulting directly from operation of the vehicle, (2) exhaust CO_2 emissions resulting from operating the air conditioning system (indirect air conditioning (A/C) emissions), (3) refrigerant emissions from the air conditioning system due to either leakage, losses during recharging, sudden releases due to accidents, or release from scrappage of the vehicle at end of life (direct A/C emissions), and (4) upstream emissions associated with the production of the fuel used by the vehicle. Upstream emissions are included so that vehicles using an alternative fuel, a fuel other than gasoline or diesel, will be given an appropriate score relative to the production and consumption of the fuel used.

The greenhouse gas regulation establishes a CO_2 "equivalent" value that includes all the various global warming gases based on their relative contribution to global warming. The CO_2 equivalent value is as follows:

$$CO_{2\ \mathrm{Equivalent}} = CO_2 + 296 \times N_2O + 23 \times CH_4 - \text{A/C Direct Emissions Allowance} - \text{A/C Indirect Emissions Allowance}$$

Using this equation, and accounting for the upstream emissions factor for alternative fuels, ARB accounts for all global warming gasses being released into the atmosphere due to the operation of each vehicle.

To maintain simplicity, the greenhouse gas regulation uses the upstream emissions for vehicles that use conventional fuels as a "baseline" against which to compare the relative upstream emissions of alternative fuel vehicles. Therefore, when certifying gasoline or diesel-fuel vehicles, manufacturers will report only the "direct" or "on vehicle" emissions. Table IV-1 lists the CO_2 upstream adjustment factor for alternative fuels used for the greenhouse gas regulation.

Table V-1: Upstream Adjustment Factors for Alternative Fuels

Fuel	$CO_{2Equivalent}$ Adjustment Factor
Conventional Gasoline (RFG)	1.00
Compressed Natural Gas (CNG)	1.03
Liquid Propane Gas (LPG)	0.89
Ethanol (E85)	0.74

The $CO_{2Equivalent}$ emissions will be multiplied by the $CO_{2Equivalent}$ Adjustment Factor for the alternative fuel, as shown in the Table V-1. For hydrogen internal combustion engine vehicles, hydrogen fuel cell electric and battery electric vehicles, the grams per mile average $CO_{2Equivalent}$ value is the sum of the upstream emissions and the A/C direct emissions. Therefore these vehicles will be given a constant $CO_{2Equivalent}$ value listed in Table V-2.

Table V-2: Upstream $CO_{2Equivalent}$ Values for Hydrogen Internal Combustion Engine, Hydrogen Fuel Cell Electric, and Battery Electric Vehicles

Fuel	$CO_{2Equivalent}$ Value (grams/mile)
Electricity	130
Hydrogen – Fuel Cell	210
Hydrogen – Internal Combustion Engine (ICE)	290

As required by the greenhouse gas regulation, $CO_{2Equivalent}$ values are reported for both city and highway testing cycles and than combined to represent a 55% city and 45% highway driving ratio. This $CO_{2Equivalent}$ combined value, including likely credits achievable from direct AC emission reductions, is the value that staff used to develop a global warming scoring and labeling system.

Staff performed a statistical analysis on the CO_2 data available from the model year 2007 California Certifications. Manufacturers are not yet certifying their vehicles to the greenhouse gas regulation standards, and not all manufacturers currently provide ARB with this data. Staff requested a complete set of CO_2 data from all manufacturers[12] but

[12] Air Resources Board: *February 28, 2007 letter to Steven Douglas, Director; Alliance of Automobile Manufacturers and February 28, 2007 letter to John Cabaniss, Director; Association of International Automobile Manufacturers.*

received minimal feedback. Statistically, the available data was sufficient to represent the new vehicle fleet as a whole. To better illustrate this point, staff compared the California dataset to a more complete dataset from Federal certifications. As seen in Table V-3, the California and Federal average and standard deviation values are very close to being equal when not including the MDPV category. The similarity in values helps demonstrate that the available CO_2 data is adequate to represent the entire fleet.

Table V-3: Statistical Distribution of California and Federal CO2 Data

CO_2 combined (g/mile)	California (with MDPV data)	California (without MDPV data)	Federal
Minimum	130	130	133
Maximum	874	570	662
Average	358	355	348
Standard Deviation	101	81	76

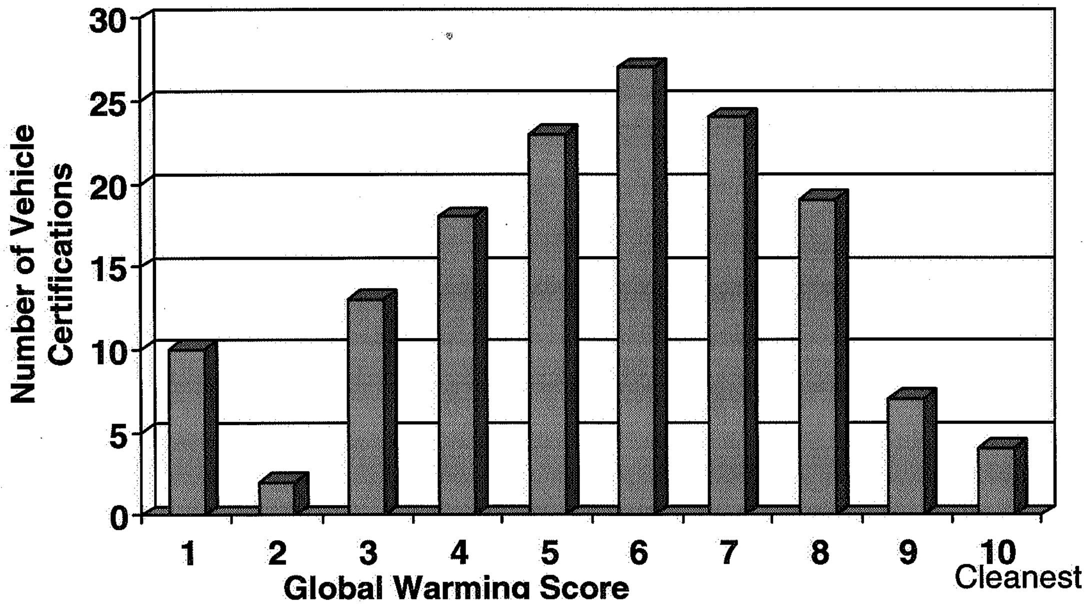
Staff used the statistical average of 360 grams per mile (g/mile) CO_2 and set that as 5 on the scale. Using a standard deviation of 80 g/mile, staff developed a scoring system based on two standard deviations from the average to simulate a normal distribution of scores. The two extremes blend into the best and worst scores. Applying this principle to the California dataset staff developed the global warming scoring system found in Table V-4.

Table V-4: Proposed Global Warming Scores based on $CO_{2Equivalent}$ Emissions

Proposed Global Warming Score	$CO_{2Equivalent}$ grams per mile
10	Less than 200
9	200-239
8	240-279
7	280-319
6	320-359
5	360-399
4	400-439
3	440-479
2	480-519
1	520 and up

Applying this global warming scoring system to the 2007 MY California certification dataset yields the distribution of scores as shown in Figure-V-1 which closely resembles a normal distribution.

Figure V-1: Distribution of Global Warming Scores



The spike at the low end of the scale (score of 1) represents the larger medium-duty passenger vehicles, such as the Ford E-250 Econoline and Expedition. Vehicles with a score of 10 are typically hybrid passenger cars, such as Toyota Prius and Honda Civic Hybrid. Average vehicles obtaining a score of 5 are typically large passenger cars and small light-duty trucks, such as the Ford Crown Victory, Toyota 4Runner, and Honda Odyssey van.

Staff recommends using this global warming scoring system on the label required by Health & Safety Code 43200.1

The greenhouse gas regulation requires vehicle manufacturers to decrease the fleet average $CO_{2Equivalent}$ emissions incrementally from 2009 to 2016 at which point the fleet average $CO_{2Equivalenmt}$ emissions remain constant. Staff looked at these incremental adjustments and determined that by the 2012 MY, on average, vehicles will have reduced the amount of $CO_{2Equivalent}$ emissions to the point of skewing the normal distribution of scores to the higher end of the scale. For example, the incremental change between global warming scores as proposed by this report is 40 (g/mile). Following the reductions required by the greenhouse gas regulation, the fleet average emissions will have been reduced by 84 (g/mile) by 2012. Therefore vehicles on average would be jumping one or more global warming scores to the next cleanest score and skewing the normal distribution of scores. Staff also believes this would be an appropriate time to evaluate the need for modifying the indices or labeling provision to reflect potentially increasing alternative fuels use in California.

A more technical analysis of the global warming scoring system can be found in Appendix C: Technical Analysis.

VI. Proposed Environmental Performance Label Requirements

A review of the existing Smog Index Label yielded many inconsistencies from manufacturer to manufacturer. As mentioned earlier in this report, the many variations of labels from one manufacturer to the next make it difficult for the consumer to compare vehicles. Appendix B shows a sampling of the many different variations of labels used by vehicle manufacturers. Based on this finding, staff decided to develop a uniform label that is easier to read and understand. To do this, staff decided to hire market research specialists to help.

In March 2007, ARB staff contracted with two market research firms to conduct two focus groups to evaluate various components of the proposed emissions label. The label designs evaluated were borrowed from the U.S. EPA's Green Vehicle Guide. The U.S. EPA developed its guide from performing numerous focus group tests over the years, and extensive market research. The purpose of our focus groups was to build upon the work already done by obtaining up to date information and receiving information from California-specific consumers.

Two focus groups were conducted in Los Angeles, California, on March 28, 2007 to obtain reactions to draft labels. One group was comprised of eight people and one group was comprised of nine people. One criterion for selection was that participants must have purchased a new vehicle within calendar years 2006 or 2007. Group number one was comprised of smaller vehicle buyers and group number two was comprised of larger vehicle buyers. The reason behind this grouping was that consumers of similar vehicle sizes would feel more comfortable talking with each other.

The following are some of the key findings of the vehicle emissions labeling focus groups[13]:

- Size of label. Consumers preferred the proposed minimum emissions label size of 4" x 6". The proposed minimum size was noticeable, simple and easy to read. The consumers felt the sample emissions label sized 1 1/4" x 4 ¼" placed on the Monroney label sized approximately 11" x 17", was too small and that they would not read it. Consumers preferred the emission label to be separate and next to Monroney label so that one would not have to walk around to the other side of car to read it. Consumers also did not like the sample size 2 ½" x 4" of the current smog index. They felt it contained too much information on too small of a label.

- Color of the label border. Consumers liked the green border of the proposed emissions label. They felt green represents the environment, conservation and that color catches the eye.

[13] Vehicle Emissions Labeling Focus Groups Qualitative Research, April 6, 2007, prepared for the California Air Resources Board by ConsumerQuest,

- Global Warming Score title versus Greenhouse Gas Score title. Consumers strongly preferred Global Warming Score. It had more meaning and was to the point.

- Cleanest versus Best as an additional indicator at end of scale. Consumers definitely preferred Cleanest. They felt it was more descriptive.

- Scale representation. Consumers preferred solid black blocks over either a solid black bar or a gradient over the entire scale. The blocks were more definitive and gave another counting mechanism. Colored blocks, whether green or blue, were not important. From a distance consumers think more blocks would mean worse pollution. However, when consumers look closer they understand the scale with 10 being the cleanest.

- Identification of agency or group responsible for the label. Consumers preferred California Environmental Protection Agency title with line over Air Resources Board versus just Air Resources Board. They felt it was more official looking and recognizable.

- Consumers desired more information on how the scores were determined. To address this concern staff has added an additional statement to the bottom border of the proposed emissions label.

Staff has used the information from these focus groups and other stakeholder input to develop the proposed design of the vehicle emissions label. These labeling requirements are prescriptive by nature and will require one label size and design to be used by all affected vehicle manufacturers. The design of the proposed vehicle emissions label is shown in figure VI-1. Figure VI-2 shows a flexible fuel vehicle with the "Alternate" fuel statement added.

Figure VI-1: California Environmental Performance Label

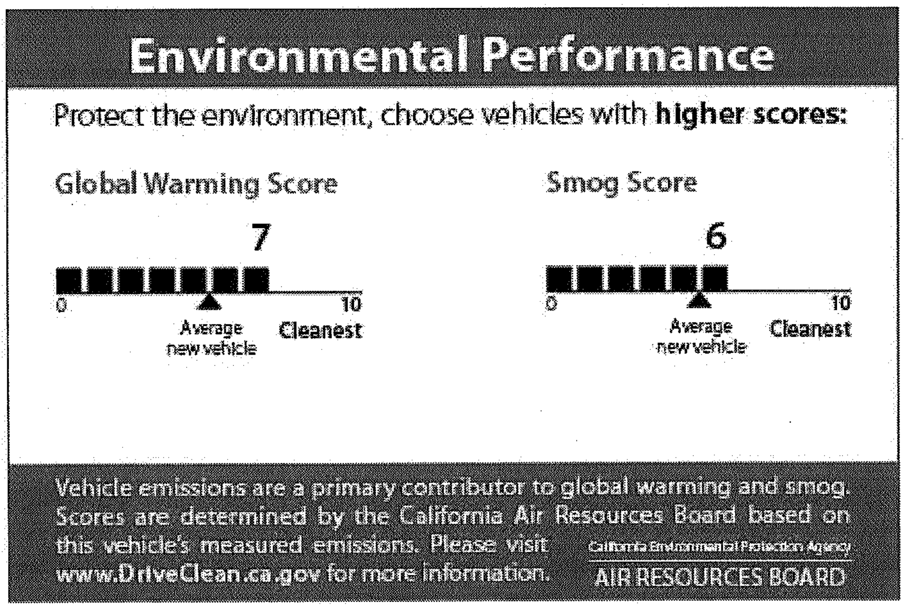


Figure VI-2: California Environmental Performance Label with Flex-Fuel Vehicle Statement

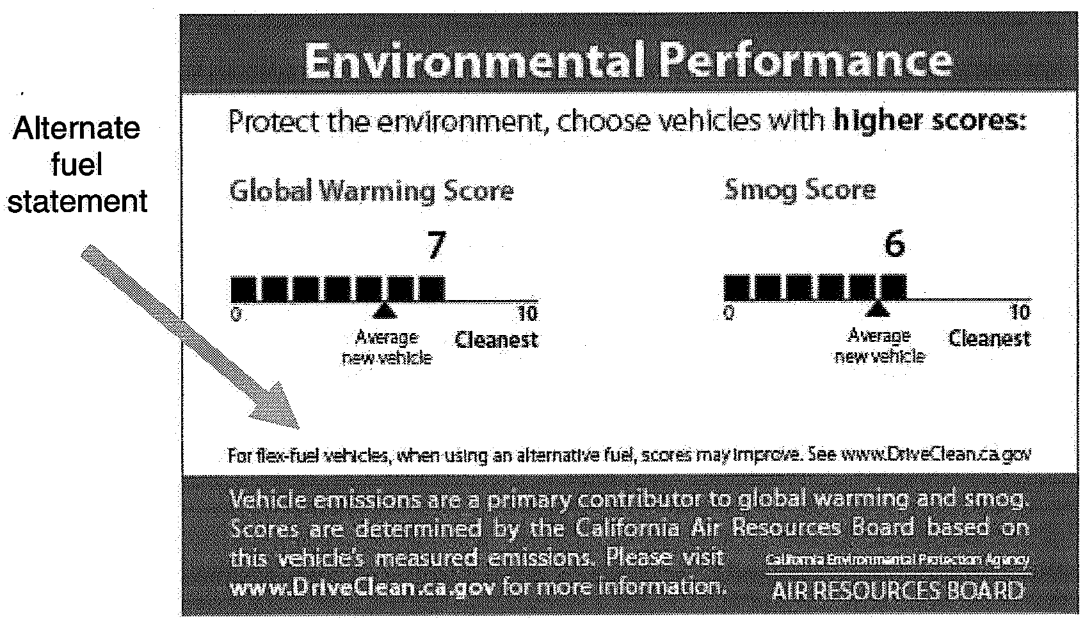


Figure VI-1 shows the Global Warming score on the left and the Smog Score on the right. The black boxes represent the score of the labeled vehicle. A triangle below the scale shows the score of an average vehicle for comparison purposes. It was clear in the focus groups that with the word "cleanest" under the 10 and with the statement: "Protect the environment, choose vehicles with the higher scores" vehicles with more black boxes were cleaner vehicles. The statement at the bottom of the label describes the impact of motor vehicles on smog and global warming. It also points consumers to the ARB's www.DriveClean.ca.gov website which is a consumer oriented website with information about clean cars, alternative fuel and advanced technology vehicles.

VII. Economic Impacts

A. Background

Staff is proposing to revise the current smog index and add a global warming index as required by statute. The statute also requires, among other things, that the label contain the use of at least one color of ink other than black (at H&S § 43200.1(b)(2)(D)) and to seek input from consumer focus groups in determining the color, which resulted in the selection of the color green.

Changes to the existing label, required by statute to include the additional global warming index information, necessitate an increase in the size of the label. Existing label sizes vary from 1½ x 6 inches to 2 ½ x 4 inches due to the current regulatory requirements for label content. Because of the amount of information already contained on the Smog Index Label and the fact that a new global warming index must be added, the size of the label must be increased to accommodate both indices. The findings of the consumer focus groups indicate that the new label size should be at least 4 x 6 inches.

Since the statute requires using a color other than black for some portion of the label, the color green was chosen as it represents an environmental color to most consumers. Most vehicle manufacturers claim to be currently using only black ink printers. Adding a color to the label requires the manufacturers to either obtain pre-printed color labels or replace their existing printers with color printers. Staff was able to analyze these costs and include them as an economic impact to the industry as a whole.

B. Estimated Costs

1. Label Size

Part of the cost imposed on the manufacturers, based on these regulations, is associated with the increase in label size. Since the vehicle manufacturers are already required to print a Smog Index Label, staff reasoned that only minor costs would be incurred for setup, programming, or testing of the new label.

The increase in label size does not appear to cause much concern for existing assembly line printers as these printers are already capable of printing labels up to 6 inches wide and even Monroney labels up to 11 inches wide. The Monroney label is a federally mandated sticker affixed to the side window or windshield of every new passenger car and light-duty truck sold in the United States. The sticker includes consumer information such as the manufacturer's suggested retail price (MSRP), vehicle specifications, standard equipment and warranty details, optional equipment and pricing, and U.S. EPA city and highway fuel economy ratings.

Requiring a label to increase from 2.5 x 4 inches to 4 x 6 inches will add an estimated 0.8 cents per label based on minimum case package purchasing quantities of label feedstock. This cost will decrease as order quantities increase. Staff conservatively rounded this cost up to 1 cent per label which equates to 1 cent per vehicle produced.

Based on 2005 California vehicle sales data of approximately 2 million passenger cars, light-duty trucks, and medium-duty passenger vehicles, this would impose an industry wide annual operating cost increase of $20,000. Thirty vehicle manufacturers are currently certifying their products for sale in California. These manufacturers sell anywhere from 50 to 450,000 vehicles a year to California citizens. Based on market share, individual manufacturer costs would vary anywhere from $1 annually to $4,350 annually, but on average would equate to $667 per manufacturer per year.

2. Label Color

The addition of color also imposes a cost to the vehicle manufacturer. Regulating a specific color or colors by ARB would require the manufacturer to bear the cost of ordering pre-printed color labels to use as feedstock or bear the cost of replacing their existing black ink printers. Each solution to providing color labels is acceptable to staff, therefore an analysis of each solution follows. A more detailed and technical analysis can be found in Appendix C.

Replace Existing Label Stock with Pre-Printed Color Label Stock

Pre-printed color labels can be used as feedstock as long as all the information on the label presented in color is constant for all labels and the information being printed for each vehicle is in black. The new label, as recommended by staff, allows for this possibility. The per-label cost to go from a non-color feedstock label to color feedstock label is estimated to be about 5 cents per label. This equates to a 5 cents per vehicle cost increase. Based on 2005 California vehicle sales data of approximately 2 million passenger cars, light-duty trucks, and medium-duty passenger vehicles, this would impose a total annual operating cost increase of $100,000 across all manufacturers. Individual manufacturer costs would vary based on their actual production volume, but on average would equate to $3,333 per manufacturer per year.

Staff believes this option may be used for an extended period of time by small volume manufacturers but only for the first year or two by medium to large volume manufacturers. In discussions with the manufacturers, staff was given the impression that color labels are something the manufacturers have already been considering. Therefore, staff believes that manufacturers will upgrade existing black ink printers to color printers.

Replace Existing Black Ink Printers with Color Printers

Staff expects manufacturers will replace existing black ink printers with color printers as existing printers wear out. New industrial laser-jet color printers cost about $6,000 each verses $5,000 for an equivalent black ink laser-jet printer. Therefore, staff reasoned that a manufacturer would only incur the incremental cost increase of $1,000 per printer. Staff reasoned that existing printers will continue to be used through the end of their useful lifecycle before being replaced or will be reutilized elsewhere in the organization. Either way, medium and large manufacturers will upgrade to color printers within the first three years of implementation. Staff estimated the range of printers required to be from as few as 2 to as many as 52 per manufacturer, based on the number of assembly facilities and ports used by each manufacturer. The total number of printer replacements required for the industry as a whole is estimated to be 286 which equates to a total statewide incremental cost increase of $286,000 or about $10,000 per average manufacturer.

This one time capital cost can be annualized over the 3-5 year life of a printer. Staff used a conservative replacement cycle of three years and a 5% real discount rate. Therefore the statewide 3-year annualized capital recovery cost will be $105,000 or about $3,500 per manufacturer. There is also an annual operational cost for switching from black ink cartridges to color ink cartridges. This annual cost was determined to be $120,000 statewide based on the estimated number of vehicles sold in California. This annual cost averages out to be $4,000 per manufacturer. Therefore the total annual cost per average manufacturer is the sum of the annualized one time capital cost and the annual operational cost which equates to $7,500.

Cost Comparison

The annual cost per average manufacturer ($7,500) for upgrading to color printers is clearly higher than the annual cost ($3,333) for ordering pre-printed color labels. Manufacturers sell anywhere from 50 to 450,000 vehicles a year to California citizens. The smaller manufacturers would be required to distribute the high capital and operational costs of using color printers over a relatively small number of production vehicles. Staff analyzed this scenario and estimated an annual cost to be as high as $20.00 per vehicle. The larger manufacturers can distribute these capital and operational costs over a much larger number of production vehicles bringing the annual cost to as little as 2 cents per vehicle. This is why staff believes larger vehicle manufacturers will choose to upgrade to color printers rather than use pre-printed color labels.

C. Total Cost of Implementation

The estimated maximum total annual cost to implement this regulation is calculated as the annualized capital cost to upgrade existing printers plus the annual operating cost for increasing the label size and using color cartridges. For the industry as a whole this equates to $245,000 per year. The initial annualized capital cost for an average manufacturer to implement this regulation is estimated to be $3,500. The annual ongoing cost for increasing label size ($667) and using color cartridges ($4,000) for a typical manufacturer is estimated to be $4,667. Therefore the total annual cost, on average, to print the new larger color labels is estimated to be $8,167 ($3,500 + $4,667). This cost estimate will vary slightly by manufacturer depending on the actual number of assembly plants, ports of entry, printers required, and vehicles produced.

VIII. Estimated Environmental Benefits

Staff expects that the proposed label will affect the purchasing choices of some vehicle buyers, however the degree to which this occurs is not known. If consumers buy vehicles with lower smog indices, smog emissions will be lower. If they buy vehicles with lower global warming indices, these emissions may also decrease. However, compliance with the current greenhouse gas emissions standards is based on a fleet average $CO_{2Equivalent}$ value by each manufacturer. Thus it may be possible that purchase of a cleaner vehicle will allow a manufacturer to produce additional vehicles with higher emissions (at presumably a lower cost). This would negate the effect of the label resulting in no change in greenhouse gas emissions. Over time however, staff expects that increased awareness of the benefits of purchasing a vehicle with low greenhouse gas emissions will result in market pressure to increase the number of models available with low emissions, with the result being manufacturer fleet wide emissions will be lower than required by regulation. The increased consumer awareness of vehicle greenhouse gas emissions may also encourage purchasers of other products to buy green.

IX. Issues

A. Lead Time Requirements

The vehicle manufacturers have expressed concerns with mandating a new label for all 2009 MY vehicles. The first and foremost concern hinges around the fact that all vehicle manufacturers have the ability to introduce 2009 MY vehicles as early as January of 2008. Therefore, there is no way to label such early introduction vehicles with a newly regulated label if the regulation itself does not become law before these early vehicles are ready for market distribution. The vehicle manufacturers have also stated that a substantial lead time to implement a new label must be considered due to the time required to purchase new label stock or printers, restructure existing assembly procedures, and reprogram existing assembly line computer language to adapt to the new label format. The following summary illustrates the main concerns the vehicle manufactures stressed for changing or implementing a new vehicle labeling program.

Staff solicited feedback from the vehicle manufacturers on actual implementation time once the regulation became law. Staff reviewed this feedback and provides the following overview of the implementation process and estimated processing time:

- Label Database Set-up: Link emission scores with variable label values. (6 months)
- Label Design and Specification: Incorporate new design with existing labels and specify ink, durability, paper, etc. (1 month)
- Label/Printer Procurement: Purchase new label feedstock and if necessary, new printers. (3 months)
- Label Delivery and Implementation: Ship new label feedstock and printers to all assembly plants and ports and integrate new labeling process into assembly line. (1 month).

Staff notes that the first process, Label Database Set-up, can be accomplished simultaneously with the other processes. However, the last three steps must be accomplished in succession. Therefore, the critical path for a new label implementation is estimated to be 6 months. Staff realizes that not all vehicle manufacturers operate identically and some variations to this process may occur during implementation, therefore staff recommends adding one additional month to the critical path in order to account for any variations.

Based on this information, staff recommends allowing at least a 7-month lead time for implementation of the new label requirements once they are approved by the Office of Administrative Law. Staff estimates this will occur no later than February, 2008. Allowing for a 7-month implementation lead-time, staff recommends the new label take affect for all vehicles manufactured beginning October 1, 2008.

B. Label Size

The vehicle manufacturers have also indicated concern about the proposed label size. They've stated that increasing the size of the label from what they currently produce to the proposed 4 x 6 inches may 1) impact the placement of the label and 2) create visibility problems for consumers wanting to test drive the vehicle.

Some vehicle manufacturers place the current Smog Index Label on the vehicle as a separate label, sized approximately 2.5 x 4 inches, and other vehicle manufacturers place the current Smog Index, sized approximately 1.25 x 4.25 inches, on the Monroney label. A Monroney label, sized 11 x 17 inches includes the vehicle's options, pricing, fuel economy information and other information. By incorporating the California Smog Index label onto the Monroney label the vehicle manufacturers have indicated the Smog Index would begin appearing in all 50 states and not just in California. Unfortunately, the Monroney label already contains a tremendous amount of consumer information and the available space for a new Environmental Performance Label is limited. Staff presented a sample of both current industry labels to consumer focus groups held in March 2007, Los Angeles, California. The focus groups felt the sample emissions labels were too small and that they would not notice or read it. Consumers preferred the emission label not be located on the Monroney label and preferred the proposed size of 4 x 6 inches. Staff concluded that maintaining a minimum label size of 4 x 6 inches is required for consumer awareness and readability.

The second issue related to a large label is the potential obstruction of driver vision for consumers during test drives. The primary concern is for vehicles without rear side windows such as two-seater sports cars and convertibles. Vehicle manufacturers recommended that a smaller label be authorized for use on such vehicles to limit the already obstructed driver vision from all other federally required labels. Staff does not recommend reducing the size of the label in such cases because the placement of the California label is not restricted to side windows only. Like the current Smog Index Label, the proposed 4 x 6 inch label (which is only expanding by an inch or two over the existing label) may also be placed on the windshield if there is no space available on the side windows. There is sufficient windshield area to place the label without interfering with the driver's view.

X. Alternatives

Thus far no alternative considered by the ARB has been identified that 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. The following alternatives were considered in reaching this conclusion.

A. Alternative 1: Keep Existing Smog Index Label and Add a Global Warming Index

One alternative would be to keep the existing Smog Index Label and expand it to add a global warming index. Staff felt this was not the best alternative for two reasons. First, the existing smog index is not well understood by consumers and focus group research suggests it needs revision. Second, the label does not have room for adding a new global warming index, and thus a second label for this index would have to be added. For these reasons a new, larger label is necessary.

Because this alternative requires expanding the existing label or adding a new label, staff assumed there is no cost difference between this alternative and the one staff is proposing.

B. Alternative 2: Incorporate SmartWay Certification Mark

U.S. EPA launched the air pollution and greenhouse gas scores on their Green Vehicle Guide in 2005 to provide consumers with emissions information that allows them to compare the environmental performance of vehicles. In January 2006, the SmartWay certification mark was added to the Green Vehicle Guide to highlight vehicles that are very good environmental performers relative to other vehicles.

The SmartWay certification mark is achieved if a vehicle receives a minimum of a 6 on both the Greenhouse Gas Score and the Air Pollution Score and receives a combined score of 13 or higher. The SmartWay certification mark is shown in Figure X-1.

Figure X-1: U.S. EPA SmartWay Certification Mark

Staff reviewed the SmartWay program and included the SmartWay certification mark on the new label in focus group discussions. Response to SmartWay was positive and participants liked that the cleanest vehicles were identified using a logo. However ARB and U.S. EPA currently use different methods to determine global warming emissions. Staff recommends that the use of the SmartWay certification mark on the new label be deferred until after the U.S. EPA's and ARB's methods for scoring global warming gases have been harmonized.

The cost of including the SmartWay certification mark is no different than the estimated cost for the proposed label. Staff assumes that most manufacturers will upgrade to color printers therefore there would be no additional cost to print out the color SmartWay logo.

C. Conclusion

Having considered these alternatives, staff concludes that the proposed regulations are the best alternative because they allow staff to incorporate all previous market research and provide the consumers with a new Environmental Performance Label that will be noticed.

XI. References

California Air Resources Board, Certification Data Reported to the California Air Resources Board, 2005.

California Air Resources Board, Estimated Annual Average Emissions, 2005.

California Air Resources Board, Letter to Steve Douglas, Director, Automobile Manufacturers and letter to John Cabaniss, Director, Association of International Automobile Manufacturers, February 28, 2007.

California Energy Commission Staff Report, "Inventory of California Greenhouse Gas Emissions and Sinks," 1990-1999.

San Jose Mercury News, "Survey finds 81% worried about global warming," April 12, 2007.

Schwartz, Cory, "Vehicle Emissions Labeling Focus Groups Qualitative Research, Prepared for the California Air Resources Board, Consumer Quest, April 6, 2007.

United States Environmental Protection Agency, www.epa.gov, "Green Vehicle Guide," 2007.

Appendix A – Regulation Language

§ 1965. Emission Control, ~~and~~ Smog Index, and Environmental Performance Labels - 1979 and Subsequent Model-Year Motor Vehicles.

In addition to all other requirements, emission control labels are required by the California certification procedures contained in the "California Motor Vehicle Emission Control and Smog Index Label Specifications for 1978 through 2003 Model Year Motorcycles, Light-, Medium- And Heavy-Duty Engines And Vehicles," adopted March 1, 1978, as last amended September 5, 2003, which is incorporated herein by reference, the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty trucks and Medium-Duty Vehicles," incorporated by reference in §1961(d), the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel-Engines and Vehicles," incorporated by reference in §1956.8(b), the "California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicle Classes," incorporated by reference in §1956.8(b) and (d), and the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," incorporated by reference in §1956.8(d). Smog index labels for passenger cars and light-duty trucks shall conform to the "California Smog Index Label Specifications for 2004 Through 2009 Model Year Passenger Cars and Light-Duty Trucks," adopted September 5, 2003, as last amended **{insert date}**, which is incorporated herein by reference. Environmental Performance labels for passenger cars, light-duty trucks, and medium-duty passenger vehicles shall conform to the "California Environmental Performance Label Specifications for 2009 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Passenger Vehicles," adopted **{insert date}**, which are incorporated herein by reference. Motorcycles shall meet the requirements of Title 40 Code of Federal Regulations section 86.413-78, as last amended October 28, 1977, which is incorporated herein by reference.

Note: Authority cited: Sections 39600, 39601, ~~and~~ 43200, and 43200.1, Health and Safety Code. Reference: Sections 39002, 39003, 43000, 43013, 43018.5, 43100, 43101, 43102, 43103, 43104, 43107, ~~and~~ 43200, and 43200.1, Health and Safety Code.

* * * *

State of California
AIR RESOURCES BOARD

CALIFORNIA SMOG INDEX LABEL SPECIFICATIONS FOR 2004 ~~AND SUBSEQUENT~~ THROUGH 2009 MODEL YEAR PASSENGER CARS AND LIGHT-DUTY TRUCKS

Adopted: September 5, 2003
Amended: {Insert Date}

Note: This new document is an abbreviated version of the "California Motor Vehicle Emission Control and Smog Index Label Specifications" (the old Label Specifications document), which has been sunsetted after the 2003 model year. All of the tune-up label requirements in the old Label Specifications document applicable to light-, medium and heavy-duty vehicles and motorcycles are being incorporated into their respective test procedure documents effective with the 2004 model year, making a separate document covering the California tune-up label requirements no longer necessary.

Effective with the 2004 model year, all of the smog index requirements in the old Label Specifications document have been moved to the new document shown here. Paragraph 1of this new document was previously contained in paragraph 11 of the old Label Specifications document; paragraphs 2, 3, and 4 were previously set forth in paragraphs 3.5, 3.5(c), and 3.5(d) respectively of the old Label Specifications document; and Appendix A in this new document is identical to Appendix A in the old Label Specifications document.

State of California
AIR RESOURCES BOARD

California Smog Index Label Specifications

1. **Prohibition**. The sale and registration in this state of any certified new 2004 ~~and subsequent~~ through 2009 model passenger car or light-duty truck to which a smog index label has not been affixed in accordance with these procedures is prohibited.

2. **Requirements**. A smog index label made of paper or plastic shall be securely affixed in a location specified in section 43200 of the Health and Safety Code. The smog index label shall display the smog index for the vehicle, as specified in section 3 below, and the fleet average smog index, which shall be referred to as "The Smog Index of the average new vehicle." Every model-year, the fleet average smog index shall be updated on the smog index label as specified in section 4 below. The smog index label shall also include information to inform purchasers of the significance of the smog index. The smog index label shall take the form set forth in Appendix A of this document. An alternative label may be used if shown to yield equivalent clarity and if approved in advance by the Executive Officer.

3. **Smog Indices**. The following smog indices shall apply to 2004 ~~and subsequent~~ through 2009 model-year passenger cars and light-duty trucks 0-8500 lbs. GVW:

	Enhanced Evap. 2.0g/ diurnal + hot soak test, 0.05 g/mi – running loss test, at 100,000 miles	PCs 0.5 g/ diurnal + hot soak test, 0.05 g/mi – running loss test, at 150,000 miles	LDTs < 6,000 lbs. GVW 0.65 g/ diurnal + hot soak test, 0.05 g/mi – running loss test, at 150,000 miles	LDTs 6,001-8,500 lbs. GVW 0.90 g/ diurnal + hot soak test, 0.05 g/mi - running loss test, at 150,000 miles	Evap. Exempt
LEV I					
Passenger Cars and Light-Duty Truck 1 (0-3750 lbs. LVW)					
LEV	1.00	0.92	0.93	0.94	0.80
ULEV	0.90	0.82	0.83	0.84	0.70
ZEV	n/a	n/a	n/a	n/a	0.00
Light-Duty Truck 2 (3751-5750 lbs. LVW)					
LEV	1.65	n/a	1.58	1.60	1.45
ULEV	1.51	n/a	1.44	1.45	1.30
ZEV	n/a	n/a	n/a	n/a	0.00
LEV II					
Passenger Cars; Light-Duty Truck 1 (0-3750 lbs. LVW); Light-Duty Truck 2 (3751 lbs. LVW – 8500 lbs. GVWR)					
LEV	0.57	0.49	0.50 (0.55)[1]	0.51 (0.57)[1]	0.36
ULEV	0.46	0.39	0.40	0.41	0.26
SULE	0.29	0.21	0.22	0.23	0.09
ZEV	n/a	n/a	n/a	n/a	0.00

[1] The smog index in parentheses applies to the optional LEV II LEV standard. Up to 4% of a manufacturer's light-duty truck 2 fleet with a maximum base payload of 2500 lbs. may be certified to a standard of 0.07 g/mi NOx at 50,000 miles.

4. **Fleet Average Smog Indices:** The following fleet average smog indices shall apply to 2004 ~~and subsequent~~ through 2009 model-year passenger cars and light-duty trucks 0-8500 lbs. GVW:

2004	2005	2006	2007	2008	2009	2010 and subsequent
1.02	0.80	0.58	0.40	0.38	0.37	0.36

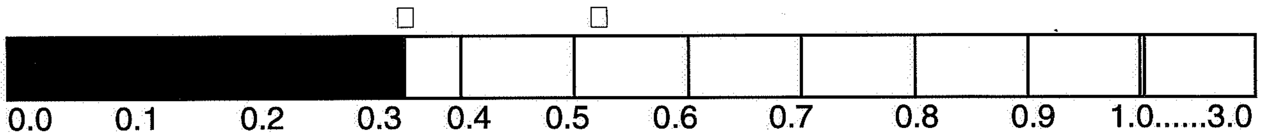
5. **Sunset:** These specifications will sunset on September 30, 2008. All passenger cars and light-duty trucks manufactured on October 1, 2008 and thereafter must comply with the "California Environmental Performance Label Specifications" incorporated by reference in Title 13 California Code of Regulations § 1965.

APPENDIX A

SMOG EMISSIONS INFORMATION

The Smog Index of this vehicle is 0.34

The Smog Index of the average new vehicle is 0.52



□ CLEANER

MORE POLLUTING□

Note: The Smog Index (SI) indicates the relative level of smog-forming pollutants emitted by the vehicle. The lower the SI, the lower the vehicle's emissions.

Note for commenters: The entire text of these proposed specifications is new.

State of California
AIR RESOURCES BOARD

CALIFORNIA ENVIRONMENTALPERFORMANCE LABEL SPECIFICATIONS FOR 2009 AND SUBSEQUENT MODEL YEAR PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY PASSENGER VEHICLES

Adopted: {Insert Date}

Note: These specifications shall take effect for all vehicles manufactured on October 1, 2008 and thereafter. On October 1, 2008, the Environmental Performance Label will replace the Smog Index Label; therefore vehicles manufactured on October 1, 2008, and thereafter will no longer require a Smog Index Label. Replacing the Smog Index Label with the new Environmental Performance Label prior to October 1, 2008, is acceptable.

State of California
AIR RESOURCES BOARD

California Environmental Performance Label Specifications

1. **Prohibition.** The sale and registration in this state of any certified new 2009 and subsequent model passenger car, light-duty truck, and medium-duty passenger vehicle manufactured on or after October 1, 2008 to which an Environmental Performance label has not been affixed in accordance with these procedures is prohibited. Affixing the Environmental Performance label to a vehicle manufactured before October 1, 2008 in lieu of the Smog Index Label is optional, however, each such label optionally affixed and not meeting all specifications herein, is prohibited.

2. **Requirements.** An Environmental Performance label made of paper or plastic shall be securely affixed in a location specified in section 43200 of the Health and Safety Code. The Environmental Performance label shall display the global warming score for the vehicle, as specified in section 3 below. The Environmental Performance label shall display the smog score for the vehicle, as specified in section 4 below. The environmental performance label shall take the form set forth in section 7 and Attachment A of this document.

3. **Global Warming Score**

(a) The global warming emissions value used to determine a vehicle's score shall be the CO2Equivalent value as calculated according to Title 13, California Code of Regulations § 1961.1(a)(1)(B) and certified pursuant thereto.

(b) The average new vehicle $CO_{2Equivalent}$ combined value is projected to be 360 grams per mile and shall be assigned a score of 5.

(c) The scores in the following table shall apply to all passenger cars and light-duty trucks 0-8500 pounds GVW and medium-duty passenger vehicles 8,500-10,000 GVW:

Grams per mile $CO_{2Equivalent}$ combined	Global Warming Score
Less than 200	10
200-239	9
240-279	8
280-319	7
320-359	6
360-399	5
400-439	4
440-479	3
480-519	2
520 and up	1

4. Smog Score

(a) The average new vehicle is assigned an Ultra-Low-Emission Vehicle (ULEV) certification and is assigned a score of 5.

(b) The scores in the following table apply to 2009 and subsequent model-year passenger cars and light-duty trucks 0-8500 pounds GVW and medium-duty passenger vehicles 8,500-10,000 GVW:

California Emissions Category - Federal Bins	NMOG + NOx (g/mile)	Smog Score
ZEV – Bin 1	0.0	10
PZEV	0.030	9
SULEV – Bin 2	0.030	8
Bin 3	0.085	7
Bin 4	0.110	6
ULEV	0.125	5
LEV – Bin 5	0.160	4
[LEV (option 1) – Bin 6] and [SULEV (MDPV)]	0.190 – 0.200	3
Bin 7	0.240	2
ULEV (MDPV) – Bin 8a	0.325	1

5. **Bi-Fuel, Fuel-Flexible, and Dual-Fuel Vehicles**. Notwithstanding Title 13, California Code of Regulations, Section 1961.1(a)(1)(B)(2)(a), the global warming score is based on exhaust mass emission tests when the vehicle is operating on gasoline.

6. **Environmental Performance Label format requirements.** Detailed printing specifications are given in Attachment A of this part and apply to the provisions in this section.

(a) Environmental performance labels:

(1) Must be rectangular in shape with a minimum size of 6 x 4 inches.

(2) Must be outlined with a 1 point green line and have exactly a 0.5 inch section of green at the top and exactly a 1 inch section of green at the bottom.

(b) Label information. The information on each label must meet the following requirements:

(1) The color for the background as specified in Attachment A is PMS 347 C selected from the Pantone Matching System, solid coated swatch book. When printing in 4 color process the color build for the prescribed green is:

Cyan	100
Magenta	0
Yellow	86
Black	3

(2) "Environmental Performance" is the title of the label. This title must be centered in the top section of green. See Attachment A for font and color requirements.

(3) The phrase "Protect the environment, choose vehicles with higher scores:" must appear. This phrase must start exactly 2 picas (0.341 inches) from the left edge of label. See Attachment A for font and color requirements.

(4) "Global Warming Score" is a title that must always appear over its respective scale. This title must start exactly 2 picas (0.341 inches) from the left edge. See Attachment A for font and color requirements.

(5) The number for the Global Warming Score is variable and must appear over the block it represents on the global warming scale. Scores are determined in section 3. See Attachment A for font and color requirements.

(6) The number 0 must appear on the left most side of the scale it is under. See Attachment A for font and color requirements.

(7) "Average New Vehicle" must appear under both scales at the center point, which is marked by a triangle (item 15 in the style guide). See Attachment A for font and color requirements.

(8) This statement must appear in the lower section of green on every label: "Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on this vehicle's measured emissions. Please visit **<u>www.DriveClean.ca.gov</u>** for more information." This statement must start exactly 2 picas (0.341 inches) from the left edge. The third row of text will end at the word "visit" and drop

down to a fourth line of text to allow room for item 17, the ARB logotype. See Attachment A for font and color requirements.

(9) "higher scores:" must be bolded. See Attachment A for font and color requirements.

(10) "Smog Score" must appear over its respective scale. It shall end exactly 1.5 inches away from the right edge, and shall be flush left with its scale. See Attachment A for font and color requirements.

(11) The number for the Smog Score is variable and must appear over the block it represents on the smog scale. Scores are determined in section 4. See Attachment A for font and color requirements.

(12) Squares on the scales. Each square represents a single point on the scale. If a vehicle scores a 5, on a given scale, there will be five squares to represent that score. The first square must be flush left with the scale line (Attachment A item 13) and the tenth square must be flush right with item 13, therefore maintaining a distance of exactly 0.042 inches between squares, even when not all ten squares are present. See Attachment A for size and color requirements.

(13) The scale line must appear on both scales and must be a consistent length. It must always be flush left with its respective title. See Attachment A for font and color requirements.

(14) A number 10 must appear flush right with Attachment A item 13 of both scales. The number 10 represents the highest score a vehicle can get on each scale. See Attachment A for font and color requirements.

(15) A triangle must appear at the center point of both scales representing where the average new vehicle falls on each scale. See Attachment A for font and color requirements.

(16) The title "Cleanest" must appear flush right and underneath the 10 (Attachment A item 14) on both scales. It must always be bold. See Attachment A for font and color requirements.

(17) The California Environmental Protection Agency / Air Resources Board logotype must appear in the lower right hand corner, ending exactly 0.3 inches from the right edge. See Attachment A for font and color requirements.

(18) The Drive Clean website (**www.DriveClean.ca.gov**) should always appear in the Myriad Semi-bold within Item 8. See Appendix A for font and size specifications.

(19) This statement must appear for bi-fueled vehicles: "For bi-fuel vehicles, when using an alternative fuel, scores may improve. See **www.DriveClean.ca.gov**".

(20) This statement must appear for fuel-flexible vehicles: "For flex-fuel vehicles, when using an alternative fuel, scores may improve. See **www.DriveClean.ca.gov**".

(21) This statement must appear for dual-fuel vehicles: "For dual-fuel vehicles, when using an alternative fuel, scores may improve. See **www.DriveClean.ca.gov**".

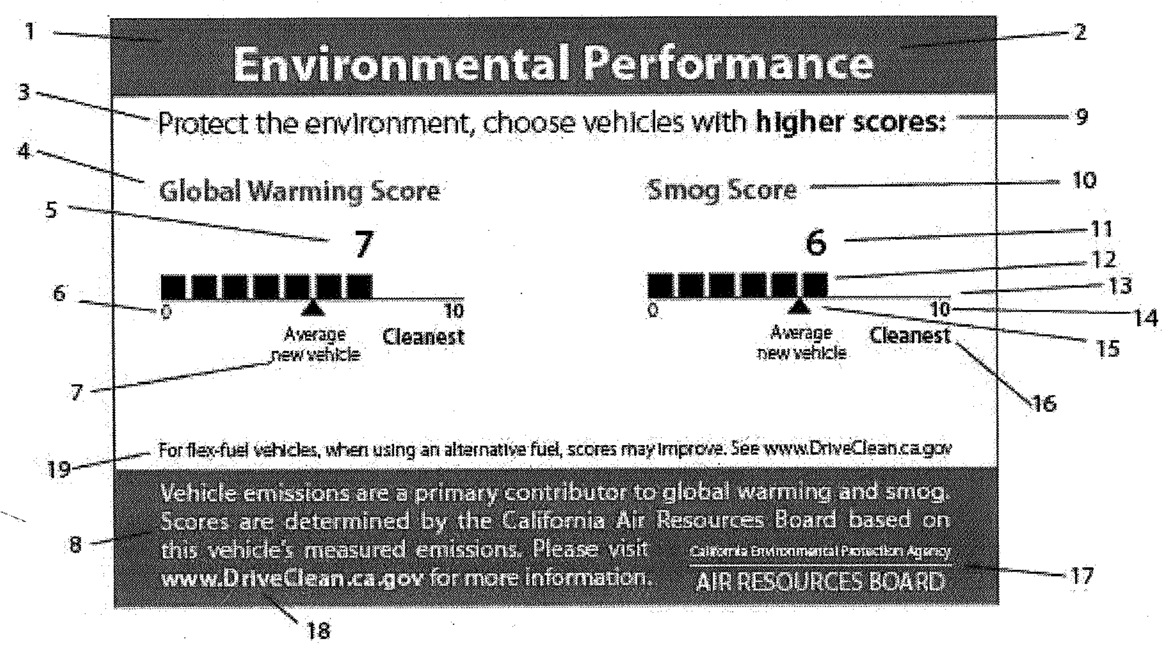
7. **Severability**. Each provision of this section is severable, and in the event that any provision of this section is held to be invalid, the remainder of these specifications remains in full force and effect.

ATTACHMENT A

ENVIRONMENTAL PERFORMANCE LABEL STYLE REQUIREMENTS

1	Label Background 6 x 4 inches whole; top green: 6 x 0.5 inches; Bottom green: 6 x1 inches; green stroke: 1 point; Color: PMS 347 C
2	font: Myriad Pro Bold; size: 25 points; color: knocked out of green (appears white)
3	font: Myriad Pro Light; size: 15 points; color: Black
4, 10	font: Myriad Pro Semi-bold; size: 14.4 points; color: PMS 347 C
5, 11	font: Myriad Pro Semi-bold; size: 19.2 points; color: Black
6, 14	font: Myriad Pro Light; size: 9.6 points; color: Black
7	font: Myriad Pro Light; size/leading: 9/10.8 points; color: Black
8	font: Myriad Pro Regular; size/leading: 11.3/13.5 points; color: knocked out of green (appears white)
9	font: Myriad Pro Semi-bold; size: 15 points; color: Black
12	size: 0.167 x 0.167 inches; color: Black; distance: 0.042 inches apart
13	Scale Line: length: 2.05 inches; stroke: 1 point; color: Black
15	size: 0.167 x 1.11 inches; color: Black
16	font: Myriad Pro Semi-bold; size: 10.5 points; color: Black
17	California Environmental Protection Agency / Air Resources Board logotype: Top Row: font: Myriad Pro Regular; size: 7 points (Title Case) Bottom Row: font Myriad Pro Regular; size: 12 points (All Caps) Line weight: 1 point; Color for all: knocked out of green (appears white)
18	**www.DriveClean.ca.gov**: Font: Myriad Pro Semi-bold Size: 12 points Color: knocked out of green (appears white)
19	Flex-fuel phrase (variable element): font: Myriad Pro Light; size: 9 points; color: Black

Environmental Performance Label



California Environmental Protection Agency
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES

Adopted:	August 5, 1999
Amended:	December 27, 2000
Amended:	July 30, 2002
Amended:	September 5, 2003 (corrected February 20, 2004)
Amended:	May 28, 2004
Amended:	August 4, 2005
Amended:	June 22, 2006
Amended:	[INSERT DATE OF AMENDMENT]
Amended:	[INSERT DATE OF AMENDMENT]

Note: The proposed amendments to this document are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions compared to the test procedures as adopted by the Board on June 22, 2006. Amendments to this document as adopted on March 22, 2007 as part of the "Rulemaking to Consider Amendments to California's Emission Warranty Information Reporting and Recall Regulations and Emission Test Procedures," are indicated by double underline to indicate additions and ~~double strikeout~~ to indicate deletions compared to the test procedures as amended on June 22, 2006. Existing intervening text that is not amended is indicated by "* * * *". The amendments proposed here are non-substantive in that they impose no additional or changed requirements beyond those proposed for Section 1965, but are proposed here to maintain consistency.

NOTE: This document is incorporated by reference in sections 1960.1(k) and 1961(d), title 13, California Code of Regulations (CCR). It contains the majority of the requirements necessary for certification of a passenger car, light-duty truck or medium-duty vehicle for sale in California, in addition to containing the exhaust emission standards and test procedures for these motor vehicles. However, reference is made in these test procedures to other ARB documents that contain additional requirements necessary to complete an application for certification. These other documents are designed to be used in conjunction with this document. They include:

1. "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" (incorporated by reference in section 1962, title 13, CCR);

2. "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" (incorporated by reference in section 1976(c), title 13, CCR);

3. "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" (incorporated by reference in section 1978(b), title 13, CCR);

4. OBD II (section 1968, et seq. title 13, CCR, as applicable);

5. "California Smog Index Label Specifications for 2004 through 2009 Model Year Passenger Cars and Light-Duty Trucks" (incorporated by reference in section 1965, title 13, CCR);

6. "California Environmental Performance Specifications for 2009 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Passenger Vehicles" (incorporated by reference in 1965, title 13, CCR);

~~6~~7. Warranty Requirements (sections 2037 and 2038, title 13, CCR);

~~7~~8. "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks" (incorporated by reference in section 2235, title 13, CCR);

~~8~~9. Guidelines for Certification of Federally Certified Light-Duty Motor Vehicles for Sale in California (incorporated by section 1960.5, title 13, CCR); and

~~9~~10. "California Non-Methane Organic Gas Test Procedures," (incorporated by reference in section 1961(d), title 13, CCR).

The section numbering conventions for this document are set forth in Part I, section A.3 on page A-2.

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2001 AND SUBSEQUENT MODEL PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY VEHICLES

The provisions of Subparts B, C, and S, Part 86, Title 40, Code of Federal Regulations, as adopted or amended on May 4, 1999 or as last amended on such other date set forth next to the 40 CFR Part 86 section title listed below, and to the extent they pertain to exhaust emission standards and test procedures, are hereby adopted as the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," with the following exceptions and additions.

PART I: GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE VERIFICATION OF EMISSIONS

* * * *

C. General Requirements for Certification

* * * *

3. §86.1807 Vehicle Labeling

* * * *

3.3 California Labeling Requirements.

3.3.1. In addition to the federal requirements set forth in §86.1807, labeling shall conform with the requirements specified in section 1965, title 13, CCR, and the "California Smog Index Label Specifications <u>for 2004 through 2009 Model Year Passenger Cars and Light-Duty Trucks</u>" <u>and "California Environmental Performance Specifications for 2009 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Passenger Vehicles"</u> as incorporated by reference in section 1965, title 13, CCR. In cases where there is conflict with the federal label specifications, the California requirements shall apply.

* * * *

PROPOSED REGULATION ORDER

Set forth below are the proposed amendments to title 13 of the California Code of Regulations. Proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions. Amendments to §1961 that were adopted by the Board on March 22, 2007 as part of the "Rulemaking to Consider Amendments to California's Emission Warranty Information Reporting and Recall Regulations and Emission Test Procedures," but which have not yet been approved by the Office of Administrative Law are indicated in double underline to indicate additions and ~~double strikeout~~ to indicate deletions. The amendments proposed here are non-substantive in that they impose no additional or changed requirements beyond those proposed for Section 1965, but are proposed here to maintain consistency.

§ 1961. Exhaust Emission Standards and Test Procedures - 2004 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.

Introduction. [No change.]

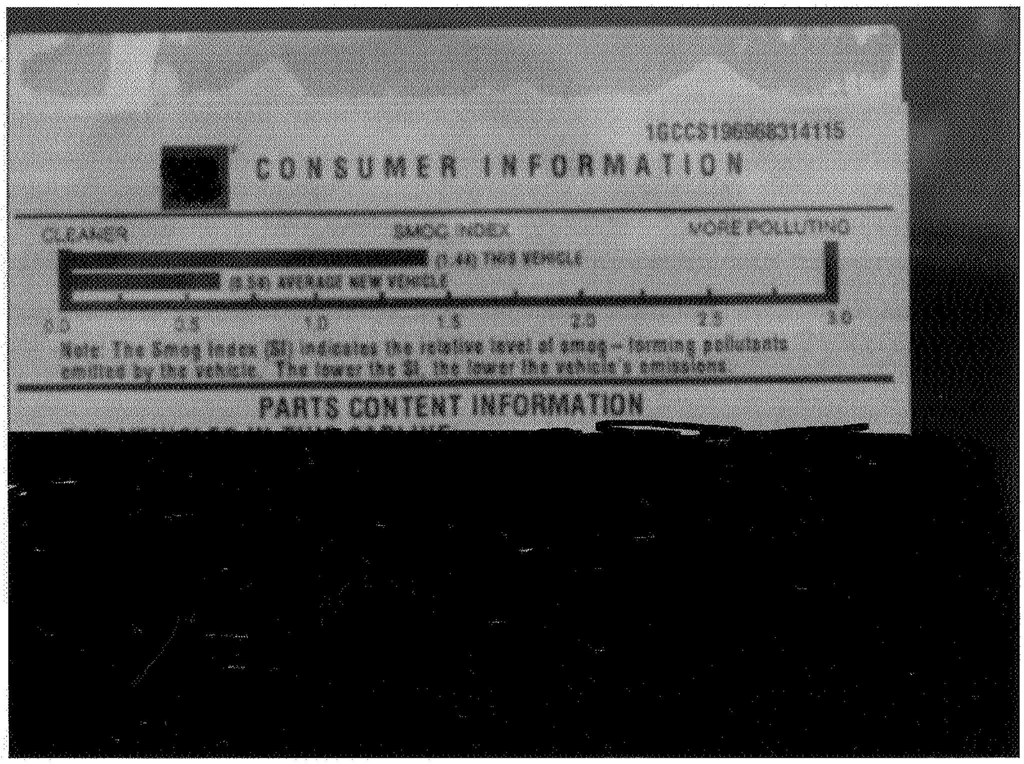
Sections (a) through (c). [No change.]

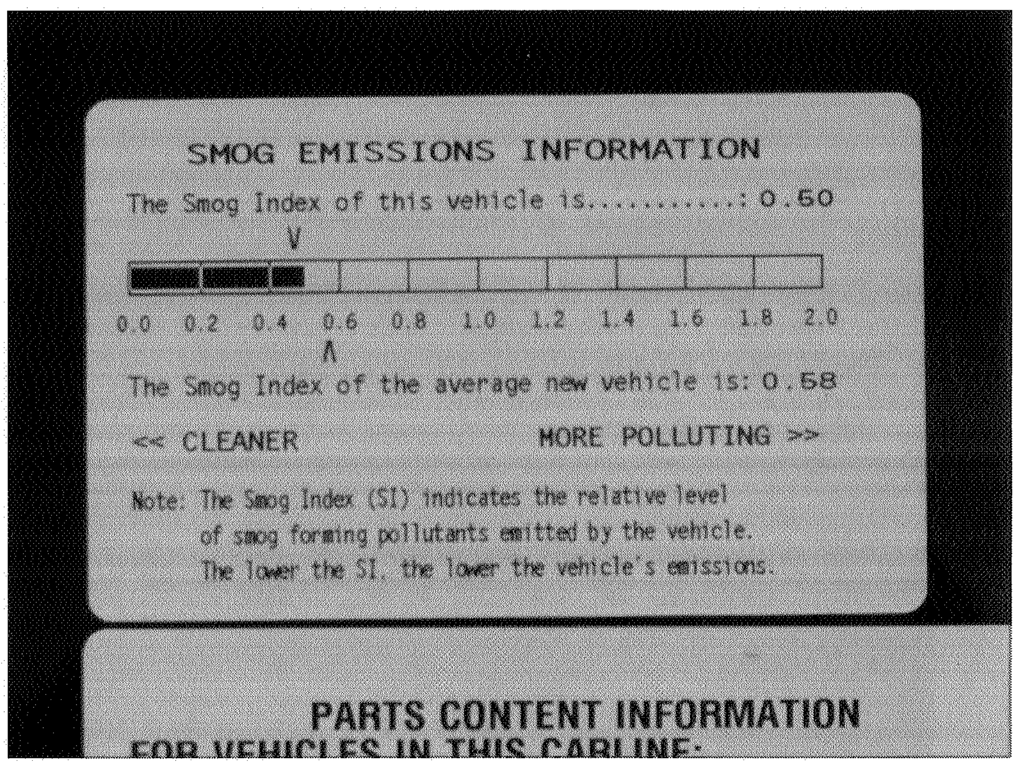
(d) *Test Procedures.* The certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended ~~June 22, 2006~~ ~~[insert date of amendment for the March 22, 2007 emission warranty rulemaking]~~ [insert date of amendment for this rulemaking], and the "California Non-Methane Organic Gas Test Procedures," as amended July 30, 2002, which are incorporated herein by reference. In the case of hybrid electric vehicles and on-board fuel-fired heaters, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.

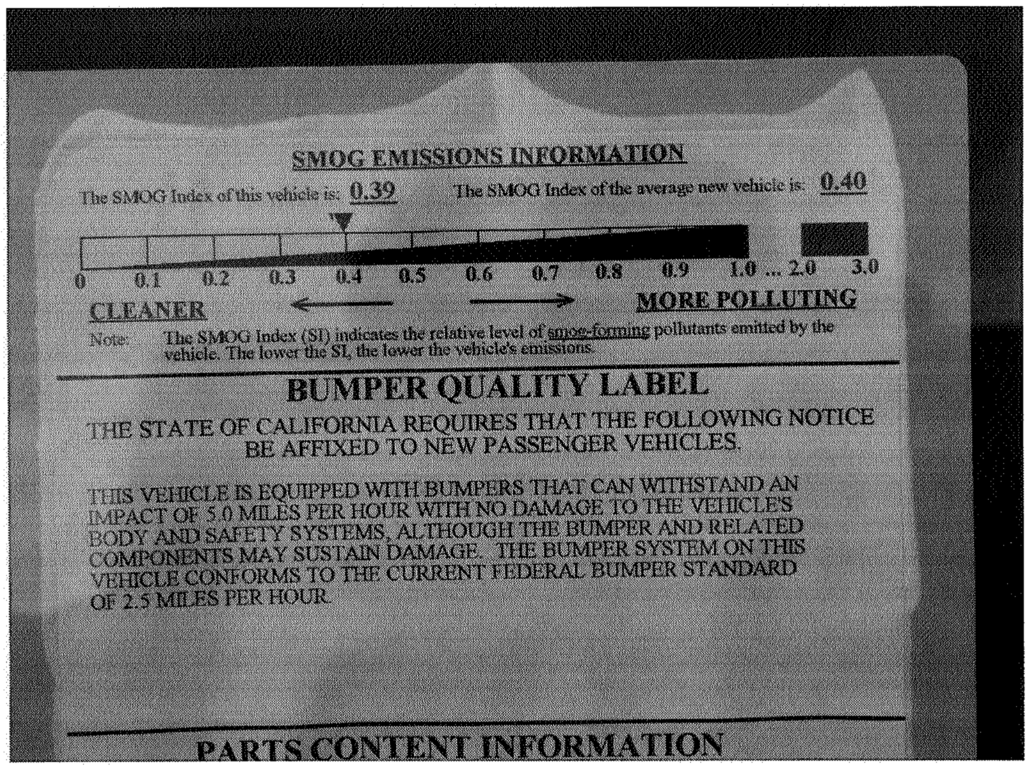
Section (e). [No change.]

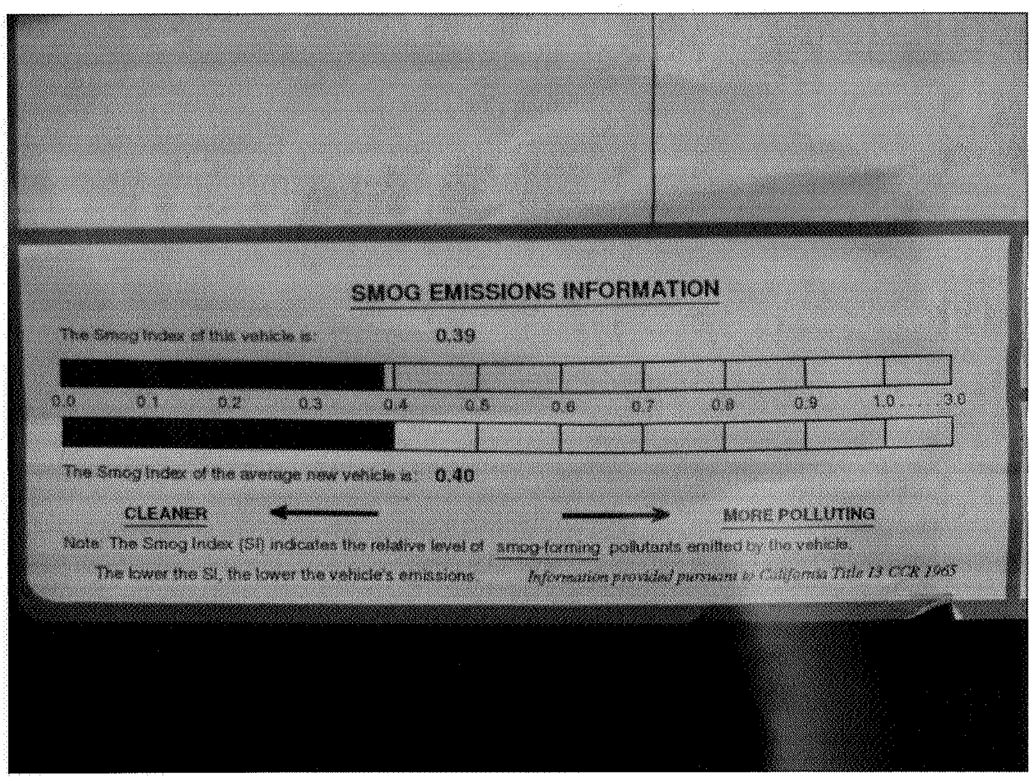
Note: Authority cited: Sections 39500, 39600, 39601, 43013, 43018, 43101, 43104 and 43105, Health and Safety Code. Reference: Sections 39002, 39003, 39667, 43000, 43009.5, 43013, 43018, 43100, 43101, 43101.5, 43102, 43104, 43105, 43106, 43204, and 43205, Health and Safety Code.

Appendix B – Example Existing Smog Index Labels






SMOG EMISSIONS INFORMATION
The SMOG Index of this vehicle is: 0.39
The SMOG Index of the average new vehicle is: 0.40
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 ... 2.0 3.0
CLEANER
MORE POLLUTING
Note: The SMOG Index (SI) indicates the relative level of smog-forming pollutants emitted by the vehicle. The lower the SI, the lower the vehicle's emissions.
BUMPER QUALITY LABEL
THE STATE OF CALIFORNIA REQUIRES THAT THE FOLLOWING NOTICE BE AFFIXED TO NEW PASSENGER VEHICLES.
THIS VEHICLE IS EQUIPPED WITH BUMPERS THAT CAN WITHSTAND AN IMPACT OF 5.0 MILES PER HOUR WITH NO DAMAGE TO THE VEHICLE'S BODY AND SAFETY SYSTEMS, ALTHOUGH THE BUMPER AND RELATED COMPONENTS MAY SUSTAIN DAMAGE. THE BUMPER SYSTEM ON THIS VEHICLE CONFORMS TO THE CURRENT FEDERAL BUMPER STANDARD OF 2.5 MILES PER HOUR.
PARTS CONTENT INFORMATION


SMOG EMISSIONS INFORMATION
The Smog Index of this vehicle is: 0.39
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 ... 3.0
The Smog Index of the average new vehicle is: 0.40
CLEANER
MORE POLLUTING
Note: The Smog Index (SI) indicates the relative level of smog-forming pollutants emitted by the vehicle.
The lower the SI, the lower the vehicle's emissions.
Information provided pursuant to California Title 13 CCR 1965

Appendix C - Technical Analysis

This Appendix focuses on the technical analysis ARB staff underwent to develop a new Smog and Global Warming scoring system for developing a new vehicle emissions label. This Appendix also focuses on the detailed analysis of the economic impact of replacing existing black and white printers with color printer to print color labels.

A. Smog Score

In developing a new Smog scoring system, staff looked at California's LEV II regulations that will be in affect for all 2009 MY vehicles. Table C-1 represents the California LEV II emission certification limits for the 2009 MY and the current air pollution score used by the U.S. EPA.

Table C-1: California Light-Duty Vehicle Emissions Standards for Air Pollutants

California LEV II Program						
Standard	Model Year	Vehicles	Emission Limits at Full Useful Life (120,000 miles) Maximum Allowed Grams per Mile			Current Air Pollution Score
			NOx	NMOG	NMOG+NOx	
ZEV	2004+	PC, LDT 8500 lbs or less	0.00	0.000	0.000	10
PZEV*	2004+	PC, LDT 8500 lbs or less	0.02	0.010	0.030	9.5
SULEV	2004+	PC, LDT 8500 lbs or less	0.02	0.010	0.030	9
ULEV	2004+	PC, LDT 8500 lbs or less	0.07	0.055	0.125	7
LEV	2004+	PC, LDT 8500 lbs or less	0.07	0.090	0.160	6
LEV option 1	2004+	PC, LDT 8500 lbs or less	0.10	0.090	0.190	5
SULEV	2004+	MDV 8501-10,000 lbs	0.10	0.100	0.200	4
ULEV	2004+	MDV 8501-10,000 lbs	0.20	0.143	0.343	3
LEV	2004+	MDV 8501-10,000 lbs	0.20	0.195	0.395	2
SULEV	2004+	MDV 10,001-14,000 lbs	0.20	0.117	0.317	3
ULEV	2004+	MDV 10,001-14,000 lbs	0.40	0.167	0.567	2
LEV	2004+	MDV 10,001-14,000 lbs	0.40	0.230	0.630	1

* Vehicles certified as PZEV have a 150,000 useful life, zero evaporative emissions and a manufacturer 15 years/150,000 miles emissions warrantee.

Table C-1 includes California certification limits for all vehicles up to 14,000 lbs. GVWR. However, AB 1229 only requires labels to be applied to vehicles up to 10,000 lbs. GVWR. Therefore the last three shaded rows of this table are not applicable to the labeling requirements.

The applicable NMOG+NOx certification values range from 0.0 (g/mile) being the cleanest to 0.395 (g/mile) being the dirtiest. This 2009 range of certification levels is less than the current range used by the U.S. EPA Green Vehicle Guide for scoring air pollution; therefore, a new scoring system must be developed. In keeping with the philosophy of harmonizing the new California scale with the U.S. EPA scale, staff took a look at the Federal certification levels for the 2009 model year. Table C-2 illustrates these values along with the current air pollution scores for each certification level.

Table C-2: U.S. EPA Light-Duty Vehicle Emissions Standards for Air Pollutants

Federal Tier 2 Program						
Standard	Model Year	Vehicles	Emission Limits at Full Useful Life (100,000-120,000 miles) Maximum Allowed Grams per Mile			Current Air Pollution Score
			NOx	NMOG	NMOG+NOx	
Bin 1	2004+	LDV, LLDT, HLDT, MDPV	0.00	0.000	0.000	10
Bin 2	2004+	LDV, LLDT, HLDT, MDPV	0.02	0.010	0.030	9
Bin 3	2004+	LDV, LLDT, HLDT, MDPV	0.03	0.055	0.085	8
Bin 4	2004+	LDV, LLDT, HLDT, MDPV	0.04	0.070	0.110	7
Bin 5	2004+	LDV, LLDT, HLDT, MDPV	0.07	0.090	0.160	6
Bin 6	2004+	LDV, LLDT, HLDT, MDPV	0.10	0.090	0.190	5
Bin 7	2004+	LDV, LLDT, HLDT, MDPV	0.15	0.090	0.240	4
Bin 8a	2004+	LDV, LLDT, HLDT, MDPV	0.20	0.125	0.325	3
Bin 8b	2004-2008	HLDT, MDPV	0.20	0.156	0.356	3
Bin 9a	2004-2008	LDV, LLDT	0.30	0.090	0.390	2
Bin 9b	2004-2008	LDT2	0.30	0.130	0.430	2
Bin 9c	2004-2008	HLDT, MDPV	0.30	0.180	0.480	2
Bin 10a	2004-2008	LDV, LLDT	0.60	0.156	0.756	1
Bin 10b	2004-2008	HLDT, MDPV	0.60	0.230	0.830	1
Bin 10c	2004-2008	LDT4, MDPV	0.60	0.280	0.880	1
Bin 11	2004-2008	MDVP	0.90	0.280	1.180	0

Again, the last eight shaded rows (Bin8b-Bin 11) in table C-2 will not apply to 2009 model year vehicles and the range of certification levels will be reduced to those identified in the non-shaded lines.

Table C-2 represents eight certification levels for all vehicles manufactured up to 10,000 lbs. GVWR. The certification values for NMOG+NOx range from 0.0 (g/mile) being the cleanest to 0.325 (g/mile) being the dirtiest. Like the California table, this 2009 range of certification levels is less then the current range used by the U.S. EPA Green Vehicle Guide to score air pollution; therefore, a new scoring system must be developed. The best way to develop a new scoring system is to merge the California certification levels and the Federal certification levels into one table. Table C-3 represents these two certification tables merged together.

It should be noted that in 2009, the applicable emission standards for California MDPVs are less stringent than the dirtiest federal Bin 8a standards as shown in table C-3. However, California regulations specify that when this occurs, the "cleaner federal vehicle" must be sold in California. Consequently, no 2009 MY MDPVs are expected to be certified to LEV

(MDPV) or ULEV (MDPV) standards in California. Therefore, only the certification levels identified in the non-shaded rows of Table C-3 would be applicable in the 2009 MY:

Table C-3: 2009 Federal and California Combined Certification Levels

Emissions Category	NMOG + NOx (g/mile)
ZEV – Bin 1	0.000
PZEV – SULEV – Bin 2	0.030
Bin 3	0.085
Bin 4	0.110
ULEV	0.125
LEV – Bin 5	0.160
LEV (option 1) – Bin 6	0.190
SULEV (MDPV)	0.200
Bin 7	0.240
Bin 8a	0.325
ULEV (MDPV)	0.343
LEV (MDPV)	0.395

After removing the bottom two rows, Table C-3 does provide 10 distinct certification levels so applying a scale from 1-10 would be simple. However, there are important differences between the SULEV and PZEV California certification requirements. First, the full-useful life for a SULEV is 120,000 miles versus 150,000 miles for a PZEV. Second, a PZEV must be certified to "zero" evaporative emissions standards and carry a 15 year/150,000 mile extended emissions warranty, which is not required for the SULEV standard. This is why the PZEV certification level is assigned a score of 9.5 in the current U.S. EPA air pollution scoring system. Staff therefore recommends that the PZEV certification level be treated as a distinct certification level and be assigned a score better than a vehicle certifying to SULEV standards. By separating the PZEV from the SULEV certification levels, the combined California and Federal certification table looks as shown in Table C-4.

Table C-4: 2009 Federal and California Combined Certification Levels with PZEV Category

Emissions Category	NMOG + NOx (g/mile)
ZEV – Bin 1	0.000
PZEV	0.030
SULEV – Bin 2	0.030
Bin 3	0.085
Bin 4	0.110
ULEV	0.125
LEV – Bin 5	0.160
LEV (option 1) – Bin 6	0.190
SULEV (MDPV)	0.200
Bin 7	0.240
ULEV (MDPV) – Bin 8a	0.325

Based on table C-4, there are 11 total certification levels so applying a simple 1-10 would require combining two levels or eliminating one level. One option is to find the two certification levels that are separated by the least amount and combine those two levels into one. This option makes sense if the separation is small relative to all other differences between certification levels or at least compared to the average separation between certification levels. Looking at table C-4, we see that the minimum separation between certification levels takes place between the LEV (option 1) – Bin 6 certification level at 0.190 (g/mile) and the SULEV (MDPV) certification level at 0.200 (g/mile). This small difference of 0.010 (g/mile) is relatively small compared to the average difference of 0.039 (g/mile). Therefore, combining these two certification levels into one would yield a Smog Score distribution with 10 levels as shown on Table C-5.

Table C-5: 2009 Smog Score by Certification

California Emissions Category – Federal Bins	NMOG + NOx (g/mile)	Possible 2009 Smog Score
ZEV – Bin 1	0.0	10
PZEV	0.030	9
SULEV – Bin 2	0.030	8
Bin 3	0.085	7
Bin 4	0.110	6
ULEV	0.125	5
LEV – Bin 5	0.160	4
[LEV (option 1) – Bin 6] and [SULEV (MDPV)]	0.190 – 0.200	3
Bin 7	0.240	2
ULEV (MDPV) – Bin 8a	0.325	1

Applying this proposed Smog scoring system to all 2007 MY California certification data yielded the distribution of Smog scores as shown on Figure C-1.

The statistical average of smog-forming (NMOG + NOx) emissions calculated based on the emission standards to which 2007 MY vehicles certify is 0.139 (g/mile). This statistical average places the average vehicle available on the market today somewhere between a Smog score of 4 and 5. For the 2009 MY, it is expected that a statistically average vehicle sold in California will be a ULEV certification and will receive a score of 5.

An alternate Smog scoring system can be developed using a straight line scale based on the range (dirtiest to cleanest) of emission levels and let the certification levels fall into whatever score they achieve. In this case the range is 0.325 – 0.0 (g/mile). Realizing that a Smog score of 10 must be reserved for a true zero emission vehicle, this leaves nine remaining Smog scores that must be divided up equally into an overall range of 0.325 (g/mile). Therefore:

$$0.325/9 = 0.036 \text{ increments/score}$$

The straight line scale applied to the 2009 Certification levels and possible Smog Scores is shown on Table C-6.

Figure C-1: Distribution of Smog Scores Based on 2007 Model Year Certifications

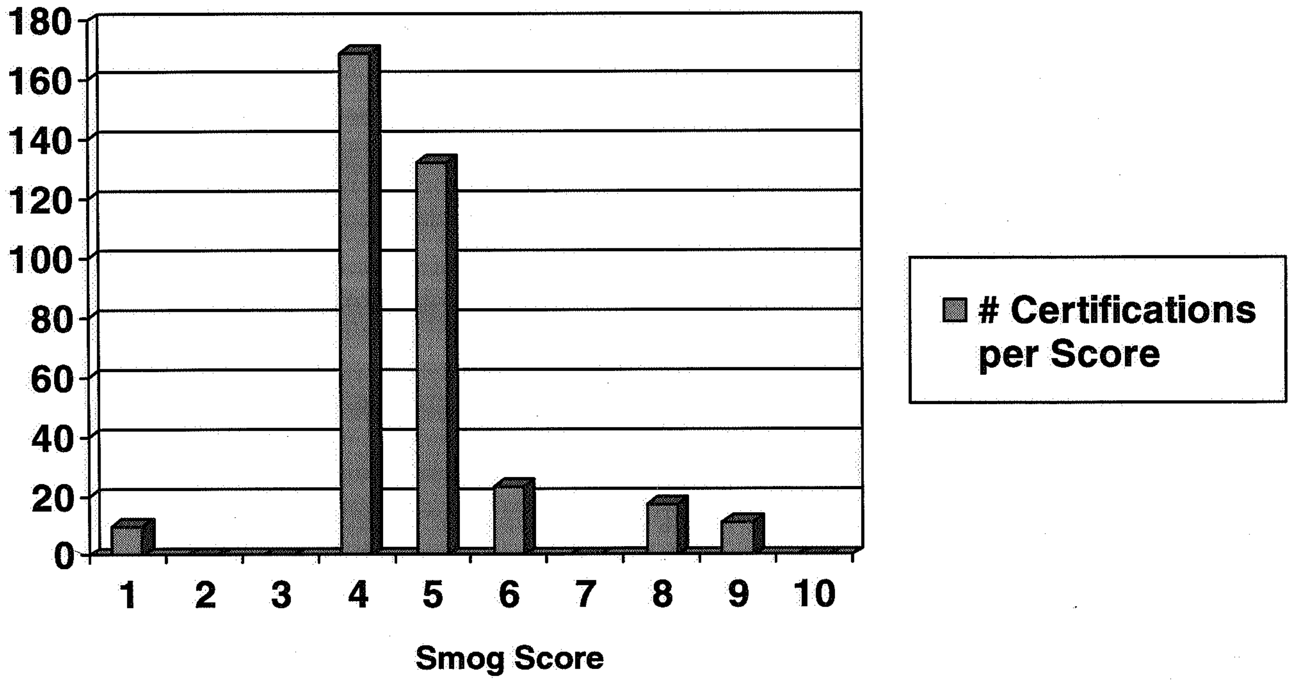


Table C-6: Possible 2009 Smog Score by Straight Line Analysis

California Emissions Category - Federal Bins	NMOG + NOx (g/mile)	Straight Line Scale	Possible 2009 Smog Score
ZEV – Bin 1	0.000	0	10
PZEV	0.030	0.001-0.036	9.5*
SULEV – Bin 2	0.030		9
		0.037-0.072	8
Bin 3	0.085	0.073-0.108	7
Bin 4	0.110	0.109-0.144	6
ULEV	0.125		6
LEV – Bin 5	0.160	0.145-0.180	5
LEV (option 1) – Bin 6	0.190	0.181-0.216	4
SULEV (MDPV)	0.200		4
Bin 7	0.240	0.217-0.252	3
		0.253-0.288	2
ULEV (MDPV) – Bin 8a	0.325	>0.289	1

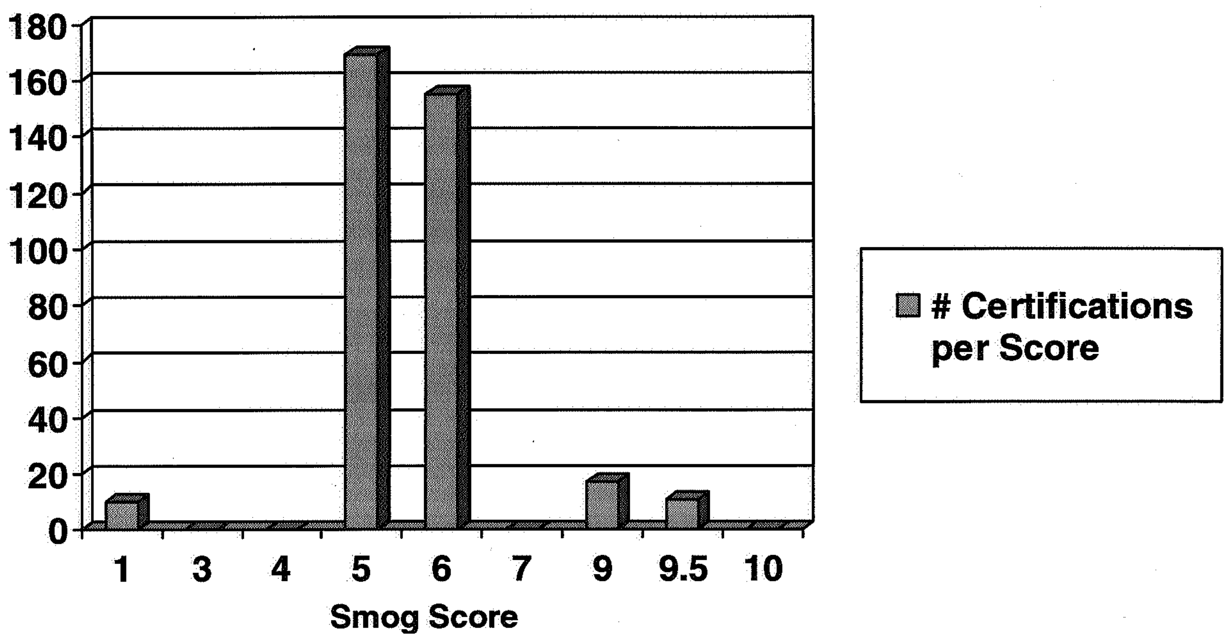
* A Smog Score of 9.5 was given to vehicles certifying to the California PZEV standards based on the longer useful life, "zero" evaporative emissions requirements, and extended warranty for these vehicles compared to vehicles certifying to the SULEV standards.

Staff looked at table C-6 and noticed two distinct issues. First, there are two instances where a single Smog score overlaps multiple certification levels. The Smog score of 4 appears twice in the table as does the Smog score of 6. This overlap is due primarily to the small incremental difference between a few certification levels. For Example, the difference between the Federal Bin 4 certification level of 0.110 (g/mile) and the California ULEV certification level of 0.125 (g/mile) is only 0.015 (g/mile) allowing these two certification levels to achieve the same score of 6. The same holds true for the California LEV (option 1) certification level (which is also the Federal Bin 6 certification level) of 0.190 (g/mile) and the California SULEV (MDPV) certification level of 0.200 (g/mile). The relative difference between these two certification levels is only 0.010 (g/mile) allowing them both to achieve the same Smog score of 4.

The second issue with this Smog score option is that some scores are not assigned to a certification level and would not appear on the new label. Looking at table C-6 staff noticed that the Smog scores of 8 and 2 are not assigned to a certification standard. This is due to the fact that there is a relatively large difference between certification levels where the Smog score of 8 and 2 do not appear.

Applying this proposed Smog scale to the model year 2007 California certification data yielded the model based distribution of Smog scores as shown in Figure C-2.

Figure C-2: Distribution of Smog Scores Based on 2007 Model Year Certifications



In this case, the statistical average of 0.139 (g/mile) receives a score of 6 on the Smog scale. This average score of 6 on a scale from 1-10 did not seem appropriate as most consumers associate the number 5 as being the average on a scale from 1-10,

Staff looked at the two distinct distributions of scores (figures 11.1 and 11.2) and noticed that they appear similar except for the simple change of smog score assignments on the lower axis. Staff realizes that these distributions are for 2007 MY California certifications and will probably look a bit different for the 2009 MY California certifications as vehicle manufacturers continue to certify to higher standards. Therefore, the simplest and best way to assign smog scores that will allow for the continued increase of cleaner vehicles is to select the smog scale that is based on the certification analysis rather than the straight-line analysis of certification data. The certification analysis scale as shown on Table C-5 provides a true 1-10 scoring for the entire range of certification levels and there are no potential for gaps (missing smog score numbers) in the scale.

B. Global Warming Score

In order to develop a scale for global warming emissions, the expected certification data for global warming emissions from each vehicle model must be known. This information is not required for the 2007 model year by ARB and therefore not all global warming gasses are available for analysis. However, staff was able to access the California certification data base for all 2007 Executive Order (EO) California certifications. After filtering out those vehicles that are not required to get an emissions label, the data contained 368 EO certifications. Of those certifications, 137 certifications voluntarily contained CO_2 data and there were no certifications that contained CH_4, N_2O or A/C refrigerant data. The 137 certifications that contained CO_2 data represent a 37% sample. A 37% sample size is adequate for a statistical analysis of the data as long as the sample size is random. A quick look at the auto manufacturers that provided CO_2 data revealed that the sampling did appear to be random as 16 vehicle manufacturers did provide CO_2 data and 14 vehicle manufacturers did not.

Since some vehicle manufacturers did not voluntarily provide CO_2 data, staff formally requested the voluntary submission of all global warming emissions – CO_2, N_2O, CH_4, and A/C refrigerants – from the manufacturers in order to develop a more complete dataset. The response ARB received from the vehicle manufacturers was minimal. Three vehicle manufacturers voluntarily submitted the information as requested, one of which had already voluntary included CO_2 data with the 2007 certification data. However, through this request, ARB staff was made aware of a Federal certification data spreadsheet available to the general public that contained CO_2 information. This spreadsheet can be found at: **www.epa.gov/otaq/cert/mpg/testcars/database/07tstcar.csv**.

Staff reviewed the Federal certification spreadsheet and found certification data for HC, CO, CO_2, NOx, PM, as well as mile per gallon fuel economy (MPG). The Federal certification spreadsheet provided certification data for both city and highway testing values of these emissions. The Federal certification data did not provide certification data for N_2O, CH_4 or A/C refrigerants. Prior to developing a $CO_{2\text{Equivalent}}$ dataset for either the California or Federal Certification data, staff wanted to look at a direct comparison between the California dataset and the Federal dataset. In doing so, staff found that the information for similar makes and models of vehicles where very close but not identical. Therefore, a CO_2 combined dataset was calculated and analyzed for both California and Federal databases using the 55% city and 45% highway driving ratio.

Taking the additional global warming emission information provided by the three manufacturers and updating the California certification dataset; staff was able to increase the sample size from 37% to 40%. With 40% of the certifications actually reporting CO_2, staff was able to statistically evaluate the data with a 90% level of confidence that the sample size available would adequately represent the entire population. Table C-7 represents the data distribution for both the California and Federal CO_2 combined certification data.

Table C-7: California and Federal CO_2 Combined Data Distribution

CO_2 combined (g/mile)	California (with MDPV data)	California (without MDPV data)	Federal
Minimum	130	130	133
Maximum	874	570	662
Range	744	440	529
Average	358	355	348

In Table C-7, the first California column represents CO_2 combined data that was voluntarily provided by the automobile manufacturers and includes passenger cars, light-duty trucks and medium-duty passenger vehicles. Staff looked at the certification data available from the Federal database and noticed that the numbers are slightly different. This is because the federal database does not include data on medium-duty passenger vehicles (passenger vehicles from 8,500 lbs. to 10,000 lbs. GVWR). Therefore, staff developed another California dataset for CO_2 combined certifications removing the data for all medium-duty passenger vehicles. The second column in Table C-7 above is the result. In comparing the last two columns, staff noticed that the information is extremely similar. The minimum for both California and Federal is almost identical. The maximum is somewhat less in California which indicates that California vehicles are typically cleaner. And the average for the Federal and California certification data is extremely close as well. Based on this comparison, ARB staff reasoned that although California had only 40% of the certification data for all 368 EOs issued, the 40% sample size was adequate to represent the entire population of California certified vehicles.

Staff also tried to look at the contributions of N_2O, CH_4, and A/C refrigerants based on the limited feedback form the manufacturers to compare the CO_2 combined certification values to the $CO_{2Equivalent}$ combined values. Of the three manufacturers that provided addition global warming emissions to ARB, only one manufacturer provided all four (CO_2, N_2O, CH_4, and A/C refrigerant) emissions certification data as requested. This manufacturer, however, only has two California certifications on file for 2007. Another manufacturer provided only CO_2 and CH_4 emissions certification data and this manufacturer has 19 California certifications for 2007. The last manufacturer provided only CO_2 data and staff incorporated this data into the California CO_2 dataset.

Because of the lack of data for N_2O, CH_4, and A/C refrigerants, staff decided there was not enough information to factor these emissions into the development of a global warming scoring system at this time. Therefore, all analyses from this point on are predicated on the analysis of 2007 CO_2 data alone. Table C-8 represents only the California CO_2 combined dataset and not the $CO_{2Equivalent}$ combined dataset.

Table C-8: California 2007 CO_2 Combined Certification Data

	CO_2 Combined (g/mile)
Minimum	130
Maximum	874
Range	744
Average	358

This distribution represents a range of CO_2 emissions of 744 (g/mile) with a minimum of 130 (g/mile) and a maximum of 874 (g/mile). Similar to the Smog scoring system, staff was able to develop a proposed global warming scoring system using an unbiased, straight line, equitable distribution of scores based on the entire range of CO_2 emissions. By taking the range of 744 (g/mile) and equally dividing that range into 10 scores, we can determine the number of increments associated with each score. Since CO_2 emission are not certified to specified individual levels, as in the case of smog forming emission, the use of a linear scale may be appropriate. This equates to:

744/10 = 74 increments/score

Table C-9 represents a possible global warming scoring system based on this analysis.

Table C-9: Possible 2009 Global Warming Scores Based on CO_2 Emissions

Global Warming Score	CO_2 Grams per mile
10	Less than 205
9	205-279
8	280-354
7	355-429
6	430-504
5	505-579
4	580-654
3	655-729
2	730-804
1	805 and up

Now applying these scores to the 2007 MY California certifications we can see how the certifications are distributed, Figure C-3 graphically illustrates this distribution.

In Figure C-3, staff realized that the scores are weighted more toward the high end of the scale. This means that the majority of the vehicles will be given scores of 7, 8, and 9. Also, the average global warming emissions of 358 (g/mile) receives a score of 7, which is not intuitive when looking at a scale from 1-10. Most consumers view the average as being in the middle of the scale or achieving a score of 5 on a 1-10 scale. Staff took a closer look at this data to see why the distribution was skewed to the high end of the scale. By breaking down the data set into actual vehicle classifications (i.e., passenger cars, light-duty trucks and medium-duty passenger vehicles), one can see the actual number of certifications in each class. Table C-10 illustrates the actual number of certifications by vehicle classification.

Figure C-3: Distribution of Global Warming Scores Based on 2007 Model Year Certifications

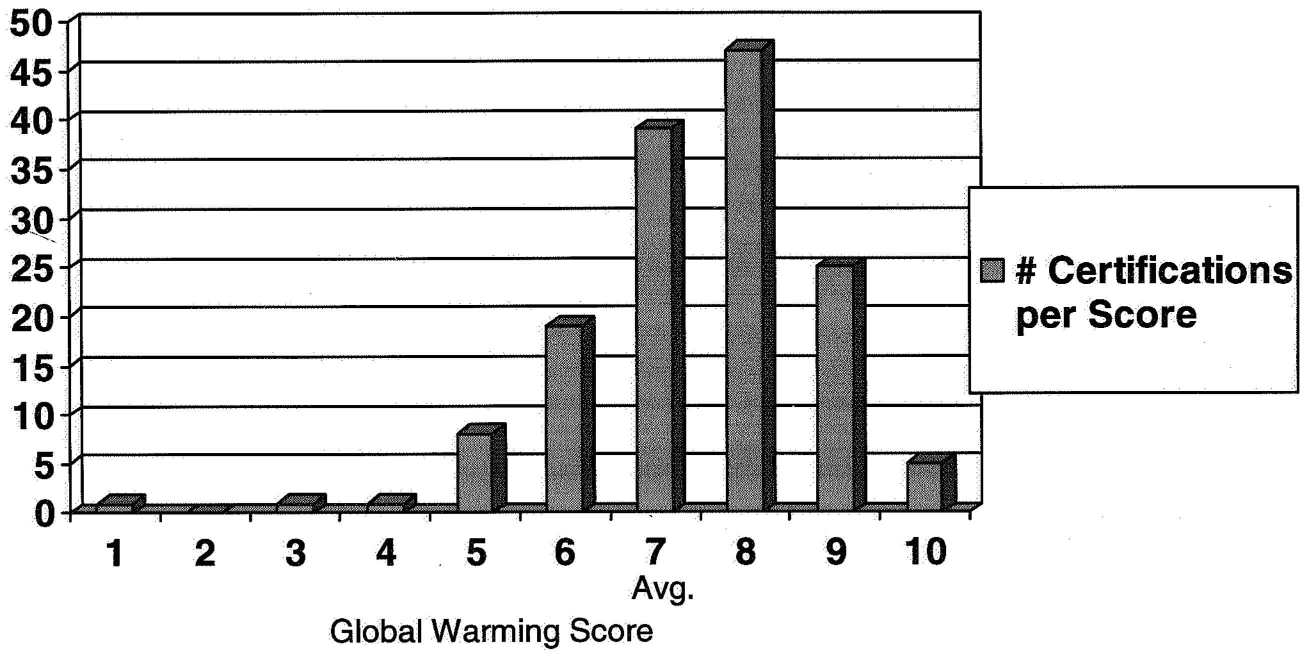
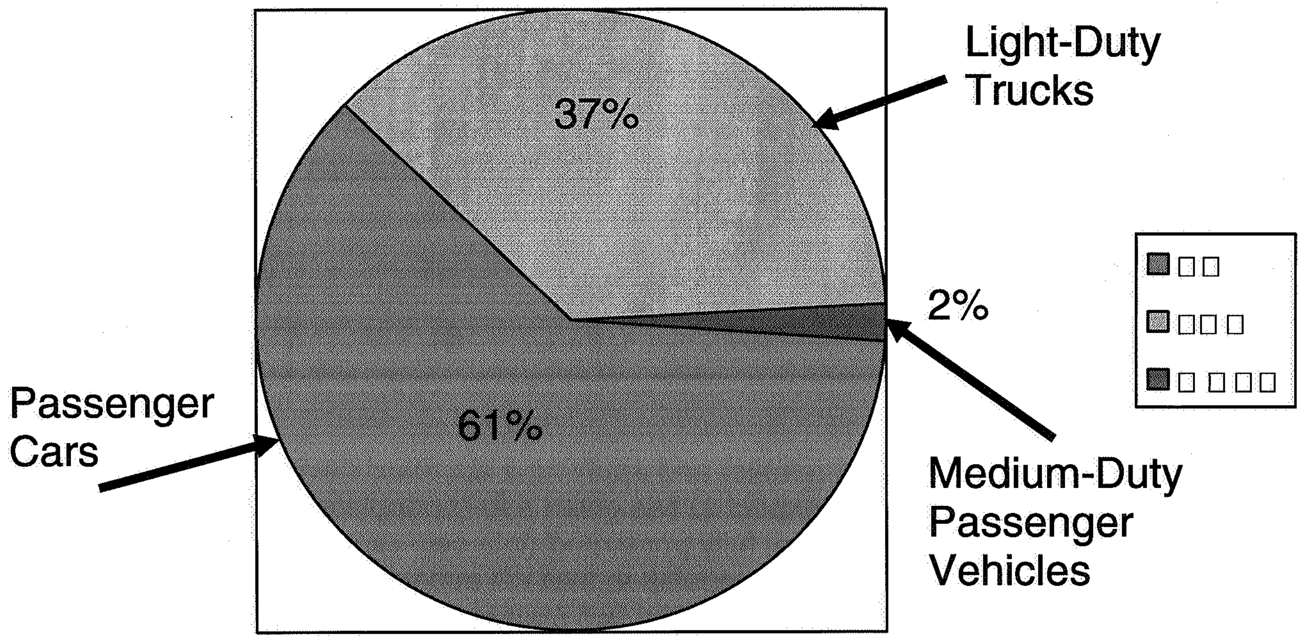


Table C-10: Distribution of California Certifications Based on Vehicle Classification

Vehicle Certification Classification	Number of Certifications	Number of Certifications with Voluntary CO_2 data
Passenger Car	226	94
Light-Duty Trucks	136	50
Medium-Duty Passenger Vehicles	6	3
Totals	368	147

From Table C-10 staff realized that of the total 368 Executive Order Certifications on file for the 2007 MY, 61% are passenger cars, 37% are light-duty trucks, and only 2% are medium-duty passenger vehicles, Figure C-4 illustrates this distribution.

Figure C-4: Distribution of Vehicle Classification Based on California EO Certifications.



With 61% of all certifications being passenger cars, which typically produce less global warming emissions than light-duty trucks and medium-duty passenger vehicles, staff expected to see higher global warming scores for passenger vehicles. Therefore, with 61% of the certifications receiving the higher global warming scores, staff reasoned that the scale would be skewed to the high end. Figure C-3 justifies this scenario. ARB staff than decided to look at the certification data using a more statistical analysis to see how the data was distributed around the average of 358 (g/mile). ARB staff also wanted to perform a statistical analysis including standard deviations of the CO_2 data that was available through the Federal certification database and compare these results. The federal database contained over 700 CO_2 values which theoretically should provide a good comparison for the California certification data. Table C-11 represents the two statistical comparisons.

Again, the first California column represents a statistical analysis including standard deviations of all CO_2 data that was voluntarily provided by the automobile manufacturers and includes passenger cars, light-duty trucks and medium-duty passenger vehicles. In comparing the last two columns, one can see that the information is extremely similar. The average and the standard deviation for the Federal and California certification data are very close to being equal. The standard deviation only increases significantly when the addition of the MDPV data is introduced. Based on this finding, ARB staff decided to develop a global warming scale that represented a normal distribution of certifications. Realizing that the MDPV data contribution is only 2% of the entire certification dataset, staff decided to use a standard deviation that more closely represented the majority of certifications rather than the minority.

Table C-11: Statistical Distribution of California and Federal CO_2 Data

CO_2 combined (g/mile)	California (with MDPV)	California (without MDPV)	Federal
Minimum	130	130	133
Maximum	874	570	662
Range	744	440	529
Average	358	355	348
Standard Deviation	101	81	76

By using the average of 360 (g/mile) and applying a standard deviation of 80 (g/mile) – the standard deviation we would expect to see given a fully populated data set, similar to the standard deviation of the Federal fully populated data set – a scale can be developed based on two standard deviations of the population that will account for 95% of all vehicle certifications. Those falling out side of the two standard deviations would be considered extrême and would achieve the "best" and the "worst" score. In the case of a scale from 1-10, the "best" would be scored a 10 and the "worst" would be scored a 1 and the average would be scored a 5. All other scores would represent an equal division of the remaining range of possible CO_2 emissions. This means that the remaining scores (2-9) will fall within two standard deviations of the average and should make up 95% of all certifications. Applying this principle to the dataset we would expect to see a normal distribution. Figure C-5 shows what a normal distribution would look like based on the number of standard distributions away from the average.

Using the average of 360 (g/mile) and going out two standard deviations, 2 x 80 = 160 (g/mile), ARB staff was able to set the extremes at 200 and 520 (g/mile). Therefore, any vehicle certifying to a global warming emissions level of 200 (g/mile) CO_2 or less would get a score of 10. Likewise, any vehicle certifying to a global warming emissions level of 520 (g/mile) CO_2 or more would get a score of 1. All other scores would be given to vehicle certifications in the range between 520 and 200 which is 320 (g/mile). By taking the range of 320 (g/mile) and equally dividing that range into the remaining 8 scores (i.e., scores 2-9), we can determine the number of increments associated with each score. This equates to:

$$320/8 = 40 \text{ increments/score}$$

Applying this scale to produce a global warming scoring system is illustrated in Table C-12.

Applying this global warming score to the 2007 model California certification dataset yields the distribution of scores as shown in Figure C-6. Staff recognized that the scores are more normally distributed indicating a more precise distribution of global warming scores. The spike at the low end of the scale represents the addition of the medium-duty passenger vehicles to the certification data and should level out over time as those vehicles achieve reduced global warming emissions.

Figure C-5: Diagram of a Normal Distribution of Scores

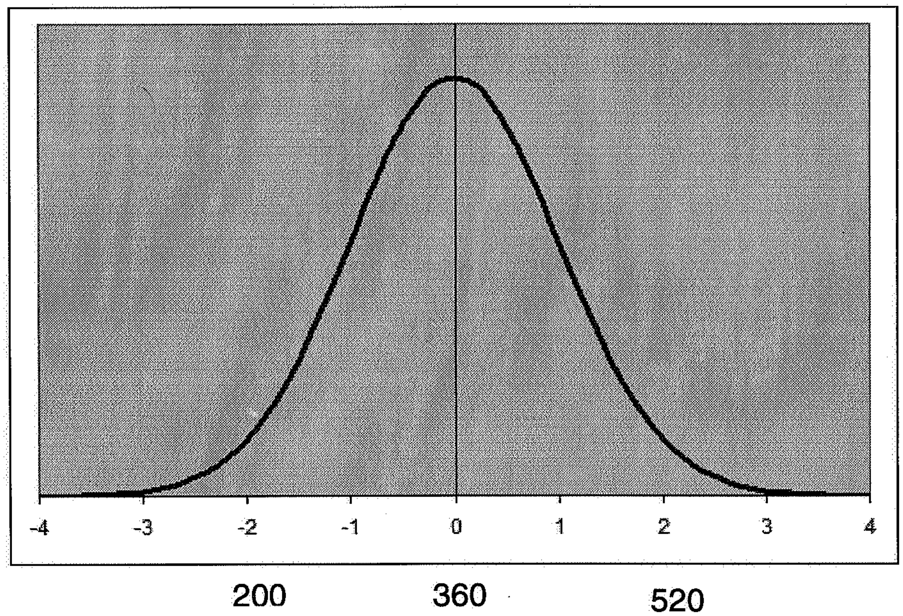
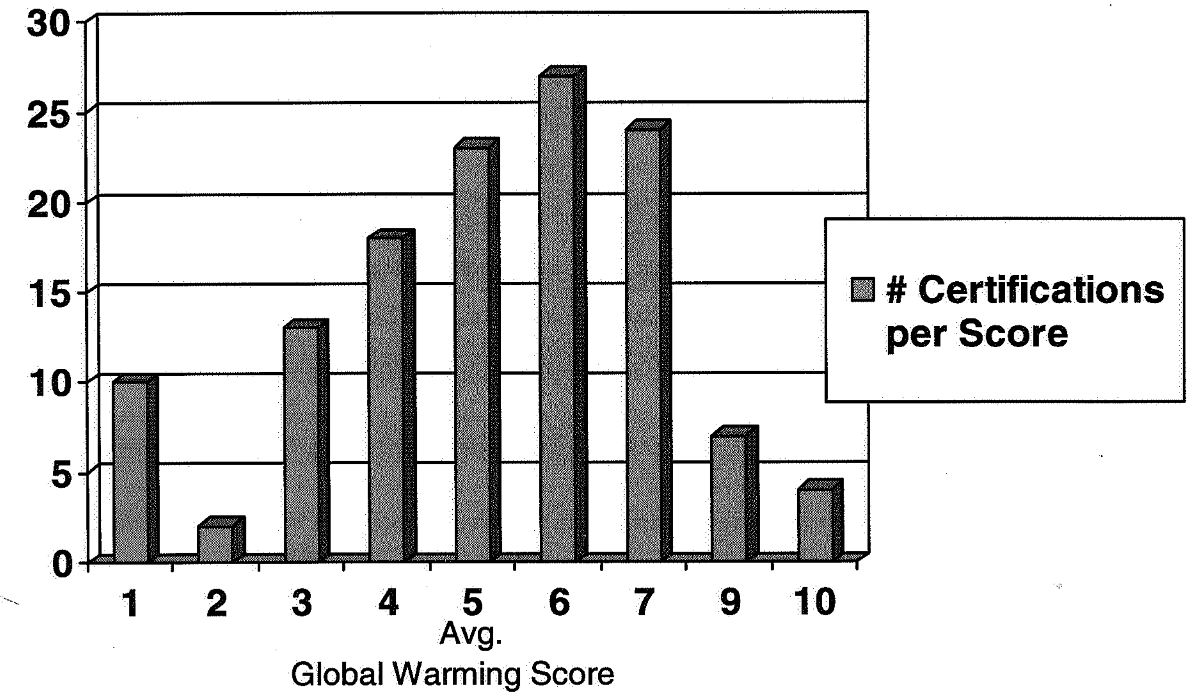


Table C-12: Possible 2009 Global Warming Scores Based on CO_2 Emissions

Global Warming Score	CO_2 Grams per mile
10	Less than 200
9	200-239
8	240-279
7	280-319
6	320-359
5	360-399
4	400-439
3	440-479
2	480-519
1	520 and up

Staff therefore recommends using a global warming score based on a statistical analysis of the global warming certification data. In the 2009 MY, per AB1493 (greenhouse gas regulation), vehicle certifications must include $CO_{2Equivalent}$ combined data from which a global warming score can be assigned. Staff recommends that the values depicted on Table C-12 be adopted for establishing the global warming scores used on the label.

Figure C-6: Distribution of Global Warming Scores Based on 2007 Model Year Certifications



C. Color Printer Economic Impact

This section focuses on the detailed economic impact imposed on vehicle manufacturers to increase the label size and upgrade to color printers. Through site visits and conversations with manufacturers, staff was able to identify the types of printers used for labeling purposes. Staff researched the replacement cost of new color printers and found that the average cost for an industrial laser jet color printer (e.g. HP 9500) is $6,000. In addition, the cartridge replacement cost runs about $1,000 for all four cartridges, because most color printers use multiple (3 color and 1 black) cartridges. Each set of cartridges should print out 25,000 labels before all four may need replacement. Staff also researched the cost of an industrial black ink laser jet printer, comparable to the ones used by vehicle manufacturers today. The average cost of these printers is around $5,000 (e.g. HP 9000). However, the cost of a replacement black ink cartridge is around $270 per cartridge. Like the color cartridges, the black ink cartridges should print out around 25,000 - 30,000 labels before needing replacement.

1. Total Statewide Costs to Comply with Regulation

The estimated incremental cost increase of upgrading existing black ink label printers to color label printers is estimated to be $1,000 per printer. These label printers are only required at the point of final assembly. Staff estimated the total number of final assembly plants in North America to be 76. However, vehicles that are imported to the United States may have their labels printed and installed at the port.

The State of California has 3 major ports of entry where vehicle manufacturers would most likely chose to import products. These ports are San Diego, Long Beach/Los Angeles, and San Francisco/Oakland. Staff did not account for ports in other states on the west coast or east coast because staff assumes that vehicles sold in California would most probably enter through one of the three major California ports for distribution. Discussions with the manufacturers indicated that typically, only two of the three major California ports are used to import vehicles into the state. Staff however, assumed a worst case scenario of each manufacturer using all three major ports in California. Smaller manufacturers building approximately 1,000 vehicles per year or less would most likely utilize only one, or at most, two port(s) of entry. Applying this scenario, staff than estimated the total number of facilities that print and apply vehicle labels to be 149.

Staff also assumed that a manufacturer would have to purchase two printers for each assembly facility or port to print a label because one printer is typically used as an emergency backup. Likewise, smaller manufacturers building approximately 1,000 vehicles per year or less would most likely utilize only one printer for labeling purposes because the annual production would not justify the need for a backup printer. Therefore, the industry wide total number of printer replacements is estimated to be 286. At the $1000 incremental cost increase per printer, this equates to a total one time capital cost of $286,000 for the industry as a whole. The incremental cost increase per manufacturer ranged from $1,000 to $52,000 with an average cost of $9,533, or rounded up to $10,000.

This cost represents a one-time capital cost to the manufacturers therefore staff applied a capital recovery factor to annualize these costs. Assuming the useful life of a printer to be 3-5 years, staff used a conservative 3-year replacement cycle and a 5% real discount rate to annualize the one-time capital investment. This equates to an annualized statewide cost to upgrade printers of $105,000 for the industry as a whole. The annualized cost per manufacturer ranged from $376 to $19,095 with an average cost of $3,500.

Staff also assumed there is an operational cost difference between black ink and color printers. The differential cost between printers is assumed to be the cost difference between replacement cartridges in going from a black ink cartridge to color cartridges. The difference turns out to be approximately $730 and only occurs after 25,000 prints or 25,000 vehicles. Staff felt that 25,000 prints from one cartridge might be an optimistic value used by the cartridge manufacturer therefore staff used half this amount, 12,500 prints, as a replacement cycle. Applying this replacement cycle to the increased cost for color cartridges ($730), staff was able to calculate a per vehicle cost of 6 cents per vehicle. Therefore, multiplying this cost by the approximately 2 million annual vehicle sales equates to a $120,000 annual operating cost for the industry as a whole. The operating cost per manufacturer ranged from $43 to $62,200 annually, depending on production volume, with an average cost of $4,000.

The total annual cost to implement this regulation is calculated as the annualized capital cost to upgrade existing printers plus the annual operating cost for increasing the label size and using color cartridges. For the industry as a whole this equates to $245,000 per year or $735,000 over a 3-year period. The initial annualized capital cost for a typical manufacturer to implement this regulation is estimated to be $3,500. The annual ongoing cost for increasing label size and using color cartridges for a typical manufacturer is estimated to be $4,667. These cost estimates will vary slightly by manufacturer depending on the actual number of assembly plants, ports of entry, printers required, and vehicles produced.

Appendix D - Other Vehicle Labels

The United States Environmental Protection Agency (U.S. EPA) in conjunction with the United States Department of Energy (U.S. DOE) has a comprehensive fuel economy rating and labeling procedure in place. These city and highway fuel economy values (in miles per gallon) have been the primary information source available for consumers to compare the fuel efficiency of vehicles they are interested in purchasing.

Over the past several years there have been attempts to develop a label for passenger cars and light-duty trucks to encourage consumers to purchase more environmentally friendly vehicles. There have also been a number of studies using focus groups and market research to evaluate different types of vehicle labeling and ranking programs. Below is a description of some of the labels and ranking systems that have been developed and evaluated along with results of the market research.

The U.S. EPA used focus groups to evaluate their SmartWay certification mark and Green Vehicle Guide rating system[14]. They found that environmental issues other than miles per gallon (MPG) were not key factors in the respondents' purchasing decisions. However, participants were more willing to pay attention to emission labeling programs that include an easily understood rating system comparing vehicles. Another comment was that the label should compare similar vehicle classes in order to have credibility.

Another study used focus groups to evaluate several government web sites that provided environmental information about vehicles[15]. These included the following web sites:

- DOE and EPA web site **www.fueleconomy.gov** provides users with information about fuel economy as well as greenhouse gas emissions and criteria pollutants.
- U.S. EPA web site **www.epa.gov/greenvehicles** offers similar information with the focus on criteria pollutants rather than fuel economy.
- The American Council for an Energy-Efficient Economy (ACEEE) web site **www.greencars.com**, provides environmental, recycling and energy-conservation information.
- The California Air Resources Board's Cleaner Car Buyer's Guide **www.arb.ca.gov/msprog/ccbg/ccbg.htm** lists California vehicles by emissions category.

From the respondents, it was determined that the most useful/meaningful information tended to be in two areas: fuel economy and some overall rating of tailpipe emissions. Respondents tended to understand the issues of GHG or global warming more easily when such issues were correlated with familiar concepts such as fuel economy. The distinction between the impacts of different gases appeared to be difficult for people to understand and seemed somewhat unimportant since the respondents viewed all of the gases as harmful anyway.

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[14] **SmartWay Vehicle Qualitative Interviews - U.S. EPA** *by ICF Consulting and APRR August 23, 2002*
[15] **Providing Consumers with Web-Based Information on the Environmental Effects of Automobiles.** *A Qualitative Research Report Based on Focus Groups in Knoxville, Tennessee and Los Angeles, California - Oak Ridge National Laboratory - June 2003*

Most respondents in this study preferred some kind of overall environmental score that (1) they could have faith in, (2) would be applicable across the country and across all vehicles, and (3) would be displayed on the new car sticker and adopted by magazines such as *Consumer Reports.* Respondents stated that the information needs to be presented in a way that consumers find simple and understandable. Respondents in all focus groups were drawn to the U.S. EPA web site's Green Vehicle Rating system, citing that designations like "superior" and simple 1-10 scale bar charts were easily understood.

Europeans have been studying fuel economy labels for passenger cars[16]. A study by the Austrian Energy Agency produced a draft fuel economy label based on market research. This market research also found that the layout needs to be both simple and understandable. The study developed a draft label that offers a fuel economy comparison in the form of colored bars making up seven classes, well known from European appliance labels. From a wide variety of possible information that could be included on a car label, only information considered critical was included in the proposed design. With this label, consumers caught the core information (i.e., the fuel consumption of the car considered compared to others) at first glance. The consumer test found that the use of colors is very important for the impact of the label. This label would give vehicles an A – G rating depending on how their emissions compare to other vehicles. It is unlikely that manufacturers that receive an "F" on a number of vehicles would support this approach.

Another study, *Final Report on the Green Vehicle Market Alliance Project*, published in March 2004, also evaluates environmental vehicle labeling[17]. In general, the study found that consumers have a good awareness of the existing fuel economy label and have some understanding of fuel economy insofar as it pertains to fuel consumption and driving costs, but they poorly link fuel economy to environmental impacts. Moreover, even when consumers consider vehicle environmental impacts, they tend to assign responsibility for addressing these issues to the government or automakers. In short, environmental factors were not clear to the participants and they did not understand that there were significant environmental differences between new vehicle models.

[16] **Choosing cleaner cars: the role of labels and guides - Department of Transport.** *Lecture Fuel economy labeling for cars - Presentation Stefphan Fickl - Austrian Energy Agency*
[17] **Final Report on the Green Vehicle Market Alliance Project,** *Prepared for Oak Ridge National Laboratory by John M. Decicco, Environmental Defense, March 2004*

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF REGULATIONS FOR THE CERTIFICATION AND TESTING OF GASOLINE VAPOR RECOVERY SYSTEMS USING ABOVEGROUND STORAGE TANKS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider the adoption of regulations for the certification and testing of gasoline vapor recovery systems installed at gasoline dispensing facilities using aboveground storage tanks.

DATE: June 21, 2007

TIME: 9:00 a.m.

PLACE: Los Angeles Airport Marriott Hotel
5855 W. Century Boulevard
Los Angeles, CA 90045

This item will be considered at a two-day meeting of the ARB, which will commence at 9:00 a.m., June 21, 2007, and may continue at 8:30 a.m., June 22, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before June 21, 2007, to determine the time when 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 amendments to section 94010 and 94011, title 17, California Code of Regulations (CCR), and the incorporated certification and test procedures: *Definitions for Vapor Recovery Procedures*, D-200; and *Efficiency and Emission Factor for Phase II Systems*, TP-201.2; and the proposed adoption of section 94016, title 17, CCR incorporating certification and test procedures: *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks*, CP-206; *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, TP-206.1; *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, TP-206.2; and *Determination of Static Pressure Performance of Vapor Recovery Systems of Gasoline Dispensing Facilities with Aboveground Storage Tanks*, TP-206.3;

and the proposed adoption of section 94168, Test Method for Determining the Static Pressure Performance of Phase II Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks.

Background: Throughout California, ARB authorizes the sale, installation, and use of vapor recovery equipment at gasoline dispensing facilities (GDF) through a certification program. Control of the emissions of air pollutants from GDFs is necessary to reduce hydrocarbon emissions that lead to the formation of ozone and to control emissions of benzene, a constituent of gasoline vapor that has been identified as a toxic air contaminant. In March 2000, ARB approved the Enhanced Vapor Recovery (EVR) certification regulation for vapor recovery equipment used with underground storage tanks (UST). The EVR regulations established new standards for vapor recovery systems to further reduce emissions during storage and transfer of gasoline at GDFs that use USTs. Vapor recovery equipment used with aboveground storage tanks (AST) was not included in the adopted rulemaking.

Staff's Proposal: ARB staff proposes new vapor recovery certification requirements to reduce emissions from GDFs using ASTs and save gasoline. The proposal will establish new performance standards and specifications for AST vapor recovery systems and components. These new performance standards and specifications control standing loss emissions unique to ASTs, which account for approximately 90 percent of the total statewide emissions for this category. Some of the proposed performance standards and specifications are similar to the existing requirements for UST systems at GDFs adopted as part of ARB's EVR program. This similarity in performance standards and specifications will achieve consistency between AST and UST vapor recovery requirements.

The proposal includes a new certification procedure, CP-206, *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks* that is specifically designed for ASTs. The certification procedure for AST vapor recovery systems and equipment relies on many of the test procedures (TP) that were adopted for UST vapor recovery systems and equipment. These procedures are equally applicable when testing equipment used with ASTs. Staff is also proposing the adoption of three new test procedures to evaluate conformance with the proposed performance requirements: TP-206.1, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks*; TP-206.2, *Determination of Emission Factors for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks*; and, TP-206.3, *Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks*. These new procedures test vapor recovery systems and equipment that reduce the tank temperature, control emissions directly, and reduce leaks in ways that are specific to systems and equipment using ASTs.

When these proposed regulations are adopted, ARB will certify EVR systems and components for ASTs. District rules determine which new and existing ASTs will be required to use ARB certified EVR systems and components. New ASTs will be required to have EVR systems and components installed by January 1, 2009. Existing ASTs will be required to retrofit or replace current equipment with EVR systems and components by January 1, 2013.

Staff also proposes amendments to TP-201.2, *Efficiency and Emission Factor for Phase II Systems* to correct the emission factor equation and clarify fugitive emissions determinations. Likewise, staff proposes amendments to the definitions in D-200 to clarify and add terms used in the AST vapor recovery certification and test procedures.

COMPARABLE FEDERAL REGULATIONS

There are no comparable federal regulations that certify gasoline vapor recovery systems for service stations; however, changes to ARB's vapor recovery regulations have a national impact. Certification by ARB is required in most other states that require vapor recovery at service stations.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action that includes a summary of the environmental and economic impacts of the proposal. The report is entitled: "Staff Report: Initial Statement of Reasons for Proposed Rulemaking: Public Hearing to Consider Adoption of Regulations for Certification and Testing of Gasoline Vapor Recovery Systems Using Aboveground Storage Tanks."

Copies of the ISOR and full text of the proposed regulatory language, in underline and strike-out format to allow for comparison with the existing regulations, 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, California 95814, at least 45 days prior to the scheduled hearing on June 21, 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 website listed below.

Requests for printed documents and inquires concerning the substance of the proposed regulations may be directed to the designated agency contact persons: Mr. Michael Werst, Mr. Joe Guerrero, or Mr. George Lew, Engineering and Certification Branch, Monitoring and Laboratory Division, at (916) 327-0900.

Further, the agency representative and designated back-up contact person to whom non-substantive inquires 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) 322-4011. 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 http://www.arb.ca.gov/regact/2007/ast07/ast07.htm

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the cost or savings necessarily incurred by public agencies and private persons and businesses in reasonable compliance with the proposed regulatory action are presented below.

Pursuant to Government Code section 11346.5(a)(5) and 11346.5(a)(6), the Executive Officer has determined that the proposed regulatory action would create costs or savings to any state agency or in federal funding to the state, costs or mandates to any local agency or school district whether or not reimbursable by the State pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other nondiscretionary cost or savings to state or local agencies.

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 developing this regulatory proposal, ARB staff evaluated the potential economic impacts on representative private persons and businesses. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action may have minor impacts on the creation or elimination of new jobs within the State of California, and may have minor impacts on the creation of new businesses and the elimination of existing businesses within the State of California, and minor impacts on the expansion of businesses currently doing business within the State of California. A detailed assessment of the economic impacts of the proposed regulatory action can be found in the ISOR.

As explained in the ISOR, some individual businesses may be adversely affected by the proposed regulatory action. Therefore, the Executive Officer finds that the adoption of the proposed regulatory action may have a significant adverse impact on some businesses. The Executive Officer has considered proposed alternatives that would lessen any adverse economic impact on businesses and invites you to submit proposals. Submissions may include the following considerations:

(i) The establishment of differing compliance or reporting requirements or timetables which take into account the resources available to businesses;

(ii) Consolidation or simplification of compliance and reporting requirements for businesses;

(iii) The use of performance standards rather than prescriptive standards; and

(iv) Exemption or partial exemption from the regulatory requirements for businesses.

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 in the regulations and incorporated documents that 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 or businesses than the proposed action.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing, or by email 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 June 20, 2007, and addressed to the following

Postal Mail is to be sent to:

Clerk of the Board
Air Resources Board
1001 I Street, 23rd Floor
Sacramento, California 95814

Electronic submittal: http://www.arb.ca.gov/lispub/bclist.php no later than 12:00 noon, June 20, 2007.

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB no later than 12:00 noon, June 20, 2007.

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 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. ARB encourages members of the public to bring any suggestions for modification of the proposed regulatory action to the attention of staff in advance of the hearing.

STATUTORY AUTHORITY AND REFERENCES

This regulatory action is proposed under the authority granted to the ARB in sections 25290.1.2, 39600, 39601, 39607, and 41954 of the Health and Safety Code. This action is proposed to implement, interpret, or make specific sections 25290.1.2, 39515, 41952, 41954, 41956.1, 41959, 41960 and 41960.2 of the Health and Safety 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, ARB may adopt the regulatory language as originally proposed or with non-substantial or grammatical modifications. ARB may also adopt the proposed regulatory language with other modifications if the modifications are 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 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, Visitors and Environmental Services Center, 1001 I Street, 1st Floor, Sacramento, California 95814, (916) 322-2990.

California Air Resources Board

Catherine Witherspoon
Executive Officer

Date: April 24, 2007

California Environmental Protection Agency

Air Resources Board

HEARING NOTICE AND STAFF REPORT

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING, PUBLIC HEARING TO CONSIDER ADOPTION OF REGULATIONS FOR THE CERTIFICATION AND TESTING OF GASOLINE VAPOR RECOVERY SYSTEMS USING ABOVEGROUND STORAGE TANKS

May 4, 2007

California Environmental Protection Agency

Air Resources Board

STAFF REPORT: INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

PUBLIC HEARING TO CONSIDER

ADOPTION OF REGULATIONS FOR THE CERTIFICATION AND TESTING OF GASOLINE VAPOR RECOVERY SYSTEMS USING ABOVEGROUND STORAGE TANKS

Date of Release: May 4, 2007

Scheduled for Consideration: June 21, 2007

Location: Los Angeles Airport Marriott Hotel
5855 W. Century Boulevard
Los Angeles, CA 90045

Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

STAFF REPORT:
INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

PUBLIC HEARING TO CONSIDER

ADOPTION OF REGULATIONS FOR THE CERTIFICATION AND TESTING OF GASOLINE VAPOR RECOVERY SYSTEMS USING ABOVEGROUND STORAGE TANKS

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Cindy Castronovo, Staff Air Pollution Specialist
Diane Moritz Johnston, Senior Staff Counsel

ACKNOWLEDGEMENTS

Staff wishes to acknowledge the participation and assistance of the following organizations and companies in providing comments on the vapor recovery proposed regulations:

Agricultural Outreach Committee
California Air Pollution Control Districts
California Air Pollution Control Officers Association (CAPCOA) Vapor Recovery Committee
California Citrus Mutual
California Cotton Ginners and Growers Association
California Farm Bureau
California Grape and Tree Fruit League
California Independent Oil Marketers Association
Franklin Fueling Systems
J.B. Dewar,Inc.
Nisei Farmers League
OPW
Steel Tank Institute
Tom Ward, Inc.
Vapor Systems Technologies, Inc.
Western States Petroleum Association
Western United Dairymen

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I. EXECUTIVE SUMMARY

The Air Resources Board (ARB) has a number of requirements in place to reduce gasoline vapor emissions because these emissions contribute to the formation of ozone. Current requirements apply to various sources of gasoline vapors including automobile gas tanks, portable gas cans, and gasoline dispensing facilities (GDF) like gas stations. In this proposal staff seeks to further reduce emissions from GDFs that use aboveground storage tanks (AST). The reductions will be achieved through more stringent certification requirements for the vapor recovery systems and equipment used with ASTs. The proposal will establish new performance standards and specifications for the vapor recovery systems and components used with ASTs, called Enhanced Vapor Recovery (EVR) for ASTs.

An AST is a fixed installation gasoline storage tank located either above ground or below ground, without backfill, that may have an emergency vent. Typical ASTs have capacities ranging from 250 gallons to 12,000 gallons. ASTs are commonly described as single wall or protected. Single wall ASTs are constructed with a primary (single) wall. Protected ASTs are typically constructed with a primary and secondary wall for containment with an insulating material between the walls.

There are approximately 9,600 ASTs in California that emit approximately 3.31 tons per day (TPD) of vapors or reactive organic gases (ROG). Approximately 33 percent of these ASTs have currently certified vapor recovery systems installed. Agricultural tanks make up a majority of the remaining 67 percent of ASTs, and at present most are uncontrolled. Controlling emissions from all ASTs is a key part of ARB and Air Pollution Control Districts and Air Quality Management Districts (District) efforts to attain the state and federal ozone air quality standards.

Staff's proposal would reduce 1.98 TPD of ROG emissions. Most of the emission reductions will come from agricultural tanks. Reductions will be achieved primarily by controlling AST diurnal evaporative (standing loss) emissions. The controls to minimize these evaporative losses are termed Standing Loss Control (SLC). Standing losses contribute approximately 90 percent of the total uncontrolled emissions from ASTs. In addition to standing losses, working losses (Phase I and Phase II) are the other categories of emissions. Phase I relates to emissions that occur when the AST receives gasoline from a gasoline cargo tank truck. Phase II relates to emissions that occur when vehicles are refueled. The proposed regulation will result in gasoline savings of approximately 600 gallons per day.

Whenever ARB adopts new or revises vapor recovery performance standards, State law provides that existing installations have up to four years from the effective date to comply. The effective date for the proposed regulation will be January 1, 2009. All currently installed ASTs subject to this regulation will be required to comply by January 1, 2013, under the four year delay imposed by State law.

ARB and District Roles

ARB is responsible for certifying vapor recovery systems. In the process of certifying vapor recovery systems, ARB establishes performance standards and specifications for systems and their components. Districts have the primary responsibility of regulating emissions from stationary sources such as gas stations. To this end, Districts have adopted rules that require gasoline storage and transfer operations, including those using ASTs, to be equipped with vapor recovery systems certified by ARB. Usually, District rules incorporate ARB performance standards; however, District rules may specify more stringent performance standards than ARB's but Districts may only implement more stringent standards if at least two systems are already certified to such levels by ARB. District rules vary as to which facilities require control with vapor recovery systems.

Technical Proposal

Most of the proposed performance standards and specifications are similar to the existing Phase I and Phase II requirements that the Board approved in 2000 for underground storage tank (UST) systems, which is called enhanced vapor recovery (EVR). This similarity in performance standards and specifications will achieve consistency between AST and UST vapor recovery requirements. However, as stated earlier, the major impact of, and difference with, this proposal is reduced emissions achieved through defining and controlling diurnal or standing loss evaporative emissions.

Staff worked with agricultural stakeholders to evaluate control technologies that would reduce standing loss emissions in a field study conducted during the summer of 2005. This study also evaluated the effects of various control technologies on ASTs and compared them to uncontrolled tanks at the same location. The results from the study form the basis for staff's recommendations for the standing loss control levels of 90 percent for new tanks and 60 percent for existing tanks. The 90 percent control level can be met using a pressure/vacuum (P/V) valve and insulation. The field study showed that single wall tanks with three inches of polyurethane foam provided adequate insulation. Additional testing showed that currently certified protected tanks also provide the needed insulation properties. The 60 percent control level can be met using a P/V valve coupled with 1) white paint, 2) shading the tank from direct sunlight, or 3) installing a carbon canister in the vent line. In addition to technologies demonstrated in the field study, other technologies such as the use of a thermal processor are viable as well.

Additional, smaller emission reductions are anticipated from the application of the EVR Phase I and Phase II standards and specifications and enhanced containment and testing requirements.

Applicability and Cost

While District rules vary throughout the state, all Districts exempt some ASTs based on tank size, date of installation, and gasoline throughput. For the purpose of this proposal, staff assumed that the District rules and exemption levels would not change, except for the adoption of SLC requirements. Thus, if an AST is currently subject to Phase I requirements, it would continue to be subject to the same general requirements, which would include SLC vapor recovery. To require only SLC vapor recovery Districts will need to amend their rules. The following three examples illustrate how some tanks might be affected.

- Example 1: A single wall 750 gallon AST in the San Joaquin Valley installed in 1991 with an annual throughput of 10,000 gallons currently must be equipped with Phase I only. Under this proposal, that same tank would be expected to meet the SLC and Phase I EVR standards by January 1, 2013. Table I-1 shows that there are approximately 1,610 tanks statewide that would be required to make a similar modification at an average incremental cost of $473.

- Example 2: A similar 750 gallon single wall AST is required to have Phase I vapor recovery but does not have the Phase I equipment installed. This AST is listed in the second row of the table as having "No Vapor Recovery (Not in Compliance with District rules)." The proposal estimates that this AST would be retrofitted with SLC and Phase I EVR. The cost to come into compliance for this tank is $2,023. The difference in cost between this and Example 1 is attributed to installing the Phase I equipment that was required but not in place in addition to installing SLC. Most of the 3,383 tanks in this category are used in agriculture. Because state law until recently exempted agricultural sources from District permitting, control requirements were largely not enforced.

- Example 3: If a District amends their rules to require SLC only, then AST owners that meet the conditions of the rule would be required to retrofit to that level. Therefore, a single wall 750 gallon AST with no vapor recovery that is expected to come into compliance with the amended rule would be required to install SLC only. The average cost for an AST owner would be approximately $432. This cost is not reflected in Table I-1 since the Districts do not have rules in place and it would be difficult to project how many tanks would be subject to this statewide.

Incremental costs represent the difference between current technologies' cost compared to the similar components that meet the enhanced standards and specifications. For example, if a currently certified nozzle costs $150 and the EVR version of this nozzle costs $200, then the incremental cost of $50 is reflected in Table I-1 below.

Table I-1
Incremental Cost of Proposed Regulation

AST	Current Configuration	Proposed Configuration	No. of tanks	Incremental Cost per tank ($)
Single Wall	No Vapor Recovery (Exempt)	No Vapor Recovery (Exempt)	2,394	$0
	No Vapor Recovery (Not in Compliance with District rules)	SLC + Phase I EVR	3,383	$2,023
	Phase I	SLC + Phase I EVR	1,610	$473
	Phase I/II	SLC + Phase I/II EVR	233	$594
Protected	No Vapor Recovery (Exempt)	No Vapor Recovery (Exempt)	39	$0
	No Vapor Recovery (Not in Compliance with District rules)	Phase I EVR	225	$1,693
	Phase I	Phase I EVR	383	$143
	Phase I/II	Phase I/II EVR	1,315	$264
		total	9582	

The cost effectiveness of the proposed regulation is approximately $1.87 per pound ROG emissions reduced. Adding in the cost savings from gasoline and assuming $2.50 per gallon, the cost effectiveness is improved by approximately $0.40 per pound. The net cost effectiveness of the proposed regulation is $1.47 per pound.

Certification and Test Procedures

Staff's proposal centers on a new certification procedure, CP-206, *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks* which is specifically designed for ASTs and establishes:

- Standing loss control performance standards and specifications applicable to all tanks required to have vapor recovery
- Standing loss control certification by a performance or design based process

- o Performance based certification is a "system" approach where the system is required to be fully integrated

- o Design based certification is "component" based where components are interchangeable

- An option is provided to allow applicants to certify to standing loss control levels that exceed the minimum retrofit requirement of 60 percent. Equipment will be evaluated by ARB and will be validated at the 76 and 90 percent levels in addition to the 60 percent level. The importance of these optional levels for retrofits is that they create a mechanism to encourage AST owners to use equipment which exceeds the minimum retrofit requirements. These optional retrofit levels will offer the opportunity to choose retrofit technologies that might be more costly but increase benefits such as fuel savings. Higher level retrofit certification may also allow for emission credits to be earned or funded as a cleaner-than-required technology.

- Phase I EVR transfer efficiency at 98 percent rather than the current level of 90 percent

- Phase II EVR transfer efficiency at 95 percent rather than the current level of 90 percent

- An operational test of at least 180-days for systems and components helps ensure field durability while conforming with performance standards and specifications

- Vapor recovery system certification will have a limited term of four years, but will be renewable without further testing if data indicate no major deficiencies with the certification

The proposed certification for AST Phase I and Phase II vapor recovery systems and equipment relies on many of the test procedures (TP) that the Board has adopted for UST Phase I and Phase II vapor recovery systems and equipment. Staff is also proposing the adoption of three new test procedures to evaluate conformance with the proposed performance requirements that are specific to AST systems and equipment:

- TP-206.1, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks*

- TP-206.2, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks*

- TP-206.3, *Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks*

These new procedures test systems that reduce the tank temperature, control emissions directly, and reduce leaks, respectively.

Staff is also proposing the modification of TP-201.2, *Efficiency and Emission Factor for Phase II Systems*. The proposed modification corrects the equation used to calculate the efficiency/emission factor, and clarifies the fugitive emissions determination. Likewise, staff proposes amendments to the Vapor Recovery Definitions, D-200, to clarify and add terms used in the AST vapor recovery certification and test procedures.

II. INTRODUCTION AND BACKGROUND

This section of the staff report summarizes the legal authority and regulatory history, provides an AST emissions overview, and discusses the public participation process.

A. Legal Authority

1. State Law

Section 41954 of the Health and Safety Code (HSC) requires the Air Resources Board to adopt procedures and performance standards for controlling gasoline emissions during gasoline marketing operations, including transfer and storage operations, to achieve and maintain ambient air quality standards (see Appendix A). This section also authorizes ARB, in cooperation with Districts, to certify vapor recovery systems. HSC section 39607(d) requires ARB to adopt test procedures to determine compliance with ARB and District non-vehicular standards. State law (HSC section 41954) requires Districts to use ARB test procedures to determine compliance with performance standards and specifications established by ARB.

To comply with state law, the Board has adopted regulations in title 17, California Code of Regulations (CCR), sections 94000 to 94015 that incorporate by reference comprehensive certification and test procedures. In separate regulations in title 17, sections 94101 to 94167, the Board has adopted by incorporation by reference the vapor recovery test procedures that Districts may use in conducting compliance testing. The proposed changes and additions to the CCR are located in Appendix B.

2. District Rules

Air pollution control districts and air quality management districts (Districts) have the primary responsibility of regulating emissions from stationary sources or air pollution such as GDFs with ASTs. To carry out their responsibility, Districts have adopted rules requiring that gasoline storage and transfer operations be equipped with a vapor recovery system certified by the ARB. District rules vary as to which facilities are subject to vapor recovery requirements. To better understand the implications of District rules, the following reviews information from the San Joaquin Valley Air Pollution Control District (SJVAPCD) rules specifying Phase I and Phase II vapor recovery requirements. Other Districts have similar requirements but have different exemption levels. A summary of these and other District vapor recovery rules is presented in Appendix C.

SJVAPCD rules exempt aboveground gasoline storage tanks from Phase I and Pressure/Vacuum valve requirements, and Phase II requirements for the situations described below

a. Phase I and Pressure/Vacuum Valve exemption

For stationary containers storing gasoline:

- with a capacity of less than 250 gallons;
- a capacity of 550 gallons or less when used exclusively for fueling implements of husbandry (as such vehicles are defined in Division 16 of the California Vehicle Code) if such container is equipped with a permanent submerged fill pipe;
- a capacity of 2,000 gallons or less when installed before July 1, 1975, if such container is equipped with a permanent submerged fill pipe;
- containers installed prior to July 1,1975 and equipped with offset fill pipe, if such container is equipped with a permanent submerged fill pipe.

b. Phase II exemption

- only applicable to those facilities installed on or before May 21, 1992; and
- less than 24,000 gallons of throughput per calendar year; and
- less than 10,000 gallons of throughput in any consecutive 30-day period.

3. Comparable Federal Regulations

There are no comparable federal regulations that certify gasoline vapor recovery systems for GDFs; however, changes to ARB vapor recovery certification regulations may have a national impact. ARB certification is required by many other states and countries that mandate the installation of vapor recovery systems in GDFs.

B. Regulatory History

Vapor recovery systems have been used in California to control ROG emissions, and specifically hydrocarbon (HC) emissions for over thirty years and to control emissions of the toxic air contaminant benzene for almost twenty years. The feasibility of the first vapor recovery system was evaluated at the District level, particularly in the San Diego and Bay Area Districts in the early 1970s. In 1975, the ARB was authorized by state law to establish a certification program to control gasoline vapor emissions from gasoline marketing operations, including storage and transfer operations. In December 1975, ARB adopted the first certification and test procedures for vapor recovery systems installed on GDFs. Certification procedures contain performance standards and specifications and other criteria that must be met for certification. Test procedures describe the methods which are used to generate data that are compared to the performance standards and specifications. In addition to GDFs, the Board has adopted certification procedures for bulk plants, terminals, cargo tanks, and novel facilities. Over the last thirty years the Board has periodically updated the certification and test procedures to reflect improvements in vapor recovery technologies and the certification processes.

To achieve additional ROG reductions and increase the reliability of vapor recovery system components, the Board approved enhanced vapor recovery (EVR) regulations for systems with USTs in March 2000. The EVR regulations represented the first major change to the certification requirements since 1975. Although ASTs and USTs share many of the same vapor recovery system components, EVR requirements were not made applicable to AST systems. A new rulemaking is required to apply appropriate EVR performance standards and specifications to AST systems and to incorporate controls for standing loss emissions. Staff proposes adoption of CP-206, *Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks*, to specifically apply to AST vapor recovery systems.

Today's AST vapor recovery systems are certified as "novel" systems under CP-205, *Certification Procedure for Vapor Recovery Systems of Novel Facilities*. The certification is based on testing an AST with a vapor recovery system certified for USTs and includes only the control of transfer emissions (working losses) through the application of Phase I and Phase II vapor recovery systems. The testing verifies that vapor recovery efficiencies are at least 90 percent, or 95 percent if requested by applicant. If the system successfully passes the test, the system is certified by issuance of an Executive Order. Currently, there are 38 AST vapor recovery systems certified.

C. Applicability of Proposed Regulation

The proposed regulation will incorporate a major change in vapor recovery by certifying Standing Loss Control (SLC) systems and components to control standing loss emissions from new and existing ASTs. Standing loss emissions occur when no gasoline is transferred from the tank but emissions are affected by diurnal temperature changes. Under the proposal, ARB will issue three types of certifications, (1) standing loss control (SLC); (2) SLC and Phase I; and (3) SLC, Phase I and Phase II. The intent is to provide Districts with flexibility in choosing control options. This regulation will have the effect of terminating the current Phase I and Phase II vapor recovery system Executive Orders.

The addition of Standing Loss Control may prompt Districts to amend their rules to require a configuration that only utilizes SLC. Phase I EVR systems will only be certified with ASTs that have SLC and therefore the Districts will not need to modify their rules to incorporate SLC with Phase I EVR. The same is true for Phase II EVR, as it includes Phase I EVR and SLC and thus modification to District rules will not be necessary.

Districts issue permits for the operation of gasoline transfer and storage operations within their enforcement jurisdiction. Until recently, Health and Safety Code section 42310(d) prohibited Districts from requiring permits for "any equipment used in agricultural operations in the growing of crops or the raising of fowl or animal." Without a permit and the associated fees, Districts have been limited in their ability to determine if installed agricultural ASTs have been in compliance. In 2003, the enactment of Senate Bill 700 (Florez) removed this prohibition and authorized Districts to issue permits for agricultural operations.

There are approximately 9,582 ASTs in California. District rules will require 7,149 ASTs to have ARB certified vapor recovery equipment installed (approximately 2,433 tanks are exempt from vapor recovery requirements based on current District rules). A summary of selected Districts such as San Joaquin Valley, Sacramento, and South Coast District vapor recovery rule applicability is presented in Appendix C. Table II-1 summarizes the applicability of the proposed regulation for the number of tanks in each current configuration based on District rules.

Table II-1
Applicability of Proposed Regulation on AST Population

Tank	Current Configuration	Proposed Configuration	No. of tanks	
			Exempt	Subject to Vapor Recovery
Single Wall	No Vapor Recovery (Exempt)	No Vapor Recovery (Exempt)	2,394	
	No Vapor Recovery (Not in Compliance)	SLC + Phase I EVR		3,383
	Phase I	SLC + Phase I EVR		1,610
	Phase I/II	SLC + Phase I/II EVR		233
Protected	Exempt	Exempt	39	
	Not in Compliance	Phase I EVR		225
	Phase I	Phase I EVR		383
	Phase I/II	Phase I/II EVR		1,315
			2,433	7,149

Under the proposal, Standing Loss Control, Phase I EVR, and Phase II EVR requirements would become effective January 1, 2009, and all existing tanks shall be in compliance by January 1, 2013, in accordance with State law. New tanks installed or existing tanks undergoing major modifications after January 1, 2009 would be required to meet the proposed performance standards for SLC, Phase I EVR, and Phase II EVR.

D. Emissions Inventory

Historically, the Air Resources Board's emissions inventory reporting system accounted for AST emissions through the gasoline dispensing facilities methodology (http://www.arb.ca.gov/ei/areasrc/onehtm/one4-10.htm). The gasoline dispensing facilities methodology estimates emissions from ASTs as an areawide source, which means that emissions are estimated for ASTs in the aggregate, rather than individually, and are then reported under a single category.[1]

In preparation for this rulemaking, ARB staff developed an improved methodology to estimate the emissions from AST. This methodology is based on the following underlying data sources and is detailed in the Appendicies of this report:

1) 2004 MLD survey of companies who supply gasoline fuel to owners of ASTs across the state (Table H-3 of Appendix H);
2) 2006 MLD survey of local air districts for data on permitted ASTs (Table H-4 of Appendix H);
3) Temperature response data of fuel temperature in ASTs to changing ambient temperatures (attenuation factors) from several MLD tests (Appendix I);
4) Evaporation rates of fuel for open AST systems (tanks without any pressure/vacuum valve) from several MLD tests (Appendix D);
5) Monthly average ambient temperatures for 15 California cities from U.S. EPA's AP-42 methodology (Appendix I);
6) AST emissions equation model from U.S. EPA's AP-42 (Appendix I).

Using this information, the current AST inventory methodology accounts for emissions from individual ASTs across the state, rather than on estimating emissions on an aggregated, statewide basis. From these new data, an estimate of reactive organic gas (ROG) emissions from ASTs in the state was developed for 2004.

[1] The gasoline dispensing facilities methodology estimates emissions from the storage of gasoline fuel for both on-road and off-road use. Emissions estimates from the storage of fuel sold for on-road use is separate from that sold for off-road use. One assumption in the methodology is that gasoline used for off-road purposes is stored in tanks without Phase II vapor control. The statewide inventory had previously accounted for emissions from ASTs as if they were used exclusively to store gasoline sold for off-road purposes, thus assuming a worst-case situation with respect to vapor losses.

As with most estimates, certain assumptions were made. The assumed fuel throughput for ASTs, based on a suggestion from key stakeholders, was derived by assuming each AST was re-filled four (4) times a year and each re-filling supplied 80 percent of the AST's maximum capacity (i.e., it was assumed the tank was not completely empty when re-filled). Using these assumptions and the estimated population and tank sizes of ASTs in the state, an annual throughput for 2004 of 30,029,000 gallons of gasoline is obtained. The resulting calculated emissions from all ASTs in the state for 2004 was approximately 3.31 tons per day (TPD) of ROG. By comparison, the Gasoline Dispensing Facilities methodology previously used in the statewide emissions inventory for ASTs would result in an estimated 0.80 TPD ROG for the same throughput of 30,029,000 gallons of gasoline. The difference in emissions with the new methodology increases emissions from ASTs by approximately 2.51 TPD ROG (3.31 TPD - 0.80 TPD).

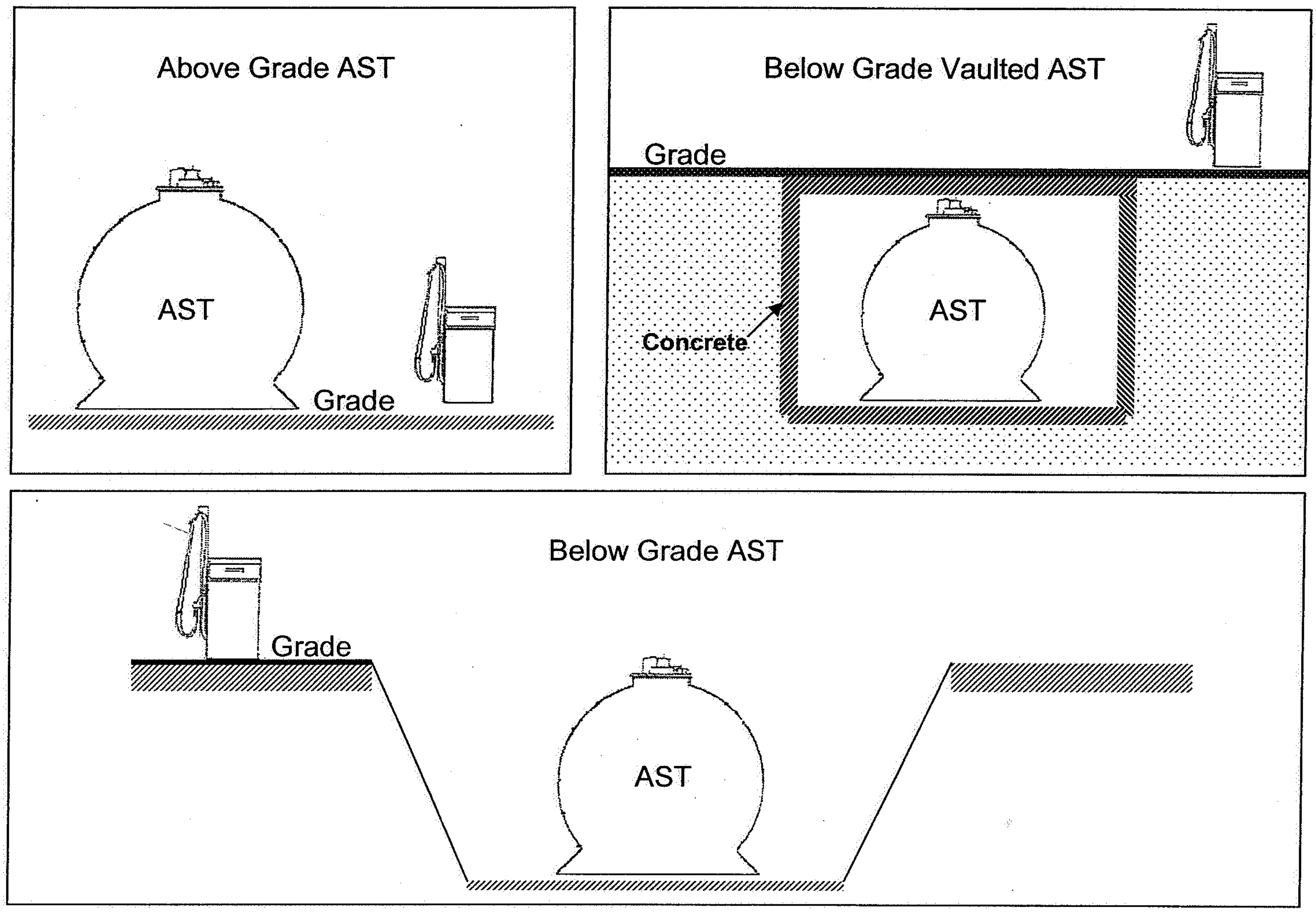
The ARB will continue to work with the local districts and other stakeholders to spatially resolve this current AST emissions estimate of 3.31 TPD to the county, air basin, and air district levels which will enable the estimates in the ARB's emissions inventory electronic data system.

E. AST Emissions Overview

1. AST Description

An AST is a gasoline storage tank intended for fixed installations, without backfill, that is located above or below grade. Some ASTs require an emergency pressure relief vent. Typical ASTs have capacities ranging from 250 gallons to 12,000 gallons. ASTs are used on farms, government facilities, private facilities, construction sites, and gasoline service stations. There are three main types of ASTs: single wall, protected, and below-grade vaulted tanks. Single wall ASTs are gasoline storage tanks located above or below grade that are typically constructed with a primary (single) wall for containment. Protected ASTs are gasoline storage tanks located above or below grade that are typically constructed with a primary and secondary wall for containment with an insulating material between the walls. Below-grade vaulted ASTs are single wall or protected gasoline storage tanks located below grade, inside a vault, that requires continuous ventilation. Figure II-1 shows examples of above and below grade ASTs.

Figure II-1
Examples of Above and Below Grade ASTs



2. Sources of Emissions

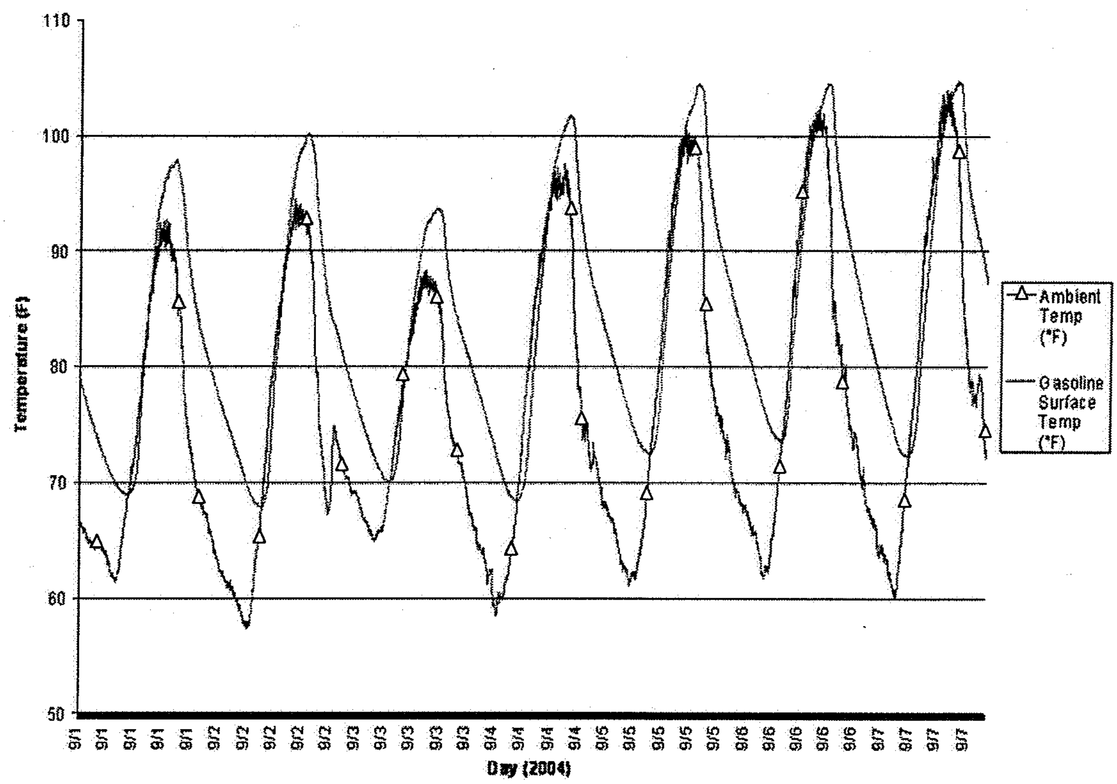
Gasoline vapor emissions from ASTs are a significant source of ROG that contribute to the formation of ozone, a criteria pollutant. Gasoline vapor emissions from ASTs also contain benzene, a toxic air contaminant. There are two main types of gasoline vapor emissions from ASTs: Standing Losses and Working Losses.

a. Standing Losses

Standing losses are gasoline vapor emissions that occur whenever the gasoline evaporates including during periods of no gasoline transfer. These evaporative emissions escape through open vent pipes and leaks in the AST. They occur when internal tank pressure increases as a result of diurnal temperature changes. Standing losses from ASTs vary based on the different tank configurations and size, and contribute approximately 90 percent of the total uncontrolled emissions from ASTs (approximately 2.95 TPD).

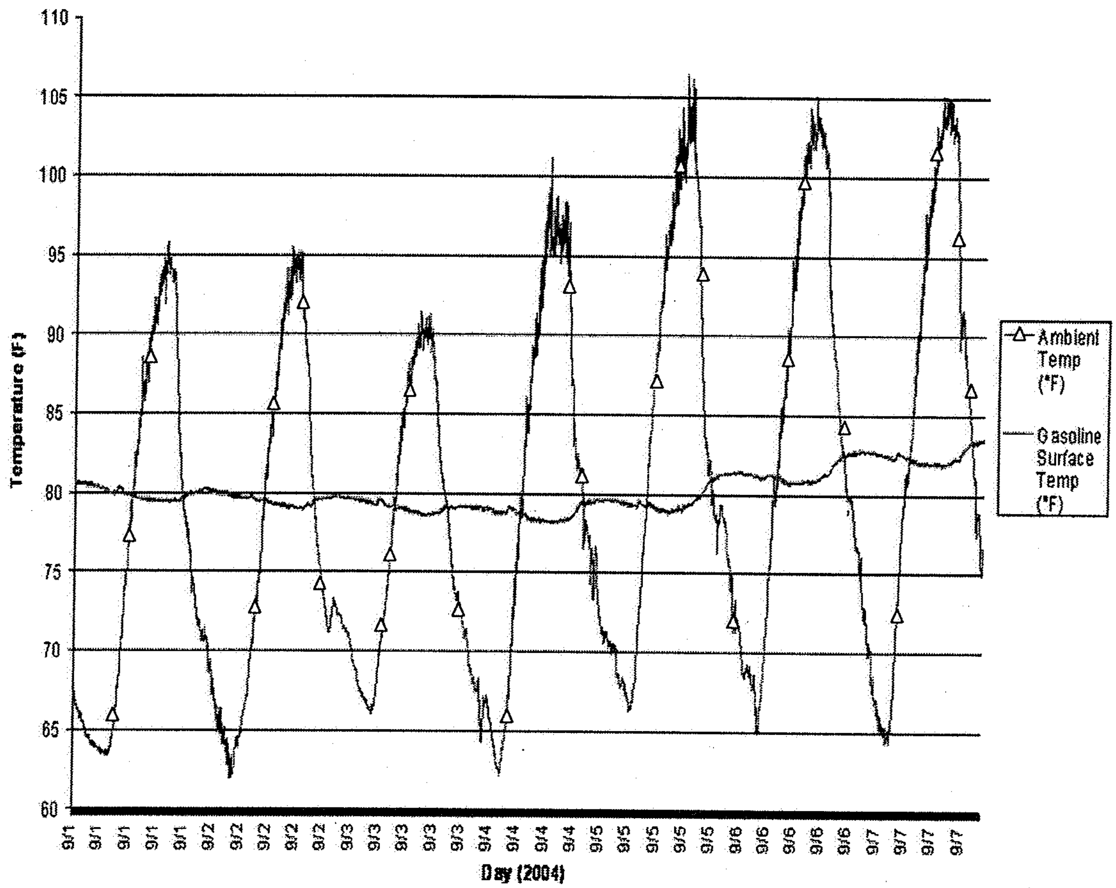
In single wall ASTs, diurnal changes in ambient temperature have a direct effect on the fuel surface temperature. As shown in Figure II-2, these ambient temperature changes cause fuel surface temperatures to change resulting in gasoline evaporation.

Figure II-2
Influence of Ambient Temperature on Fuel Surface Temperature
Single Wall AST



In protected ASTs, diurnal changes in ambient temperature have very little effect on the fuel surface temperature. As shown in Figure II-3, the fuel surface temperature remains relatively constant resulting in emission reductions of approximately 90 percent compared to single wall ASTs.

Figure II-3
Influence of Ambient Temperature on Fuel Surface Temperature
Protected AST



b. Working Losses

Working losses are emissions during gasoline transfer operations. Phase I and Phase II vapor recovery systems are used to collect vapors during delivery to and dispensing from an AST, respectively. Working losses contribute approximately 10 percent of the total emissions from ASTs (approximately 0.34 TPD). Currently certified Phase I vapor recovery systems collects 90 percent of the vapors released during delivery operations. Currently certified Phase II vapor recovery systems collect 90 percent of the vapors released while dispensing fuel.

c. Spillage Losses and Liquid Retention

Spillage losses are emissions occurring when liquid gasoline spills to the ground. Liquid retention is when gasoline is retained in the hanging hardware (nozzles, hoses, etc.) and then evaporates. These emissions are released during pre-fueling, fueling and post fueling operations. Spillage loss emissions contribute approximately one percent of the total emissions from ASTs (approximately 0.02 TPD).

F. Public Process

Beginning in 2001, the ARB staff has conducted 10 AST Vapor Recovery Workshops in consultation with the public, agriculture, industry, vapor recovery equipment manufacturers, tank manufacturers, associations, and Districts to address specific technical issues, define regulatory development timelines, and discuss implementation strategies. Additionally, multiple workgroup meetings were held with interested parties to have open discussions and address concerns.

The dates and locations of workshops are listed in Table II-1.

Table II-1
Workshop Meetings

DATE	LOCATION
June 21, 2001	Sacramento
February 5, 2002	Sacramento
August 20, 2002	Sacramento
April 24, 2003	Fresno
November 14, 2003	Sacramento
February 10, 2004	Sacramento
November 3, 2004	Sacramento
June 7, 2005	Sacramento
September 27, 2006	Sacramento
December 13, 2006	Sacramento

In addition to the workshops listed above, staff kept the California Air Pollution Control Officers Association (CAPCOA) Vapor Recovery Committee informed at its quarterly meetings on the progress in developing the AST certification procedure. CAPCOA formed a subcommittee, headed by the San Joaquin Valley APCD, to provide input and suggestions.

Staff provided information and updates on the AST proposal to the ARB Agricultural Advisory Committee for Air Quality, which consists of over 50 representatives of farm bureaus, commissions, and associations as well as government representatives. Staff also held one workshop and some agricultural workgroup meetings in the San Joaquin Valley to facilitate participation from agricultural interests. Staff also participated in subcommittee meetings and discussions related to the State Implementation Plan (SIP) for ozone, some of which also involved agricultural community representatives.

Staff has met with other stakeholders such as the California Independent Oil Marketers Association, Steel Tank Institute (STI), and various agricultural groups and associations to discuss the AST proposal, and met again with STI to specifically discuss testing conducted for the proposed regulation as well as the cost analysis. Meetings with the State Water Resources Control Board (SWRCB) staff are scheduled regularly to discuss regulatory activities that affect gasoline storage and transfer.

Staff established the AST web site (www.arb.ca.gov/vapor/ast/ast.htm) providing stakeholders with information regarding the AST program as well as updates of the regulatory proposal. All persons on the e-mail list serve are notified whenever new information is posted on the vapor recovery web site. Workshop presentations and associated documents are posted on the web site prior to the workshop date and sent by mail to stakeholders on the vapor recovery mailing list. Interested stakeholders participated in the workshops in person or via conference call.

III. NEED FOR AST RULEMAKING

This section discusses the justification for the proposed regulation.

A. State Implementation Plan

All non-attainment areas are required by the federal Clean Air Act to submit a State Implementation Plan (SIP) containing strategies to improve air quality and achieve the federal ambient air quality standards. In 1994, ARB adopted a comprehensive ozone SIP. Since 1994, most of the existing near-term control measures have been adopted.

In 1999, the ARB settled a lawsuit with three Los Angeles-based environmental groups regarding the 1994 ozone SIP. Under the terms of the settlement, the ARB must achieve specified reductions in hydrocarbons and oxides of nitrogen. This settlement was amended in 2003 and includes a commitment by the ARB to consider a measure reducing emissions from ASTs.

ARB has developed a state strategy plan to be incorporated in the 2007 California State Implementation Plan for ozone which is due to U.S. EPA in June 2007. Enhanced vapor recovery for ASTs is one of the proposed SIP measures to reduce the Reactive Organic Gases (ROG) emissions from ASTs statewide. The staff's proposal will satisfy the requirements of the SIP and related settlement.

The proposed regulation will further reduce ozone forming hydrocarbon emissions necessary to assist California in meeting SIP commitments and protecting public health.

B. Consistency with UST EVR Regulations

The EVR regulations approved by the Board in 2000 for UST based vapor recovery systems do not apply to ASTs. To obtain additional emission reductions, staff is proposing to apply the EVR standards and specifications for USTs to ASTs. This will remove any unintended incentive to install ASTs instead of USTs.

IV. SUMMARY OF PROPOSAL

A. Introduction

This section summarizes the proposed performance standards and specifications and discusses the basis for the proposed regulation and the availability of control technologies for meeting these performance standards and specifications.

The central element of the proposal is the establishment of new performance standards or specifications to reduce emissions from standing losses. Other proposed changes include applying UST EVR performance standards and specifications, where feasible, to control working loss emissions from ASTs. With certain exceptions, new certifications will require an operational test of at least 180 days.

This section discusses the key elements of staff's proposed regulation in the following order:

- Standing Losses
- Working Losses
- New, Modified and Applicable Current Certification Procedures

B. Standing Losses

During the summer of 2005, staff conducted a field study on various sizes of ASTs in Fresno County, California in cooperation with the agricultural stakeholders. The purpose of the field study was to evaluate emission reductions from ASTs when retrofitted with various control technologies during periods of no fuel transfers. The study, concluding that standing loss emissions are significant and that controls are currently available which reduce these losses (see Appendix D for more detail), provides the basis for the proposal to control standing loss emissions.

The following sub-sections describe the certification process, proposed standards, need for the proposed standard, and available standing loss control technologies.

1. Performance Based Certification

Performance based certification tests standing loss control components as a system for the specified minimum time period. After successfully meeting the proposed standards, these components remain together as a system in a specific Executive Order (EO). This approach is similar to current Phase I and Phase II certification, where the EO specifies the components that are required to be installed. No modification to the system is allowed without the Executive Officer's approval.

2. Design Based Certification

Under the design based certification, the system configuration is defined. The configuration also includes the components. Individual component specific standards are listed. After successfully meeting the component standards, the design based approach allows components more flexibility in being combined with other components that are part of another configuration. These components will be interchangeable in specific combinations as defined in the certification procedure. The design based component is added to a universal EO.

3. Proposed Standards

The 2005 field study showed how various technologies performed. That data provided a technical basis for establishing the proposed standards. Results from the field study demonstrate that a P/V relief valve and insulation technologies can reduce emissions up to 97 percent when compared to a tank with no controls.

The following standing loss performance standards are proposed for new and/or existing ASTs. The proposed standards are more stringent for new ASTs compared to existing ASTs. The lower standard for existing ASTs allows more cost effective options for GDF owner/operators with tanks presently in the field. The proposed standards are lower than the field study results to maintain a margin of error based on engineering judgment and are given in units of pounds of hydrocarbons per 1000 gallons of tank ullage per day. Percent reduction is provided to show equivalent emission reductions. Additionally, Standing Loss Controls levels may be certified at two levels higher than the proposed standard (for existing ASTs) to allow for emission credits. Table IV-1 through IV-3 lists the technologies that are capable of meeting the proposed standards for new and existing tanks.

a. New Installations: 0.57 lbs/1000 gallon tank ullage/day (90%)

Table IV-1
Standing Loss Control Proposed Performance Standards for New ASTs

Performance Standard	Control*	Control Technology Combination
0.57 lbs/1000 gal tank ullage/day	90 Percent	P/V + Insulation, or P/V + Protected Tank

* compared to a tank with no controls

Staff recommends a proposed performance standard emission factor of 0.57 pounds of hydrocarbons per 1000 gallons of gasoline ullage per day for new installations. This proposed performance standard will apply to new AST installations and major modifications of existing AST installations.

b. Existing Installations: 2.26 lbs/1000 gallon tank ullage/day (60%)

Table IV-2
Standing Loss Control Proposed Performance Standards for Existing ASTs

Performance Standard	Control*	Control Technology Combination
2.26 lbs/1000 gal tank ullage/day	60 Percent	P/V + Paint, or P/V + Shade, or P/V + Carbon Canister

*compared to a tank with no controls

Results from the 2005 field study demonstrate that P/V relief valve and paint, shade, or carbon canister technologies can reduce emissions between 65 and 67 percent when compared to tanks with no controls. To provide a safety margin, staff recommends a proposed performance standard emission factor of 2.26 pound of hydrocarbons per 1000 gallons of gasoline ullage per day (60 percent control) for existing installations. This proposed performance standard would apply to retrofits of existing ASTs.

c. Optional Controls for Existing Installation

Table IV-3
Standing Loss Control Proposed Levels for Existing ASTs

	Performance Standard	Control*	Control Technology Combination
Required	2.26 lbs/1000 gal tank ullage/day	60 Percent	P/V + Paint, or P/V + Shade, or P/V + Carbon Canister
Optional	1.34 lbs/1000 gal tank ullage/day	76 Percent	P/V + Paint, or P/V + Shade, or P/V + Carbon Canister
Optional	0.57 lbs/1000 gal tank ullage/day	90 Percent	P/V + Insulation, or P/V + Protected Tank

* compared to a tank with no controls

To encourage the use of SLC technologies that achieve higher emission reductions for existing installations, staff proposes validating SLC vapor recovery systems and components to retrofit existing ASTs that exceed the 60 percent certification level, specifically at 76 and 90 percent. The increased emission reduction benefits can be used as emission credits. This concept was developed in conjunction with stakeholders and the Districts and will allow for the use of in-use retrofit technologies that higher control efficiencies.

Upon request from an applicant, staff will evaluate control technologies using all the same certification and test procedures. Those technologies that meet or exceed the 2.26 lbs/1000 gallons/day Standing Loss Control performance standard for retrofits will be certified to either the 76- or 90-percent-control-level performance standard as determined through operational testing.

Again, these levels are optional for both the applicant and the end users under staff's proposed certification procedure regulations.

4. Need for Proposed Standard

The field study results identified standing losses as the primary source of gasoline vapor emissions from ASTs. Measurements recorded from the field study indicate a significant amount of hydrocarbons (approximately 90 percent of total AST emissions) are released as standing losses, proportional to the size of the AST. A 1,000 gallon AST lost approximately 32 gallons of gasoline over a period of three months. A 350 gallon AST lost approximately five gallons of gasoline over a period of two months. The results of the field study helped to identify technologies that provided significant emission reductions. Appendix D summaries the results of the field study.

C. Working Losses

Working losses are emissions during the transfer of gasoline from cargo tank truck to the AST (Phase I) and during the transfer of gasoline from the AST to a motor vehicle (Phase II). Phase I and Phase II vapor recovery systems are currently certified for ASTs through Executive Orders. These systems are subject to less rigorous certification testing under CP-205, *Certification Procedures for Vapor Recovery Systems of Novel Facilities*. With the introduction of EVR systems for USTs, improved component reliability was required along with higher transfer efficiencies. It is the intention of the proposed regulation to certify Phase I and Phase II EVR systems to performance standards that increase transfer efficiency and component reliability. This will also make the AST and UST programs consistent. Certification testing for Phase I and Phase II EVR systems will be minimum 180 days.

1. Proposed Standards

The proposed regulations will require ASTs to be certified to performance standards and specifications contained in the proposed CP-206. CP-206 is more stringent than CP-205, which is currently used for AST certification. The proposed changes are nearly identical to the revised EVR program for USTs and will take advantage of technology advances and design improvements. Where applicable, testing data from EVR certifications for USTs will be used to demonstrate compliance with the standards. Because of the similar standards, it is expected that many of the components will meet the AST criteria without any modifications. Table IV-4 highlights major changes in the standards and specifications, compared to the existing requirements for ASTs.

Table IV-4
Summary of Proposed Changes to the Phase I and II Performance Standards and Specifications

Performance Type	Proposed Requirement	Existing Requirement
Phase I Efficiency	$\geq$ 98.0%	$\geq$ 90.0%
Phase I Emission Factor	HC $\leq$ 0.15 pounds/1,000 gallons dispensed	none
Pressure Integrity of Drop-Tube with Overfill Protection	Leakrate $\leq$ 0.17 CFH at 2.0 inches H_2O	none

Performance Type	Proposed Requirement	Existing Requirement
Static Pressure Performance	Lowered the allowable leakrate, based on ullage of tank (see TP-206.3)	TP-201.3B
Phase I Product and Vapor Adaptors	1. Fixed or Rotatable 360° 2. ≤108 inch-pound Static Torque, if rotatable 3. Cam and Groove Dimensions	1. none 2. none 3. none
Side or Bottom Fill Phase I Adaptor	Poppetted or Close-Coupled Shut-Off Valve	none
Pressure/Vacuum Relief Valves	2.5" to 6.0" H_2O Positive Pressure 6.0" to 10.0" H_2O Negative Pressure Leakrate at +2.0" H_2O ≤ 0.17 CFH Leakrate at –4.0" H_2O ≤ 0.63 CFH	+3.0" ± 0.5"H_2O -8.0" ± 2.0"H_2O same same
Spill Container-Drain Valve	Leakrate ≤ 0.17 CFH at +2.0" H_2O	none
Emergency Relief Venting	No indication of vapor leaks @ 2" H_2O	same
Vapor Connectors and Fittings	No indication of vapor leaks @ 2" H_2O	same
Compatibility with Fuel Blends	Materials shall be compatible with approved fuel blends	same
Phase II Emission Factor Includes: Refueling and Vent Emissions	1. Summer Fuel: 95% Efficiency and HC ≤ 0.38 lbs/1,000 gals dispensed 2. Winter Fuel: 95% Efficiency or HC ≤ 0.38 lbs/1,000 gals dispensed	1. 90% efficiency 2. 90% efficiency
Connectors and Fittings	No indication of vapor leaks @ 2" H2O	same
Nozzles	1. Spillage: ≤ 0.24 pounds/1,000 gallons 1. Post-Refueling Drips: ≤ 3 Drops/Refueling 3. Dimensions: OD ≤ 0.840 inches and a length of 2.5 inches 4. Liquid Retention: ≤ 100 ml/1,000 gallons 5. Spitting: ≤ 1.0 ml per nozzle per test 6. Capable of fueling any vehicle that can be fueled with a conventional nozzle	1. none 2. none 3. none 4. none 5. none 6. none

Performance Type	Proposed Requirement	Existing Requirement
ORVR Compatibility*	Refueling ORVR Vehicles Shall Not Cause the System to Exceed the Applicable Efficiency or Emission Std	none
Phase II Vapor Riser	Minimum 1" Nominal ID	same
Vapor Return Piping	No liquid or fixed blockage Minimum 3" Nominal ID after first manifold Recommended slope ¼" per foot Minimum slope ⅛" per foot Rigid piping or equivalent	same
AST Vaulted System	Based on Certification Procedure 201	none
Liquid Removal System	Capable of Removing 5 ml/ gal. (average)	same
Liquid Condensate Traps	Shall have Automatic Evacuation System	none

*Effective January 1, 2001, state law requires the certification of only those systems that are ORVR compatible (H&SC section 41954).

2. Need for Proposed Requirements

The most common emission sources of working losses are leaking components. Operational testing for certification of AST vapor recovery systems under CP-205 was much less than the proposed minimum 180-day testing duration. This led to AST vapor recovery components that were unreliable in the field and did not pass testing requirements for in-use evaluation. The introduction of stricter performance standards and specifications for leaks, transfer efficiencies, and longer operational test periods will provide AST EVR systems a higher level of durability and reliability, similar to the UST EVR systems.

3. Availability of Controls to Meet Standard

Technologies are currently available under the UST EVR program. It is most likely that these components will be certified for use with ASTs. Vapor recovery equipment manufacturers have already completed some research and development of EVR systems for USTs. Vapor recovery equipment manufacturers already have commercially available components that may meet the proposed EVR performance standards and specifications. Additionally, EVR technology is currently certified that will compliment the proposed AST EVR program. More durable tank components will improve the containment of gasoline vapors in ASTs.

D. New, Modified, and Applicable Current Certification Procedures

1. Definitions: D-200

D-200, *Definitions for Vapor Recovery Procedures,* defines the terms and acronyms used in the vapor recovery certification procedures and test procedures for gasoline dispensing facilities, bulk plants, terminals, cargo tanks, and novel facilities. The following describes the proposed changes to D-200. For a complete copy of D-200 with changes in ~~strikeout~~/underline format, see Appendix F.

a. Aboveground Storage Tank

The definition of an AST has been changed by removing the words, "and required emergency relief venting" to recognize that not all tanks are required to have this capability.

b. Applicability

The term, Aboveground Storage Tank, was added to the applicability paragraph to recognize the proposed new certification procedure for aboveground storage tanks.

c. Below-grade Vaulted Tank

A below-grade vaulted tank definition is added to highlight the differences in certification requirements. Since such tanks are operated in the same manner as a UST, CP-206, *Certification Procedures for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks,* would require below-grade vaulted tanks to comply with component standards and effective dates listed in CP-206 and certification requirements of CP-201, *Certification Procedures for Vapor Recovery Systems at Gasoline Dispensing Facilities.*

d. Modification

The proposed change defines a major modification for an AST to mean replacing the tank. An exception is when the tank is installed after retrofitting to comply with requirements of CP-206 or when an existing tank is exchanged with a retrofitted tank of equal capacity to comply with CP-206.

e. **Standing Loss Control**

The "Standing Loss Control" definition is added as a new vapor recovery system for ASTs to control evaporative emissions during periods of no gasoline transfers.

f. **Temperature Attenuation**

"Temperature Attenuation" is added to define a means to test a Standing Loss Control vapor recovery system's ability to control the effects that diurnal ambient temperature changes and solar radiation have on the fuel surface temperature in ASTs. It is the ratio of the fuel surface temperature range to ambient temperature range.

2. TP-201.2 Efficiency and Emission Factor for Phase II Systems

Staff proposes to amend Section 12.7 of TP-201.2, *Efficiency and Emission Factor for Phase II Systems,* to provide the correct equation for the calculation of Phase II system efficiency. Staff also proposes to modify Sections 7.7 and 11.1 to make the determination of fugitive emissions consistent with the adopted and referenced test procedure, *Pressure Related Fugitive Emissions* (TP-201.2F).

3. TP-206.1 Temperature Attenuation

Temperature attenuation is a mathematical comparison of the fuel surface temperature divided by the ambient temperature. Temperature attenuation tests are used to measure the ability of technologies applied to tanks to control the effects of ambient temperature and solar radiation on gasoline surface temperatures in the AST. Field testing conducted during the summer of 2005 showed that certain technologies, such as insulation, can reduce ROG emission up to 97 percent. Other technologies, used in combination, reduce ROG emissions between 43 percent and 87 percent. The relationship between fuel surface temperature and emissions reduction was developed from the field testing and is summarized in Appendix G. To evaluate the effectiveness of these technologies, TP-206.1, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, was developed to compare the ratio of average fuel surface temperature range to average ambient temperature range. The test is conducted for a minimum of 30 consecutive days during the summer months (June through September), with 7 days when ambient temperatures are greater than 95 degrees Fahrenheit. Technologies that can achieve a temperature attenuation factor that correlates to the emission factor performance standard for existing (retrofit) and new facilities will be certified in an Executive Order.

4. TP-206.2 Hydrocarbon Source Testing

Hydrocarbon source tests are used to directly measure emissions from destructive and non-destructive processors, and passive purge systems applied to ASTs to control standing losses. Field testing conducted during the summer of 2005 showed passive purge systems can reduce emissions up to 65 percent when used alone. When used in configurations that control fuel surface temperature, passive purge systems can reduce up to 83 percent of standing loss emissions. Currently certified destructive and non-destructive processors have been tested to be up to 98 percent efficient.

Processors and passive purge systems will be evaluated with a new test procedure, TP-206.2, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, by directly measuring the processor outlet emissions. Processors and passive purge systems that meet the minimum emission factor performance standard will be certified in an Executive Order. ARB staff tested both processors and passive purge systems using TP-206.2 to evaluate the accuracy and reproducibility of this test procedure.

5. TP-206.3 Static Pressure Performance

Static pressure performance tests are used to measure leaks in vapor recovery systems. Field testing on ASTs systems showed that systems were able to meet the currently adopted TP-201.3B in spite of visible emissions at various locations (Appendix F). Because the final decay values are so low, it is possible to have a significant leak and yet pass the standard. Also, the current TP-201.3B, *Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, does not allow for testing below 300 gallons ullage. Our inventory assessment found that a significant number of the tanks are small in size. Staff performed numerous pressure decay tests and demonstrated that ASTs can meet a higher final decay value, which corresponds to reducing the leak rate by half. This value was used to calculate a new pressure decay profile constant and thereby establishing a new allowable decay table in the proposed new static pressure performance test for ASTs, TP-206.3

6. CP-206 Certification Process

The certification process is similar to CP-201. The following sub-sections highlight the differences between CP-206 and CP-201.

a. Applicability

A significant difference between CP-201 and CP-206 is that Standing Loss Control, Phase I, and Phase II vapor recovery systems will be certified separately. Compatibility between systems will still be evaluated, but separate certifications will allow Districts and stakeholders more flexibility than is currently available in CP-201.

b. Effective/Operative Dates

Staff proposes an effective date of January 1, 2009 for this measure. The effective date will start the four-year clock mentioned below, which will require existing certified AST systems to meet the proposed EVR standards by January 1, 2013. This means that new AST installations occurring on or after January 1, 2009 must comply with the new AST EVR performance standards and specifications. The January 1, 2009, effective date will allow manufacturers sufficient time and opportunity to develop and certify vapor recovery systems and components that would comply with the new AST EVR performance standards and specifications. The proposal authorizes the Executive Officer to modify or change the effective date in the event a system is not commercially available.

Although existing facilities can continue to operate for up to four years after the January 1, 2009 effective date, components on these systems may need replacement within this four-year timeframe. Staff has proposed a limited-term certification process to address certification of replacement components so that installed systems can continue operation with the best replacement parts available. The certification for these replacement parts will expire at the end of the four-year clock if the parts do not meet all of the new standards. However, when replacement parts certified to meet the new standard are commercially available and are compatible, only those replacement parts shall be installed.

c. State Law Requirements and Four-Year Clock

The proposal specifies new performance standards and specifications for Standing Loss, Phase I, and Phase II vapor recovery systems as well as new certification and test procedures. The change in performance standards and specifications means that existing AST vapor recovery system certifications will expire on the effective date of the new requirements. After the effective date, ARB may only certify systems that comply with the new performance standards and specifications.

Health and Safety Code Section 41956.1 provides that vapor recovery systems certified under procedures in effect prior to adoption of revised performance standards and specifications, and installed prior to the effective date of the revised standards, may continue to be used for a period of four years after the effective date of the revised standards. This is commonly referred to as the "four-year clock." Thus, for example, a station owner who purchased and installed a new vapor recovery system before the date of the new standard will have four years to comply.

New facilities installed on or after the effective date must comply with the new standards and specifications. Existing facilities that undergo a major modification after the effective date must also comply with the new standards and specifications. For AST systems, a major modification means replacing the tank. An exception is when the tank is installed after retrofitting to comply with requirements of CP-206 or when an existing tank is exchanged with a retrofitted tank of equal capacity to comply with CP-206.

d. Standing Loss Control

Standing Loss Control vapor recovery systems will be certified either through performance based or design based testing. Performance based testing will evaluate Standing Loss Control systems. These systems of components that meet or exceed the performance standards will be certified and given a system specific Executive Order. Standing Loss Control systems must remain together. Design based testing will evaluate Standing Loss Control components independently. Components that meet or exceed the performance standards will be certified and added to a universal Executive Order from which the GDF owner/operator may select for control.

e. Phase I and Phase II

Phase I and Phase II certification will be similar to the certification process defined in CP-201. Systems will be evaluated for a minimum 180 days. Systems that meet or exceed all the performance standards and specifications will be given a specific Executive Order. Phase I and Phase II systems must remain together. Certification of Phase I and Phase II systems will be tested independently, although compatibility between systems will remain a requirement.

f. Limited Term Certification

Staff proposes a four-year limited term certification, as already required for UST vapor recovery systems under EVR.

Currently, certifications for AST vapor recovery equipment have no expiration date. State law provides for decertifying systems if the system no longer meets the required specifications or standards (H&SC section 41954(c)(2)); however, this process is not often invoked, because of the consequences of revocation. As a result, equipment may be purchased and installed while identified problems are being resolved. Also, systems that are no longer manufactured or supported remain installed and, in some cases, are still being installed from old stockpiles of equipment.

Staff is proposing limited term certifications of four years duration that could be renewed continuously without additional testing unless renewal is denied based on data demonstrating deficiencies. ARB staff would process the renewal automatically if there were no deficiencies. If deficiencies are found, ARB staff would work with the equipment manufacturer to resolve the problems before a new certification is issued. This process allows timely correction of problems while avoiding the negative attributes associated with decertification.

Installed systems affected by certification expiration may remain in use for the remainder of the useful life, or four years, whichever is shorter, as required by state law.

g. Below Grade Vaulted Tanks

Below-grade vaulted storage tanks have become more popular recently primarily due to water quality concerns and environmental clean-up considerations. A partial sales tax exemption has made the use of vaulted systems attractive as the increased installation costs are often recouped in a short period for high throughput stations. The ARB has evaluated and certified several vaulted systems in California and has determined that these systems operate very similarly to UST vapor recovery systems, with the exception of the emergency vent requirements. For this reason, staff is proposing to certify the vaulted systems in nearly an identical manner as the UST vapor recovery systems and is, therefore, referencing CP-201 for the certification requirements for most aspects of these systems.

h. Test Procedures

Staff proposes to incorporate the following test procedures into the Gasoline Vapor Recovery Certification and Test Methods 206 series to evaluate systems and components specific to an AST.

- TP-206.1, Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks,

- TP-206.2, Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks, and

- TP-206.3, Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks.

V. ENVIRONMENTAL AND ECONOMIC IMPACT

This section discusses the environmental and economic impacts of the proposed regulation. The environmental impact includes the AST population distribution, baseline emissions, and emission reductions achieved through adoption of the proposed regulation. Economic impacts consider standing- and working- loss EVR system costs, staff assumptions related to those costs, and an evaluation of the cost effectiveness of the proposed regulation.

A. Environmental Impact

Staff's proposed regulation will provide ROG emission reductions of up to 1.98 tons per day (TPD).

1. AST Population Distribution

The number of ASTs in California is determined through a 2004 Fuel Carrier survey and provides the basis for environmental and economic impact calculations (Appendix H). The survey distributes different size ranges of ASTs into two categories: single wall and protected. The 2004 Fuel Carrier survey data is summarized in Table V-1.

Table V-1
Vapor Recovery Configurations of Single Wall and Protected ASTs

Tank	Current Configuration	No. of tanks	
		Exempt	Subject to Vapor Recovery
Single Wall	No Vapor Recovery (Exempt)	2,394	
	No Vapor Recovery (Not in Compliance with District rules)		3,383
	Phase I		1,610
	Phase I/II		233
Protected	No Vapor Recovery (Exempt)	39	
	No Vapor Recovery (Not in Compliance)		225
	Phase I		383
	Phase I/II		1,315
	Total	2,433	7,149

The 2004 Fuel Carrier Survey also categorized ASTs into three applications: farm (agriculture), marina, and other (retail GDFs and municipalities). ASTs in the farm category are assumed to be non-permitted by Districts. ASTs in the marina and other categories are assumed to be permitted by Districts.

The total number of tanks identified in the 2004 Fuel Carrier survey data is 9,582, of which 7,149 will be subject to the proposed regulation (total tanks minus exempt tanks).

2. Baseline AST Emissions

The baseline AST emissions were developed from the 2004 Fuel Carrier survey. The methodology used to develop the emissions inventory is detailed in Appendix I. Staff estimates there are 3.31 TPD of ROG emissions from ASTs operating in California.

The 2004 fuel carrier survey did not have information on the number of ASTs for each of the districts in the state and therefore the emissions could not be calculated for each district. However, emissions can be estimated for a defined region based on the number of tanks in that particular region. The emissions from San Joaquin Valley region defined in Appendix I, are estimated to be 1.13 TPD which is approximately 34 percent of the total AST emissions.

Table V-2 summarizes the 2004 Statewide emissions from ASTs in their current configurations.

Table V-2
2004 Statewide AST Emissions

Emission Source	Emissions (TPD)
Standing Losses	2.95
Phase I losses	0.14
Phase II losses	0.20
Spillage losses	0.02
Total AST Emissions	**3.31**

3. Emission Reductions

ARB is authorized by the HSC to certifying vapor recovery systems and Districts have the primary responsibility of regulating emissions from stationary sources such as service stations and ASTs. To achieve emission reductions Districts have adopted rules that require gasoline storage and transfer operations to be equipped with a vapor recovery system certified by the ARB. All emission reductions assume 100 percent compliance with District rules.

a. Standing Losses

The majority of emission reductions resulting from the proposal come from reducing standing loss emissions. These emissions are due to the release of gasoline vapors through leaks in the system when tank pressure increases due to increases in fuel surface temperatures that are affected by diurnal ambient temperature changes. Through the application of Standing Loss Control (SLC) vapor recovery systems, the fuel surface temperature range can be attenuated to reduce emissions and components can be used to control vent emissions. Proposed TP-206.1 and TP-206.2 provide test procedures to evaluate systems that attenuate fuel surface temperature and processed hydrocarbon emissions to CP-206 performance standards and specifications.

The emission factor performance standard defined in CP-206 allows for emission reductions for new facilities (0.57 lbs./1000 gallons/day) and retrofitting existing facilities (2.26 lbs./1000 gallons/day). The emission reductions associated with new facilities will not be realized until these systems are installed. Therefore most of the emission reductions come from application of Standing Loss Control vapor recovery systems to existing ASTs. Emission reductions from the application of Standing Loss Control vapor recovery systems to existing ASTs by January 1, 2013, are summarized in Table V-3.

Table V-3
Standing Loss Control Vapor Recovery System Emission Reductions for AST Retrofits

Category	No. of tanks	Percent Reduction	Emission Reduction (TPD)
Existing ASTs	7,149	60%	1.77

New ASTs will be required to meet 90 percent standing loss control begining January 1, 2009. Assuming the growth from 2009-2020 is approximately 13.5 percent, the additional emission reductions from new tanks will be approximately 0.34 TPD by 2020.

b. Working Losses

The introduction of EVR for Phase I and Phase II, as well as the use of the new test procedure, TP-206.3, will provide higher transfer efficiencies and stricter standards for allowable leak rates in AST systems. TP-206.3 improves the testing strategies as compared to the current test procedure, TP-201.3B, "*Determination of Static Pressure of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks*." Current Phase I and Phase II systems are certified at 90 percent transfer efficiency. To be consistent with underground tank systems, staff's proposal is to increase transfer efficiencies to 98 percent for Phase I and 95 percent for Phase II. Although these proposed transfer efficiency increases do not contribute to large emission reductions, making Phase I and Phase II consistent with EVR standards and specifications assures higher component and system durability and will improve overall system performance and align the UST and AST vapor recovery requirements. The allowable static pressure decay value will be approximately half what is currently allowed by TP-201.3B. Certification testing will assure those future systems and components meet the new performance standards and are reasonably durable in use.

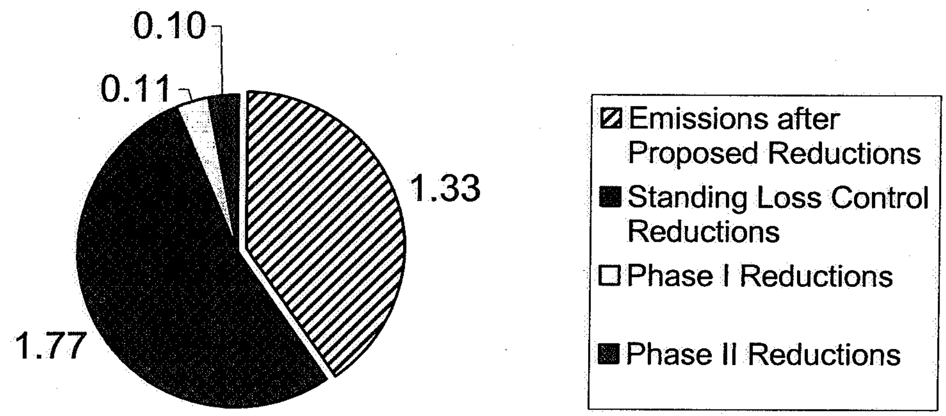
Table V-4 summaries the emission reductions associated with increasing Phase I and Phase II transfer efficiencies to EVR performance standards and specifications.

Table V-4
Phase I and Phase II Vapor Recovery System Emission Reductions

Category	No. of tanks	Transfer Efficiency	Emission Reduction (TPD)
Phase I	5,601	98%	0.11
Phase II	1,548	95%	0.10
Total	7,149	--	**0.21**

The estimated statewide emission reductions achieved with staff's proposal will be 1.98 TPD. The estimated emission reductions are illustrated in Figure V-1.

Figure V-1
Emissions Reductions and Remaining Emissions for Proposal



B. Economic Impact

1. Gasoline Savings

Emissions are directly related to gasoline lost through evaporation. As stated in the previous section there are approximately 1.98 TPD of emissions reduced with the adoption of the proposed regulation. This is equivalent to approximately 600 gallons of gasoline saved per day. At a current market price of $2.50 per gallon of gasoline, the potential cost savings attributed to the proposed regulation is approximately $1,516 per day, or $0.40 per pound of ROG emissions. Cost savings from gasoline savings are included in the cost analysis or cost effectiveness of the regulation.

2. Cost Analysis

The cost analysis is based on AST Pre-EVR and UST EVR equipment from three vapor recovery system manufacturers. Research and development, and certification costs were not considered since these systems are already certified or undergoing certification testing. The price of EVR systems includes these costs.

The cost to install and/or upgrade each tank to meet the proposed regulatory requirements depends on multiple factors: type of tank (single wall or protected), current District vapor recovery requirements (Phase I and/or Phase II), and compliance status with District rules (no vapor recovery). These categories determine capital cost associated with a single wall or protected tank to install and/or upgrade with Standing Loss Control, Phase I EVR, and/or Phase II EVR systems. Table V-5 summarizes the capital cost per tank of the proposed regulation assuming 100 percent compliance with District rules. The following three examples illustrate how some tanks might be affected.

- Example 1: A single wall 750 gallon AST in the San Joaquin Valley which was installed in 1991 with an annual throughput of 10,000 gallons currently requires Phase I only. Under this proposal, that same tank would be expected to meet the SLC and Phase I EVR standards by January 1, 2013. Table I-1 shows that there are approximately 1,610 tanks statewide that would be required to make a similar modification at an average incremental cost of $473.

- Example 2: A similar 750 gallon single wall AST is required to have Phase I vapor recovery but does not. This AST is listed in the second row of the table as having "No Vapor Recovery (Not in Compliance with District rules)". The proposal estimates that this AST would be retrofitted with SLC and Phase I EVR just as in Example 1. The cost to come into compliance for this tank is $2,023. This difference in cost between this and Example 1 is attributed to installing equipment that was required but is not in place. Most of the 3,383 tanks in this category are used in agriculture and until recently were exempt from District permitting, thus control requirements were not enforced.

- Example 3: If a District amends their rules to require SLC only, then AST owners that meet the conditions of the rule would be required to retrofit to that level. Therefore, a single wall 750 gallon AST with no vapor recovery that is expected to come into compliance with the amended rule would be required to install SLC only. The average cost for an AST owner would be approximately $432. This cost is not reflected in Table I-1 since the Districts do not have rules in place and it would be difficult to project how many tanks would be subject to this statewide.

Table V-5
Estimated Incremental Cost per Tank

Tank	Current Configuration	Proposed Configuration	No. of tanks		Incremental Cost per tank ($)
			Exempt	Subject to Vapor Recovery	
Single Wall	No VR (Exempt)	No VR (Exempt)	2,394		$0
	No VR (Not in Compliance with District rules)	SLC + Phase I EVR		3,383	$2,023
	Phase I	SLC + Phase I EVR		1,610	$473
	Phase I/II	SLC + Phase I/II EVR		233	$594
Protected	No VR (Exempt)	No VR (Exempt)	39		$0
	No VR (Not in Compliance with District rules)	Phase I EVR		225	$1,693
	Phase I	Phase I EVR		383	$143
	Phase I/II	Phase I/II EVR		1,315	$264
		Total	2,433	7,149	

From the 2004 Fuel Carrier AST population survey, each category of single wall and protected tank current is compared to District rule applicability. This comparison provides the basis for the cost assumptions (Appendix J) used to determine which, if any, vapor recovery requirements will apply to current vapor recovery configurations. District rules determine which ASTs will be exempt from vapor recovery or require Standing Loss Control, Phase I EVR, and/or Phase II EVR vapor recovery.

3. Cost-Effectiveness of Proposed Regulations

The cost effectiveness analysis distributes the number of ASTs in each category, quantifies the annualized upgrade/installation costs per AST in each category, converts these costs to annualized statewide cost, and divides the annualized statewide cost by the annualized statewide emission reductions for each vapor recovery category. Annualized costs include the opportunity cost of capital at a 5 percent discount rate. Once the cost effectiveness is determined for each category, the annual statewide cost effectiveness of the proposed regulation is determined.

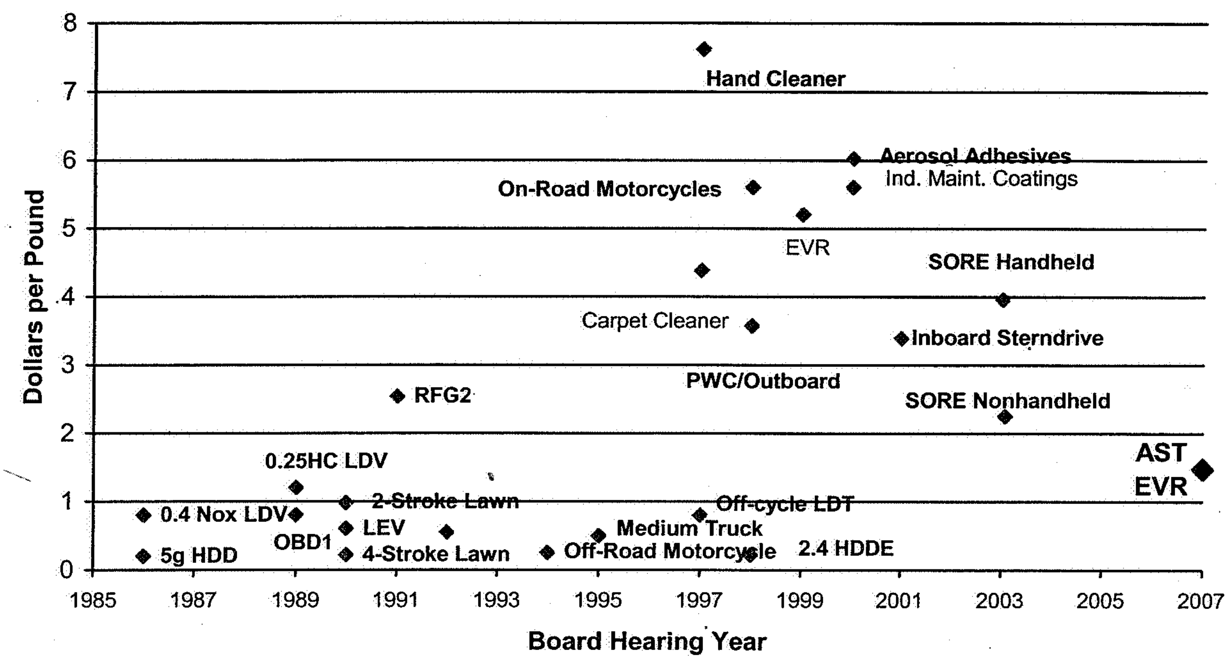
The cost effectiveness for all California ASTs is approximately $1.87 per pound of ROG emissions reduced. Including the cost savings from gasoline (approximately $0.40 per pound gasoline saved) the net cost effectiveness of the proposed regulation is approximately $1.47 per pound. Table V-6 summarizes the cost effectiveness of the proposed regulation.

Table V-6
Cost Effectiveness of Proposed Regulation

Tank	Current Configuration	Proposed Configuration	No. of tanks		Annualized Statewide Cost	Statewide emission reductions (TPD)	Cost effectiveness ($/lbs.)
Single Wall	No VR (Exempt)	No VR (Exempt)	2,394		—	—	—
	No VR (Not in Comp.)	SLC + Phase I EVR		3,383	$2,165,120.00	1.20	$2.48
	Phase I	SLC + Phase I EVR		1,610	$309,635.20	0.57	$0.74
	Phase I/II	SLC + Phase I/II EVR		233	$52,932.94	0.10	$0.74
Protected	No VR (Exempt)	No VR (Exempt)	39		—	—	—
	No VR (Not in Comp.)	Phase I EVR		225	$103,356.00	0.00	$41.28
	Phase I	Phase I EVR		383	$4,473.44	0.01	$1.03
	Phase I/II	Phase I/II EVR		1,315	$61,200.10	0.11	$0.80
			2,433	7,149	$2,696,717.68	1.98	$1.87
Net Cost Effectiveness with Gasoline Savings							**$1.47**

To put these figures into context, Figure V-2 compares the overall cost effectiveness of this proposal with other recent ARB rulemakings.

Figure V-2
Cost Effectiveness Comparison of Major Regulations



4. Economic Impact on the Economy of the State

Staff does not expect the proposed regulation to impose an unreasonable cost burden on gasoline dispensing equipment manufacturers, component suppliers, or gasoline dispensing facilities. Most of the major manufacturers are located outside of California although some may have small operations in California. Predominate costs are to owners and operators of gasoline dispensing facilities with AST's.

Staff estimates the cost of the proposed regulations to be approximately $10.8 million dollars upon full implementation in 2013. These costs represent equipment retrofits, upgrades, and installations required by District rules.

a. Legal Requirement

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete.

Section 11346.5 of the Government Code requires State agencies to estimate the cost or savings to any state, local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

Health and Safety Code Section 57005 requires the ARB to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year.

b. Businesses Affected

Businesses potentially affected by the proposed regulation include manufacturers of ASTs and vapor recovery equipment, contractors servicing and installing ASTs and vapor recovery equipment, and owners and operators of GDFs with ASTs.

c. Vapor Recovery Equipment Manufacturers

The proposed regulation will impose additional certification costs on manufacturers of ASTs and vapor recovery equipment. These costs were discussed in the cost effectiveness section and are included in the cost of vapor recovery equipment. Costs for development of AST vapor recovery equipment to meet the new performance standards are minimal because the technologies are commercially available. Equipment unique to ASTs, such as leak-tight emergency vents, is also already commercially available. Staff does not expect the proposed regulation to cause a noticeable adverse impact on the affected manufacturers.

d. Vapor Recovery Equipment Distributors and Contractors

Contractors will potentially benefit from staff's proposal. Contractors will experience an increase in demand for their services, as manufacturers require certification testing and GDFs require installation and testing of EVR equipment.

e. Owners and Operators of Gasoline Dispensing Facilities

Gasoline dispensing facilities with ASTs are the main focus of the proposed regulation. Owners and operators of GDFs with ASTs would be required to retrofit, upgrade, and/or install EVR systems based on their current equipment and District rule requirements. Based on ARB's Fuel Carrier survey, there are 9,582 ASTs dispensing gasoline to vehicles in California. Of these 9,582 ASTs, 2,433 are exempt from vapor recovery requirements per District rules. The new requirements are expected to impose additional costs on the remaining 7,149 ASTs. The annualized cost ranges from $12 to $1,148 per tank.

f. Potential Impact on Retail Consumers

A typical retail service station has throughputs exceeding 100,000 gallons per month, but most ASTs are used to fuel farm vehicles or fleets (utilities, government, etc.). Most ASTs have throughputs far less than retail service stations. Therefore, the effects from this proposal have a minimal effect on the general public. However, businesses affected by the proposal may pass on costs to the customer by increasing the price per gallon of gasoline dispensed. Staff calculates an annualized cost increase of approximately $0.10 per gallon for ASTs with 1,000 gallons per month throughput to offset the "worst case" scenario of $1,148 annually per tank. This cost could be passed on to the consumer. Non-retail GDFs such as those used on farms are discussed in section VI of this report

g. Potential Impact on Business Competitiveness

The proposed regulation would have no significant impact on the ability of California manufacturers to compete with manufacturers of similar products in other states. All EVR equipment manufactured for sale in California is subject to the proposed regulation regardless of origin. Most EVR manufacturers are located outside of California although some may have facilities within the State. Out of a total 62 manufacturers of AST measuring and dispensing equipment, only 15 were located in California in 2002 according to the U.S. Census Bureau.

h. Potential Impact on Employment

California accounts for only a small share of the manufacturing employment for EVR equipment. According to the U.S. Census Bureau, California employment in the industry (NAICS 333911 or SIC 3586) was 352 in 2002, or about 9.6 percent of the national employment for establishments primarily involved in manufacturing measurement and dispensing pumps, such as gasoline pumps and lubricating oil measuring and dispensing pumps. This represents only 0.02 percent of the total manufacturing jobs in California. These employees from the 15 establishments in California generated approximately $27 million in payroll. Six establishments had more than 20 employees and the other nine establishments have fewer than 20 employees. The proposed regulation is unlikely to cause a noticeable change in employment for EVR manufacturers because they are likely to pass on the majority of the cost increase to GDF owners and operators.

Contractors that install and maintain vapor recovery systems may benefit from Staff's proposed regulation as demand could potentially increase for these contractor's services, resulting in an employment increase for that sector.

i. Potential Impact on Business Creation, Elimination, or Expansion

The proposed regulation is not expected to have a significant impact on the status of California businesses. Most manufacturers are likely to pass on the majority of cost increases to GDF owners and operators. Some operators of GDFs with ASTs may reassess whether the cost increase is justified for continued operation.

GDF owners and operators in the small business sector may lack the financial resources to install EVR systems within a timely basis. Grants and low-interest loans for EVR installations and retrofits available under the Replacement and Removal of Underground Storage Tank (RUST) program are not available for ASTs. The State of California offers information on loan programs for small businesses at: http://www.commerce.ca.gov/state/ttca/ttca_homepage.jsp.

The proposed regulation may result in the creation of some business opportunities in California by potentially increasing the demand for contractor services to install and maintain vapor recovery equipment. As a result, some existing businesses may expand, and some new businesses may be created to meet the increased demand for installation, retrofitting, and maintenance of EVR equipment.

j. Potential Impacts to California State and Local Agencies

Staff does not expect a substantial adverse impact on local Districts. ARB will continue to conduct certification testing of EVR systems and equipment, and the Districts' roles of inspecting the in-field applications of EVR equipment will not change. However, Districts may need to undergo a new rulemaking to require Standing Loss Control requirements. This will require additional District staff time and resources to evaluate current rules, potentially amend those rules, and conduct public workshops prior to local Board hearings.

Additionally, California State and local agencies with AST GDFs, such as the California Highway Patrol, local fire districts, and school districts, will incur costs to retrofit and/or install EVR systems and equipment to meet the new performance standards. The annualized costs of ASTs for these agencies will range from $12 to $1,148.

C. Environmental Justice Impacts

The ARB is required to evaluate community impacts of proposed regulations including environmental justice concerns. Because some communities experience higher exposure to toxic pollutants, it is a priority of ARB to ensure that full protection is afforded to all Californians. The proposed AST EVR regulation is not expected to result in significant negative impacts in any community. The proposed regulation is designed to reduce emissions of ROG in mostly rural areas of California. This has the effect of reducing exposure of gasoline vapors containing benzene, a toxic air contaminant, to farm labor working near ASTs.

VI. IMPACTS ON AGRICULTURE

This section summarizes the impacts the proposed regulation is anticipated to have on agricultural operations. It includes a discussion of the background, applicability, and costs associated with the proposed regulation with respect to agriculture, specifically.

A. Background

The California Health and Safety Code (HSC) provide exemptions from vapor recovery requirements for stationary storage tanks used primarily for the fueling of "implements of husbandry" (HSC section 41950(e)). The HSC defined implements of husbandry by reference to their definitions in the California Vehicle Code (HSC section 39034 and Vehicle Code section 36000, et. seq.). The Vehicle Code's basic definition says that an implement of husbandry is a vehicle which is used exclusively in conduct of agricultural operations. Specific examples of implements of husbandry in the Vehicle Code include tractors, harvesters, and other vehicles involved in the cultivation of crops and breeding and raising of livestock. Aboveground Storage Tanks (AST) used for fueling implements of husbandry are considered agricultural sources of air pollution, specifically hydrocarbon emissions. These ASTs are typically located in remote areas far from gasoline dispensing facilities and fuel off-road farm equipment. There are approximately 6,400 agricultural ASTs in California identified in the 2004 fuel carrier survey.

B. Applicability to Agricultural Sources

Air pollution control and air quality management district rules specify requirements for vapor recovery for stationary gasoline tanks. Most District rules include exemption criteria for Phase I and Phase II vapor recovery for ASTs used primarily for fueling implements of husbandry. For example, San Joaquin Valley Air Pollution Control District (SJVAPCD) rules exempt agricultural ASTs used exclusively for fueling implements of husbandry less than or equal to 550 gallons that operate with a permanent submerged fill pipe from Phase I requirements. The SJVAPCD also exempts tanks from Phase II requirements based on installation date and gasoline throughput. Under District rules, most ASTs that do not meet the exemption criteria are required to have only Phase I vapor recovery equipment. Larger tanks with higher throughputs are required to have Phase I and Phase II vapor recovery systems.

Historically, ASTs used in agricultural operations have been exempted by state law from District permit requirements; however, with the passage of Senate Bill 700 (Florez, 2003) agricultural sources of air pollution, including stationary gasoline storage tanks, are no longer exempt from district permits. Currently ASTs used in agricultural operations that do not meet district rule exemption criteria would be required to have currently certified Phase I and Phase II vapor recovery systems. The district's size and throughput exemptions would remain in force, unless changed through a district rulemaking. District rules may now require permits for ASTs as well.

C. Agricultural Costs

Agricultural stakeholders are concerned that retrofitting and upgrading existing ASTs with vapor recovery equipment certified to the performance standards and specifications proposed in the Certification Procedure will be cost prohibitive. The cost associated with the proposed regulation is shown in the Environmental and Economic Impact, Section V, of the staff report. The typical configurations of agricultural ASTs and their associated cost and cost effectiveness are summarized in Table VI-1. Most agricultural ASTs operating in California are single wall and/or exempt from Phase II vapor recovery in District rules. Aboveground Storage Tanks that are exempt from District rules (2,394) are expected to remain exempt. A large number of single wall ASTs (3,383) that are not in compliance with District rules (No Vapor Recovery, or No VR) will be required to install Standing Loss Control (SLC) and a Phase I EVR system under this proposal. The last category represents single wall ASTs (1,610) that are in compliance with District rules and will be required to install SLC and upgrade to Phase I EVR system under this proposal.

Table VI-1
Cost and Cost Effectiveness of Agricultural ASTs

Single Wall AST	Total Lifetime Cost ($) per tank	Annualized Cost ($) per tank	Cost Effectiveness* ($/lbs)
Exempt	$0	$0	--
No VR to SLC and Phase I EVR	$6,650	$640	$2.48
Phase I to SLC and Phase I EVR	$2,000	$192	$0.74

*does not include gasoline cost savings

Many ASTs used in agricultural operations do not currently have vapor recovery systems installed. District rules require vapor recovery systems on permitted and non-permitted ASTs that do not meet District exemption requirements. ASTs that are exempt from District rules will not be required to have EVR systems unless the District changes their exemption criteria. The cost of the proposed regulation varies depending on the current configuration of the AST.

D. Impact of Proposed Standard

ARB staff recommends existing agricultural ASTs that are not exempt by District rule be required to retrofit to meet a minimum Standing Loss Control level of 2.26 lbs./1000 gallons/day. Staff recommends new agricultural tanks meet a minimum Standing Loss Control level of 0.57 lbs./1000 gallons/day. Phase I EVR and Phase II EVR systems may also be required based on District rules; however, staff is not recommending the expansion of District rules for Phase I and Phase II applicability.

VII. ALTERNATIVES

In accordance with Government Code Section 11346.5, subdivision (a)(13), ARB must determine that no reasonable alternative it considered or that has been identified would be more effective or as effective and less burdensome to affected private persons than the proposal for carrying out the purpose of the proposal. This section discusses alternatives to the proposal.

A. Tank Pressure Management

An alternative to staff's proposal is to adopt certification and test procedures specifically designed for ASTs that incorporate performance standards and specifications that could reduce emissions up to 2.98 tons per day by reducing the leak rates and managing tank pressure. This alternative would include the inclusion of a Phase II negative pressure requirement and necessitate the use of a vapor processor and the annual cost per tank would be approximately $2,478. This does not include the cost of securing and use of electricity to operate the processor. Table VII-1 compares this alternative to staff's proposal.

Table VII-1
Comparison of Tank Pressure Management Alternative to Staff Proposal

	Emission Reductions (TPD)	Cost Effectiveness ($/lbs.)
Alternative	2.98	$8.14
Staff Proposal	1.98	$1.47

B. 0.57 lbs./1000 gallons/day Standing Loss Control Level (90 percent)

An alternative to staff's proposed regulation is to adopt certification and test procedures for retrofitting existing ASTs to a Standing Loss Control level of 0.57 lbs/1000 gallons/day. Under this alternative, Phase I EVR and Phase II EVR performance standards and specifications will be incorporated into the proposed regulation to ensure vapor recovery system durability and consistency. This alternative will reduce standing loss emissions up to 2.65 TPD and transfer emissions by 0.21 TPD. The total emission reductions for this alternative will be 2.86 TPD compared to 1.98 TPD for staff's proposal. Control technologies such as foam insulation along with a P/V relief valve can achieve this level of emission reduction and can be used to retrofit existing ASTs. The retrofit cost of insulating an AST with foam type material depends on several factors, including the tank condition, location, number of tanks on site, and preparation (e.g. sandblasting, pre-coating, two-component mixing, overspray) of the AST as well as the area surrounding the AST (e.g. environmental conditions, geography, physical obstructions, power supply). These variables were discussed at a meeting between ARB, agricultural stakeholders, and foam insulation contractors in Fresno, California in March 2007. Due to these variables, many foam insulation contractors are unable to estimate the cost and are unwilling to provide cost estimates to retrofit existing ASTs in the field. Agricultural stakeholders have also expressed concerns that this technology has not been durability tested and may be cost prohibitive because of the variables that affect the retrofit cost. Staff does not recommend this alternative because of the high degree of uncertainty of the cost.

C. 1.34 lbs/1000 gallons/day Standing Loss Control Level (76 percent)

An alternative to staff's proposed regulation is to adopt certification and test procedures for retrofitting existing ASTs to Standing Loss Control of 1.34 lbs/1000 gallons/day. Under this alternative, Phase I EVR and Phase II EVR performance standards and specifications would be incorporated into the proposed regulation to ensure vapor recovery system durability and consistency. This alternative will reduce standing loss emissions up to 2.24 TPD of ROG and transfer emissions by 0.21 TPD of ROG. The total emission reductions for this alternative will be 2.45 TPD of ROG. The annual cost per tank associated with this alternative will be $377. Control technologies used to achieve this level of emission reduction include passive purge carbon canisters. Carbon canisters mounted on the top of an AST vent are open to the atmosphere to allow air to flow in and out resulting in the capture of hydrocarbons on the carbon and the purge of hydrocarbons back into the AST. A majority of ASTs are used in agricultural operations. Under these environmental conditions dust and debris may restrict the airflow through the carbon canister. Staff has no information on how the carbon canister will perform over 15 years (assumed lifetime used in cost effectiveness calculations) under these environmental conditions. Routine inspections and maintenance may be required to achieve maximum performance potentially driving up the cost of this control technology. Districts have expressed concerns related to the proper operation of this technology based on experiences with carbon canisters in other applications. Cost of in-use compliance of carbon canisters is unknown and could substantially affect the viability of this alternative. Staff will monitor the progress of this technology if stakeholders choose the optional level for existing installations to take advantage of emission credits. Table VII-2 compares this alternative to staff's proposal. While this option has reasonable cost effectiveness, there are significant stakeholder and staff concerns about the long term effectiveness of the carbon canister in this environment and cost of in-use compliance. Staff is not recommending this alternative.

Table VII-2
Comparison of 1.34 lbs/1000 gallons/day Standing Loss Control Alternative to Staff Proposal

	Emission Reductions (TPD)	Cost Effectiveness ($/lbs.)
Alternative	2.45	$1.68
Staff Proposal	1.98	$1.47

D. No Adoption of Proposed Standard

Staff has considered this option. Without the adoption of the proposed regulation, some emission reductions may be achieved as Districts enforce current rules on ASTs used in agricultural operations. A majority of these tanks have not been permitted, and thus not inspected for compliance with District rules. The passing of Senate Bill 700 (Florez, 2003) gave Districts the authority to permit tanks used in agricultural operations. With more resources available to enforce District rules, it is estimated that an additional 4,032 tanks would be required to have Phase I vapor recovery systems installed. These tanks already are required to have vapor recovery per District rule, but are not likely in compliance. The annual cost for this alternative will be $448 with associated emission reductions of approximately 0.13 TPD, if 100 percent compliance with District rules is assumed. Table VII-3 compares this alternative to staff's proposal. Staff does not recommend this alternative because it is not reduce significant emissions and is not cost effective.

Table VII-3
Comparison of No Adoption Alternative to Staff Proposal

	Emission Reductions (TPD)	Cost Effectiveness ($/lbs.)
Alternative	0.13	$17.02
Staff Proposal	1.98	$1.47

E. Staff Proposal

Staff recommends that its proposal be adopted, since it is cost effective as compared to recently adopted regulations, achieves substantial emission reductions, and is amenable to industry and agricultural stakeholders. In addition, the advances made in the EVR systems for the UST program appear to be transferable to this program making components for ASTs more durable. Since EVR equipment is being certified for UST programs it would also be appropriate to keep the EVR standards and specifications similar for the AST program.

VIII. OUTSTANDING ISSUES

This section discusses issues associated with the proposed regulation and is intended to clarify staff's recommendation.

A. Cost of AST EVR Proposal

Stakeholders from the retailer to agricultural sectors have expressed concerns with the cost of the proposal. These stakeholders indicate that it would be difficult to pass through any significant increase in cost and still remain competitive. Raising the necessary capital to retrofit and/or install new EVR equipment has also been identified as an issue. In Section V, Staff estimated the annualized cost of the proposed regulation would be as much as $1,148 per tank, based on a tank that is single wall with no vapor recovery that would be required to retrofit with Standing Loss Control equipment and install Phase I and Phase II EVR systems (Appendix J). The cost effectiveness of the proposed regulation is $1.87 per pound of ROG emission reduction, which compares favorably with other control measures recently adopted by the Board. This does not include gasoline cost savings which is approximately $0.40 per pound of gasoline saved. The net cost effectiveness of the proposed regulation including the cost saving from gasoline is approximately $1.47 per pound of ROG.

B. Applicability of Bulk Plants/Terminals

The AST proposed regulation (CP-206) will not apply to bulk plants and terminals. At multiple workshops there was some confusion whether the proposed regulation would affect bulk plants and terminals. Bulk plants are intermediate gasoline distribution facilities that receive and deliver gasoline via cargo trucks. Terminals are primary distribution facilities for the loading of cargo trucks that deliver gasoline to bulk plants, service stations, and other distribution points. ARB certifies bulk plants under CP-202, *Certification for Vapor Recovery Systems of Bulk Plants*, and certified terminals under CP-203, *Certification of Vapor Recovery Systems of Terminals*. The bulk plant and terminal certification testing determine whether the transfer efficiencies to and from the cargo tank meet the performance standards and specifications. Some bulk plants and terminals have dispensers that refuel motor vehicles. The refueling is done with fuel stored in bulk plant tanks which may be underground or aboveground storage tanks. Districts have adopted rules requiring such bulk plants and terminals to install Phase II vapor recovery systems. Currently, staff is considering a new rulemaking for bulk plants to incorporate Phase II system certification into CP-202. There are currently no plans to incorporate Phase II system certification for terminals into CP-203.

C. Availability of Electricity for ASTs in Remote Areas

Electricity is not available in remote areas and bringing in electricity would be a substantial cost. Electricity is needed to operate certain Phase II systems, especially those that are equipped with processors or are vacuum assist. Staff understands that significant cost would be incurred with bringing electricity to remote areas and recommends using Standing Loss Control technologies that use no electricity instead of more costly and electricity dependent vapor recovery systems. Districts are also in a better place to determine on a case-by-case basis whether vapor recovery is needed for certain areas. Any cost with bringing electricity into remote areas would be considered by Districts in their rulemaking.

D. District Permitting Costs

Staff recognizes that there are additional District permitting costs associated with the installation, retrofitting, and operation of GDF with ASTs. Stakeholders have stated that District permitting costs should be incorporated into the cost analysis sections of the proposed regulation. Staff has surveyed the District permitting costs and has summarized these costs from four Districts in Table VIII-1.

Table VIII-1
District AST Permitting Fees

District	Authority to Construct	Permit to Operate
San Joaquin Valley APCD	$60	$28/nozzle
Sacramento Metropolitan AQMD	$600	$85/nozzle
Siskiyou County APCD	$200	$90 (if < 10 dispensers)
Shasta County APCD	$75	$30 (if < 50,000 gallons throughput

Based on the District permitting cost survey, the permitting costs are small in comparison to the costs of compliance and do not significantly change the cost effectiveness of the proposed regulation.

E. Certification of Paint

Agricultural stakeholders expressed a concern about the certification of paint for the control of standing loss emissions. White paint is available in many retail facilities with a wide range of reflective properties. Stakeholders requested ARB certify the paint used during the field study for retrofitting existing ASTs. The HSC requires ARB to test, or contract for testing, gasoline vapor recovery systems for the purpose of determining whether those systems may be certified. At the time of the field study no certification and/or test procedures were adopted for the certification of paint as a Standing Loss Control technology. Staff recommends that paint be certified after the adoption of the proposed regulation, in accordance with State law and the administrative requirements in CP-206. White paint will be tested using proposed TP-206.1 for a minimum duration of 30 days.

IX. CONCLUSION AND RECOMMENDATION

The staff's goal is to achieve ROG emission reductions using technologies that are technically feasible and cost effective. The emissions from dispensing facilities using ASTs are significant and can be further reduced. ASTs are the only part of the gasoline dispensing facility that has not already been brought up to EVR performance standards and specifications. Staff believes that the proposed regulation is achievable using current vapor recovery control technologies and incorporating new technologies that can control standing loss emissions. The proposed regulations will help make progress toward achieving the ozone ambient air quality standard.

Staff recommends that the Board approve the proposed regulation to adopt Sections 94016 and 94168, and amend Sections 94010 and 94011, Title 17, California Code of Regulations. This would incorporate by reference changes to D-200, *Definitions for Vapor Recovery Procedures* and TP-201.2, *Efficiency and Emission Factor for Phase II Systems*, add a new certification procedure for aboveground storage tanks, CP-206, *Certification Procedures for Vapor Recovery Systems for Gasoline Dispensing Facilities Using Aboveground Storage Tanks*, and add three new test procedures, TP-206.1, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, TP-206.2, *Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks*, and TP-206.3, *Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks.*

X. REFERENCES

1 "STAFF REPORT: Enhanced Vapor Recovery Technology Review and Proposed Amendments of Vapor Recovery System Certification and Test Procedures for Gasoline Marketing Operations at Service Stations," October 25, 2002

2. "STAFF REPORT: Enhanced Vapor Recovery Certification and Testing Procedures for Gasoline Loading and Motor Vehicle Gasoline Refueling at Service Stations," February 4, 2000

3. "CP-201: Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities," Amended May 25, 2006

4. "CP-205: Certification Procedures for Vapor Recovery Systems at Novel Facilities," Amended March 17, 1999

5. "San Joaquin Valley Air Pollution Control District – Rule 4621," Amended June 18, 1998

6. "San Joaquin Valley Air Pollution Control District – Rule 4622," Amended September 19, 2002

7. "1994 California State Implementation Plan Volume I: Overview of the California Ozone SIP," Approved September 25, 1996

8. "Air Resources Board's Proposed State Strategy for California's 2007 State Implementation Plan, Section 4 – Proposed New SIP measures, page 108." Released January 31, 2007

9. Senate Bill 700 (Florez, 2003)

10. "TP-201.3B: Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks," Adopted April 12, 1996

11. MLD survey of companies who supply gasoline fuel to owners of ASTs across the state, 2004 (Included in ISOR as Appendix H)

12. MLD survey of local air districts for data on permitted ASTs, 2006 (Included in ISOR as Appendix H)

13. Temperature response data of fuel temperature in ASTs to changing ambient temperatures (attenuation factors) from several MLD tests (Included in ISOR as Appendix I)

14. Evaporation rates of fuel for open AST systems (tanks without any pressure/vacuum valve) from several MLD tests (Included in ISOR as Appendix D)

15. Monthly average ambient temperatures for 15 California cities from U.S. EPA's AP-42 methodology (Included in ISOR as Appendix I)

16. AST emissions equation model from U.S. EPA's AP-42 (Included in ISOR as Appendix I)

XI. APPENDIX

APPENDIX A
Vapor Recovery Health and Safety Code

SECTION 41954

(a) The state board shall adopt procedures for determining the compliance of any system designed for the control of gasoline vapor emissions during gasoline marketing operations, including storage and transfer operations, with performance standards that are reasonable and necessary to achieve or maintain any applicable ambient air quality standard.

(b) The state board shall, after a public hearing, adopt additional performance standards that are reasonable and necessary to ensure that systems for the control of gasoline vapors resulting from motor vehicle fueling operations do not cause excessive gasoline liquid spillage and excessive evaporative emissions from liquid retained in the dispensing nozzle or vapor return hose between refueling events, when used in a proper manner. To the maximum extent practicable, the additional performance standards shall allow flexibility in the design of gasoline vapor recovery systems and their components.

(c) (1) The state board shall certify, in cooperation with the districts, only those gasoline vapor control systems that it determines will meet the following requirements, if properly installed and maintained:

(A) The systems will meet the requirements of subdivision (a).

(B) With respect to any system designed to control gasoline vapors during vehicle refueling, that system, based on an engineering evaluation of that system's component qualities, design, and test performance, can be expected, with a high degree of certainty, to comply with that system's certification conditions over the warranty period specified by the board.

(C) With respect to any system designed to control gasoline vapors during vehicle refueling, that system shall be compatible with vehicles equipped with onboard refueling vapor recovery (ORVR) systems.

(2) The state board shall enumerate the specifications used for issuing the certification. After a system has been certified, if circumstances beyond the control of the state board cause the system to no longer meet the required specifications or standards, the state board shall revoke or modify the certification.

(d) The state board shall test, or contract for testing, gasoline vapor control systems for the purpose of determining whether those systems may be certified.

(e) The state board shall charge a reasonable fee for certification, not to exceed its actual costs therefor. Payment of the fee shall be a condition of certification.

(f) No person shall offer for sale, sell, or install any new or rebuilt gasoline vapor control system, or any component of the system, unless the system or component has been certified by the state board and is clearly identified by a permanent identification of the certified manufacturer or rebuilder.

(g) (1) Except as authorized by other provisions of law and except as provided in this subdivision, no district may adopt, after July 1, 1995, stricter procedures or performance standards than those adopted by the state board pursuant to subdivision (a), and no district may enforce any of those stricter procedures or performance standards.

(2) Any stricter procedures or performance standards shall not require the retrofitting, removal, or replacement of any existing system, which is installed and operating in compliance with applicable requirements, within four years from the effective date of those procedures or performance standards, except that existing requirements for retrofitting, removal, or replacement of nozzles with nozzles containing vapor-check valves may be enforced commencing July 1, 1998.

(3) Any stricter procedures or performance standards shall not be implemented until at least two systems meeting the stricter performance standards have been certified by the state board.

(4) If the certification of a gasoline vapor control system, or a component thereof, is revoked or modified, no district shall require a currently installed system, or component thereof, to be removed for a period of four years from the date of revocation or modification.

(h) No district shall require the use of test procedures for testing the performance of a gasoline vapor control system unless those test procedures have been adopted by the state board or have been determined by the state board to be equivalent to those adopted by the state board, except that test procedures used by a district prior to January 1, 1996, may continue to be used until January 1, 1998, without state board approval.

(i) With respect to those vapor control systems subject to certification by the state board, there shall be no criminal or civil proceedings commenced or maintained for failure to comply with any statute, rule, or regulation requiring a specified vapor recovery efficiency if the vapor control equipment which has been installed to comply with applicable vapor recovery requirements meets both of the following requirements:

(1) Has been certified by the state board at an efficiency or emission factor required by applicable statutes, rules, or regulations.

(2) Is installed, operated, and maintained in accordance with the requirements set forth in the document certification and the instructions of the equipment manufacturer.

APPENDIX B
Proposed Amendments of the California Code of Regulations

PROPOSED REGULATION ORDER

Note: ~~Strikeout~~ indicates deleted text; underline indicates inserted text.

Amend Sections 94010 and 94011, Article 1, Subchapter 8, Chapter 1, Division 3, Title 17, California Code of Regulations to read as follows:

§ 94010. Definitions.

The definitions of common terms and acronyms used in the certification and test procedures specified in Sections 94011, 94012, 94013, 94014, ~~and~~ 94015, and 94016 are listed in D-200, "Definitions for Vapor Recovery Procedures", adopted April 12, 1996, as last amended ~~May 25, 2006~~ [insert date of last amendment], which are incorporated herein by reference.

NOTE: Authority cited: Sections 39600, 39601, 39607 and 41954, Health and Safety Code. Reference: Sections 25290.1.2, 39515, 41954, 41959, 41960 and 41960.2, Health and Safety Code.

§ 94011. Certification of Vapor Recovery Systems of Dispensing Facilities.

The certification of gasoline vapor recovery systems at dispensing facilities (service stations) shall be accomplished in accordance with the Air Resources Board's CP-201, "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities" which is herein incorporated by reference. (Adopted: December 9, 1975, as last amended May 25, 2006).

The following test procedures (TP) cited in CP-201 are also incorporated by reference.

TP-201.1 – "Volumetric Efficiency for Phase I Systems" (Adopted: April 12, 1996, as last amended October 8, 2003)

TP-201.1A – "Emission Factor For Phase I Systems at Dispensing Facilities" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.1B – "Static Torque of Rotatable Phase I Adaptors" (Adopted: July 3, 2002, as last amended October 8, 2003)

TP-201.1C – "Leak Rate of Drop Tube/Drain Valve Assembly" (Adopted: July 3, 2002, as last amended October 8, 2003)

TP-201.1D – "Leak Rate of Drop Tube Overfill Prevention Devices" (Adopted: February 1, 2001, as last amended October 8, 2003)

TP-201.1E – "Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves" (Adopted: October 8, 2003)

TP-201.1E CERT – "Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valves" (Adopted: May 25, 2006)

TP-201.2 – "Efficiency and Emission Factor for Phase II Systems" (Adopted: April 12, 1996, as last amended ~~October 8, 2003~~ [insert date of last amendment])

TP-201.2A – "Determination of Vehicle Matrix for Phase II Systems" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.2B – "Flow and Pressure Measurement of Vapor Recovery Equipment" (Adopted: April 12, 1996, as last amended October 8, 2003)

TP-201.2C – "Spillage from Phase II Systems" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.2D – "Post-Fueling Drips from Nozzle Spouts" (Adopted: February 1, 2001, as last amended October 8, 2003)

TP-201.2E – "Gasoline Liquid Retention in Nozzles and Hoses" (Adopted: February 1, 2001)

TP-201.2F – "Pressure-Related Fugitive Emissions" (Adopted: February 1, 2001, as last amended October 8, 2003)

TP-201.2G – "Bend Radius Determination for Underground Storage Tank Vapor Recovery Components" (Adopted: October 8, 2003, as last amended May 25, 2006)

TP-201.2H – "Determination of Hazardous Air Pollutants from Vapor Recovery Processors" (Adopted: February 1, 2001)

TP-201.2I – "Test Procedure for In-Station Diagnostic Systems" (Adopted: October 8, 2003, as last amended May 25, 2006)

TP-201.2J – "Pressure Drop Bench Testing of Vapor Recovery Components" (Adopted: October 8, 2003)

TP-201.3 – "Determination of 2 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities" (Adopted: April 12, 1996, as last amended March 17, 1999)

TP-201.3A – "Determination of 5 Inch WC Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities" (Adopted: April 12, 1996)

TP-201.3B – "Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities with Above-Ground Storage Tanks" (Adopted: April 12, 1996)

TP-201.3C – "Determination of Vapor Piping Connections to Underground Gasoline Storage Tanks (Tie-Tank Test)" (Adopted: March 17, 1999)

TP-201.4 – "Dynamic Back Pressure" (Adopted: April 12, 1996, as last amended July 3, 2002)

TP-201.5 – "Air to Liquid Volume Ratio" (Adopted: April 12, 1996, as last amended February 1, 2001)

TP-201.6 – "Determination of Liquid Removal of Phase II Vapor Recovery Systems of Dispensing Facilities" (Adopted: April 12, 1996, as last amended April 28, 2000)

TP-201.6C – "Compliance Determination of Liquid Removal Rate" (Adopted: July 3, 2002)

TP-201.7 – "Continuous Pressure Monitoring" (Adopted: October 8, 2003)

NOTE: Authority cited: Sections 25290.1.2, 39600, 39601, 39607 and 41954, Health and Safety Code. Reference: Sections 25290.1.2, 39515, 41952, 41954, 41956.1, 41959, 41960 and 41960.2, Health and Safety Code.

Adopt new Section 94016, Article 1, Subchapter 8, Chapter 1, Division 3, Title 17, California Code of Regulations to read as follows:

<u>§ 94016. Certification of Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks</u>

The certification of gasoline vapor recovery systems at dispensing facilities using aboveground storage tanks shall be accomplished in accordance with the Air Resources Board's CP-206, "Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks," adopted [insert adoption date], which is herein incorporated by reference.

The following test procedures (TP) cited in CP-206 are also incorporated by reference.

TP-206.1 – "Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks" (Adopted: [insert adoption date])

TP-206.2 – "Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks" (Adopted: [insert adoption date])

TP-206.3 – "Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks" (Adopted: [insert adoption date]).

The following certification and test procedures cited in certification procedure CP-206 and adopted in section 94011 by incorporation by reference are also incorporated by reference herein: CP-201, TP-201.1, TP-201.1A, TP-201.1B, TP-201.1C, TP-201.1D, TP-201.1E, TP-201.1E CERT, TP-201.2, TP-201.2A, TP-201.2B, TP-201.2C, TP-201.2D, TP-201.2E, TP-201.2H, TP-201.2I, TP-201.2J, TP-201.4, TP-201.5, TP-201.6, and TP-201.7.

Note: Authority cited: Sections 39600, 39601, 39607, and 41954, Health and Safety Code. Reference: Sections 39515, 39605, 41954, 41956.1, 41959, 41960 and 41960.2, Health and Safety Code.

Adopt new Section 94168, Article 2, Subchapter 8, Chapter 1, Division 3, Title 17, California Code of Regulations to read as follows:

§ 94168. Test Method for Determining the Static Pressure Performance of Phase II Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks

The test method for determining the static pressure performance of Phase II vapor recovery systems of dispensing facilities at gasoline dispensing facilities with aboveground storage tanks is adopted in Section 94016 by incorporation by reference and is set forth in the Air Resources Board's TP-206.3 "Determination of Static Pressure

Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks," which are incorporated herein by reference.

Note: Authority cited: Sections 39600, 39601, 39607, and 41954, Health and Safety Code. Reference: Section 39515, 39605, 41954, 41956.1, 41959, 41960 and 41960.2, Health and Safety Code.

APPENDIX C
DISTRICT RULE VAPOR RECOVERY APPLICABLITY SUMMARY

San Joaquin Valley APCD	Rules
Phase I (Rule 4621)	Permitted tanks: ≥ 250 gallons and <19,800 gallons
	Exemption: Agricultural tanks ≤ 550 gallons
	Exemption: tanks ≤ 2,000 installed before July 1, 1975
Phase II (Rule 4622)	Tanks < 24,000 gallons throughput/year
	Exemption: Tanks ≤ 10,000 gallon throughput/30 consecutive days
Sacramento Metropolitan AQMD	**Rules**
Phase I (Rule 448)	Permitted Tanks ≥ 250 gallons
	Exemption: Agricultural tanks
Phase II (Rule 449)	Permitted Tanks > 250 gallons
	Exemption: Agricultural tanks
South Coast AQMD	**Rules**
Phase I (Rule 461)	Permitted Tanks ≥ 250 gallons
	Exemption: Agricultural tanks used ≥ 75% until 7/1/2007
	Exemption: Agricultural Wind Machines until 7/1/2007
Phase II (rule 462)	Permitted Tanks ≥ 120 gallons
	Exemption: Agricultural tanks used ≥ 75% until 7/1/2007
	Exemption: Agricultural Wind Machines until 7/1/2007

California Environmental Protection Agency

Air Resources Board

TEST REPORT FOR CONTROL TECHNOLOGY FEASIBILITY STUDY ON ABOVEGROUND STORAGE TANKS

Engineering Development & Testing Section
Stationary Source Testing Branch
Monitoring and Laboratory Division

July 27, 2006

Draft - Test Report for Control Technology Feasibility Study on Aboveground Storage Tanks

I. Introduction

Aboveground Storage Tanks (ASTs) are used to store gasoline throughout California. These tanks are typically used in agriculture, construction, maintenance and emergency response operations. Emissions from ASTs vary depending on their type, size and configuration. A significant amount of emissions from ASTs is caused by evaporation. These losses are known as standing storage (evaporative) loss or breathing loss. Heating of the tank by the sun causes fuel to volatilize and vent to the atmosphere. These evaporative losses increase with higher temperatures. Evaporative losses from ASTs are a significant source of hydrocarbons that contribute to the formation of ozone throughout the state. However, control technology exists that can limit evaporative losses from ASTs.

Air Resources Board (ARB) staff is developing a control measure to reduce evaporative emissions from ASTs. To support this measure, Engineering Development and Testing Section (EDTS) staff conducted a field study on ASTs in summer 2005. The purpose of this study was to evaluate potential emission reductions from ASTs when retrofitted with some simple control technologies. Control technologies evaluated in various combinations include pressure relief valves, reflecting white paint, shade structure, foam insulation, and carbon canisters on various tank sizes. Different emission quantification techniques like U.S. EPA approved AP-42 methodology and gravimetric measurements were used to calculate emissions from ASTs. This report summarizes the field study testing and the staff's evaluation of the feasibility of using control technologies on ASTs. The results show that the use of these control technologies, either singly or in combination, can reduce AST evaporative losses from 43 to 97 percent.

II. Field Study Testing

Field study was conducted at a fuel distribution facility located in Firebaugh, Fresno County. Testing was done in summer (May – October) 2005, when emissions are at the highest level due to high ambient temperatures. Two identical sets of common sizes (350, 550 and 1000 gallon) ASTs were tested. Each size category included an uncontrolled tank and a test tank.

- Uncontrolled Tank: This was a fuel storage tank open to the atmosphere through a flip top cap on the vent, i.e. no control. This is also referred to as baseline or control tank and was used to measure the uncontrolled emissions.

- Test Tank: This was a closed fuel storage tank retrofitted with various combinations of control technologies listed below:

  - Pressure Vacuum Vent Valve (PV Valve)
  - Reflective White Paint
  - Shade structure
  - Polyurethane Foam Insulation
  - Carbon Canister (CC)

Due to limited number of summer months with higher temperatures, it was not possible to evaluate all the controls singly or in combinations on each AST. Therefore, initial testing was done for a period of two to three weeks to evaluate simple controls like PV valve, paint and shade on all three AST sizes. PV Valve was tested by itself and paint and shade were added on incrementally. Controls like carbon canister, polyurethane foam insulation, along with other controls were tested for two to three months, till the end of summer, and were identified as the final configuration of ASTs. Carbon canister and polyurethane foam insulation were tested and evaluated for the first time on ASTs in this field study. The different control configurations tested on all three AST sizes are shown in Table 1. The detailed matrix of AST field study is shown in Attachment 1.

Table 1

Test Tank Configuration	350 Gallon AST	550 Gallon AST	1000 Gallon AST
PV	x	x	x
PV + Paint	x	x	x
PV + Paint + Shade	x	x*	x
Carbon Canister (CC)	NA	x*	NA
PV + Insulation	x*	x*	NA
PV + Paint + Shade + CC	NA	NA	x*

x* represents the final configurations that were tested for 2-3 months
NA – Not Applicable (Not Tested)

Emission Quantification techniques used in the field study:

- AP-42 Methodology, approved by U.S. EPA, calculates emissions based on fuel surface temperature in the tanks. AP-42 methodology can be viewed under section "Organic Liquid Storage Tanks" (Background Document) on the U.S EPA's website at http://www.epa.gov/ttn/chief/ap42/ch07/index.html.
  However, this method applies to single wall storage tanks with some pressure setting i.e. closed systems and likely underestimates emissions from open systems (tanks with just a flip top cap on the vent).

  - Thermocouples were used to measure the daily fuel surface temperatures and ambient temperatures. Each tank configuration was equipped with its own thermocouple.
  - Data Loggers were used to download all the temperature data from the respective thermocouples.

- Gravimetric measurement measured the changes in AST fuel weight and was made using load cells. This was a direct measurement of emissions from tanks based on weight changes. Both uncontrolled and test tanks, in each size category were weighed before, during and after the test period. The difference in the weights determined the weight of gasoline emitted.
  - Load Cells, with a capacity of 10,000 lbs., were used for weighing the tanks.
  - Load cells were available only when tanks were tested in their final configurations.

All three size ranges of ASTs were tested in the field simultaneously. Both test and control tanks were filled with fresh gasoline before testing each control configuration. Tanks were half filled with gasoline and therefore the volume of the vapor space in the AST was equal to half of the tank size. Gasoline samples were tested in ARB laboratory to determine Reid Vapor Pressure (RVP). Most samples tested had RVP values in the range of 6-7 psi. An RVP value of 7 was used in AP-42 calculations for consistency.

III. Field Study Test Results

Figure 1 shows a comparison between AP-42 methodology and load cell measurements of emissions from uncontrolled tanks i.e. open systems with a flip top cap on the vent. This field study documented that AP-42 methodology underestimates emissions from uncontrolled tanks by about 40% (a factor of 1.6). An example of AP-42 method calculations is in Attachment 2. Figure 2 shows the calculated evaporative emissions, using AP-42 and Load cells, from two uncontrolled tanks. The load cell measurements indicate that the 1000 gallon uncontrolled tank lost about 32 gallons of gasoline in three months and the 350 gallon uncontrolled tank lost about 5 gallons of gasoline in two months.

Figure 1

Comparison Between AP-42 and Load Cell Emission Calculations for Uncontrolled ASTs

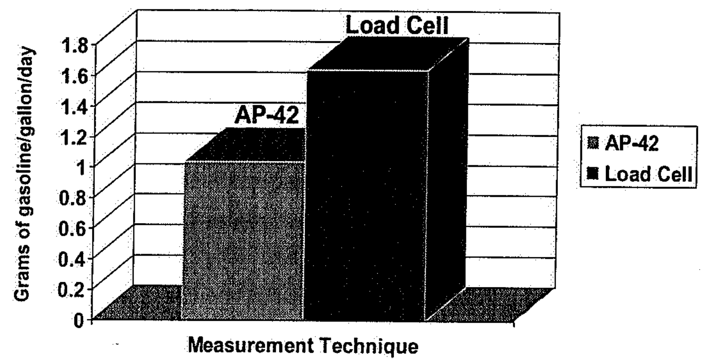
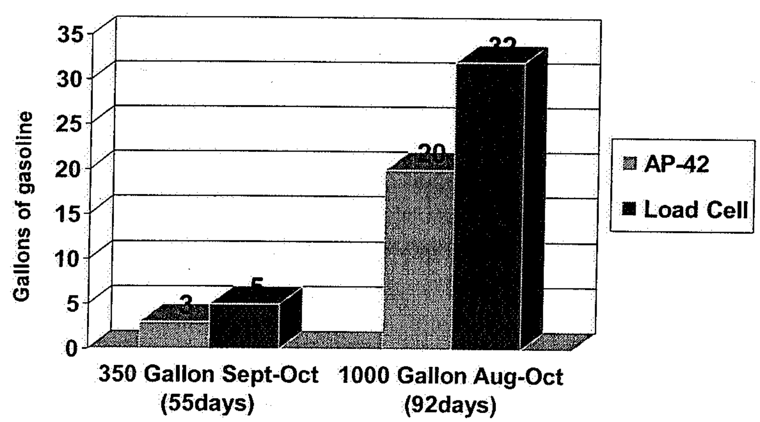


Figure 2

Evaporative Emissions from Uncontrolled ASTs in Summer Months

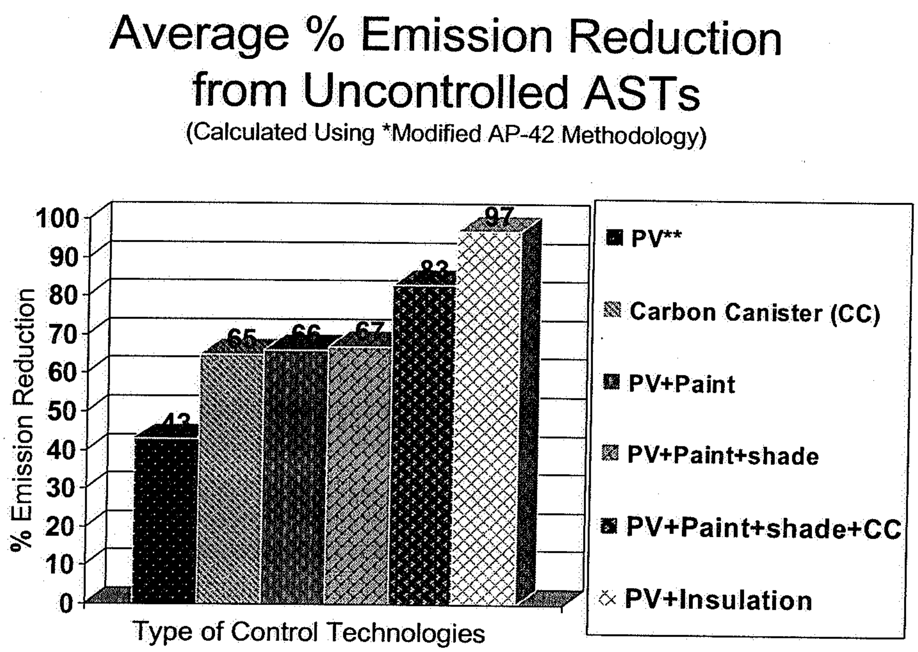


IV. Control Technologies Evaluated

Evaporative emissions from ASTs are controlled by controlling the vapor released from the tank using components such as PV valve and carbon canister and by reducing the temperature of the fuel in the tank using technologies such as white paint, shade and insulation.

Figure 3 shows the emission reduction as a percentage when compared to emissions from an uncontrolled tank. All the emission reductions achieved using different control technologies are calculated using modified AP-42 methodology, which means that a correction factor of 1.6 is applied to emissions from uncontrolled tanks.

Figure 3



*correction factor of 1.6 applied to control tanks (open systems)

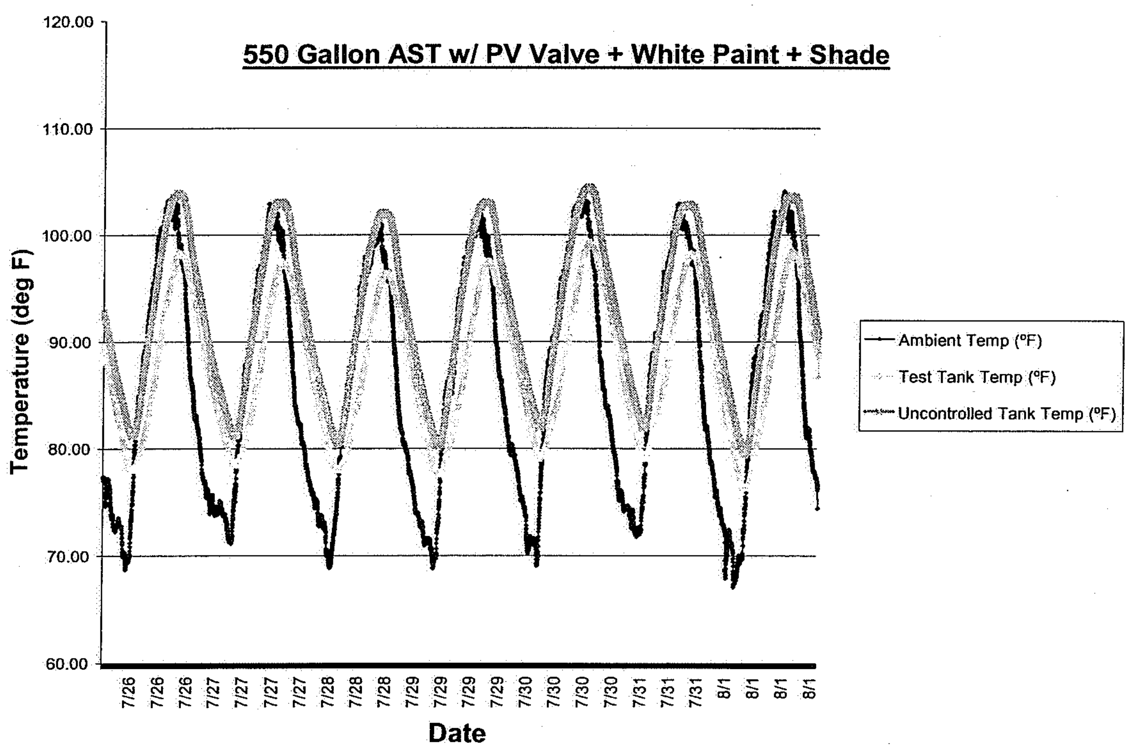
**3"W.C. PV valve

PV Valve (pressure vent setting +2.5" to +3" water column and vacuum vent setting of -6" to -10" water column). This control was tested on all three tank sizes and controlled an average of 43% of the evaporative emissions as compared to an uncontrolled tank. The PV valve remains closed and keeps the vapors in the tank until the vapor pressure exceeds the pressure vent setting, causing it to open and release the vapors. It has no effect on the temperature of the fuel in the tank.

PV Valve + White Paint
This control configuration was tested on all three tank sizes and controlled an average of 66% of the evaporative emissions as compared to an uncontrolled tank. PV valve controlled the vapor release and white paint reduced the fuel surface temperature in the tank by reflecting back the direct sunlight hitting on the tank surface.

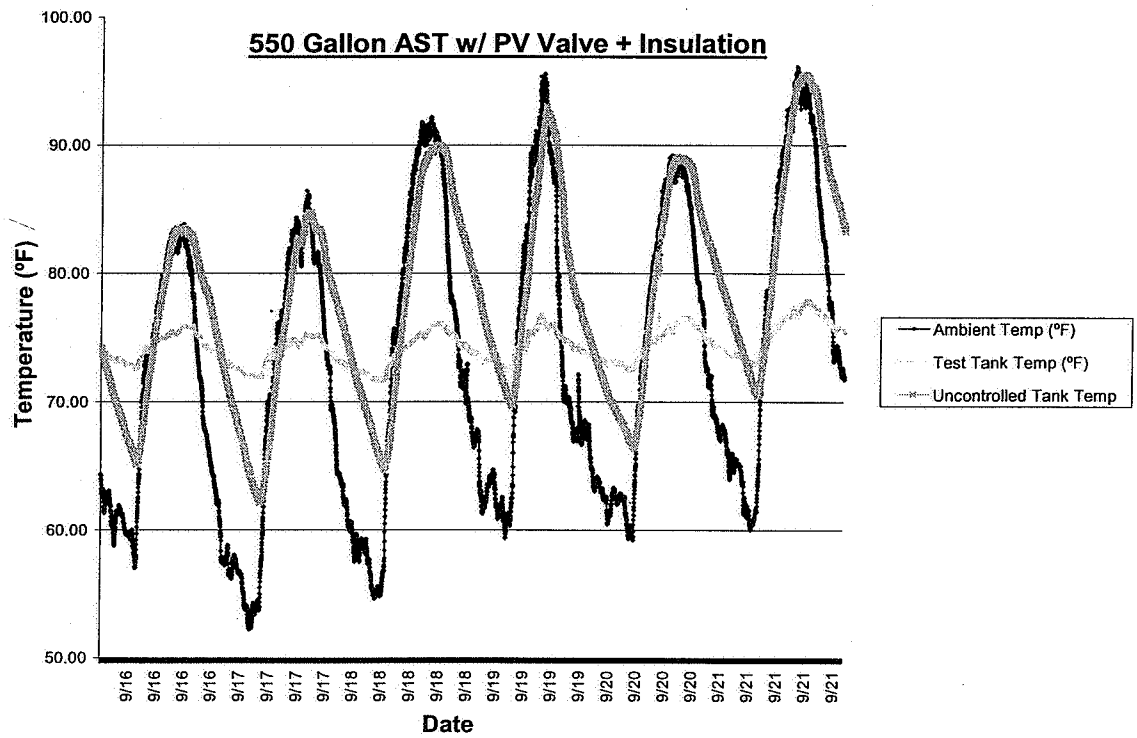
PV Valve + White Paint + Shade
This control configuration was tested on all three tank sizes and controlled an average of 67% of the evaporative emissions as compared to an uncontrolled tank. PV valve controlled the vapor release and paint and shade reduced the fuel surface temperature in the tank by reducing the impact of direct sunlight hitting on the tank surface. It appears that adding the shade structure cancelled the effect of paint on the fuel surface temperature. Therefore the percent emissions controlled with this control configuration is very similar to PV + Paint. Figure 4 shows the effect of paint and shade on fuel surface temperature in the tank. The paint and shade reduced the maximum fuel surface temperature in test tank by 5-6 °F as compared to fuel surface temperature in the uncontrolled tank.

Figure 4



PV Valve + Insulation
This control configuration was tested in the final configuration on the 350 and 550 gallon ASTs and controlled an average of 97% of the evaporative emissions as compared to an uncontrolled tank. PV valve controlled the vapor release and insulation reduced the fuel surface temperature in the tank by significantly reducing the impact of direct sunlight hitting on the tank surface. Figure 5 shows the effect of insulation on fuel surface temperature in the tank. Insulation reduced the maximum fuel surface temperature in the test tank by approximately 10-15 °F as compared to fuel surface temperature in the uncontrolled tank.

Figure 5



Carbon Canister
This control was tested as a final configuration on the 550 gallon AST and controlled approximately 65% of the evaporative emissions as compared to an uncontrolled tank. A passively purged carbon canister is filled with activated carbon which contains billions of pores. This porous structure provides for high efficiency adsorption and desorption of organic compounds from gases and liquids. A diurnal change in ambient temperatures causes air and vapors in the AST to expand and contract. Increase in temperature volatilizes the fuel in the tank and causes adsorption of vapors onto the carbon whereas a decrease in temperature brings cool air in the canister i.e. back purge and causes desorption of the vapors back in the tank. The carbon canister controlled the vapor release

from the tank up to the point of saturation and is then regenerated for the next diurnal cycle. It had no control on the fuel surface temperature in the tank. The difference in the weight of carbon canister before and after the test determined the amount of vapor (emissions) trapped in it.

PV Valve + White Paint + Shade + Carbon Canister
This control configuration was tested as a final configuration on the 1000 gallon AST and controlled approximately 83% of the evaporative emissions as compared to an uncontrolled tank. PV valve and carbon canister controlled the vapor release from the tank. Paint and shade reduced the fuel surface temperature in the tank by reducing the impact of direct sunlight hitting on the tank surface. The difference in the weight of carbon canister before and after the test determined the amount of vapor (emissions) trapped in it.

V. Quality Control

To ensure good quality of data, all the measurement devices were pre-calibrated and in some cases, periodic calibration checks were performed. Following is a list of devices used in collecting the field study data and their respective accuracies:

1. Thermocouples Omega® - K-type (CHROMEGA®-ALOMEGA®) bimetallic thermocouples were used to measure the daily fuel surface temperatures and daily ambient temperatures. Each tank configuration was equipped with a sealed cork float that incorporated a 36–gauge wire K-type thermocouple. The thermocouple was insert into the cork float so that its tip protruded from the side of the sealed float just below the surface. Calibration checks were done on all the thermocouples before, during and after the test period. Calibration checks were done using ice water. Room temperature tap water and boiling water. Thermocouple readings were compared to a temperature standard. Excellent correlations were found with $r > 0.9999$. According to the manufacturer specifications, thermocouples have accuracy of $\pm$ 1.1° C or 0.4% of the reading, whichever is greater.

2. Data Loggers Campbell Scientific Model CR10X data loggers were used to download and store in one minute increments of all the temperature data from the respective thermocouples. According to the manufacturer specifications, CR10X data logger has an accuracy of $\pm$ 0.05% of Full Scale Range (0° - 40° C).

3. Load Cells Sentran Model# ZB1-10K load cells were used in this field study for gravimetric measurements of tanks. Load Cell is a transducer which converts force into a measurable electrical output. These S-beam load cells have a capacity of 10,000 lbs. According to the manufacturer specifications, the accuracy is within 0.02% of full scale ($\pm$ 2lbs.).

4. <u>Other Measurements</u> were made but assumed to be a certain value for consistency purposes and are as follows:

    - **RVP = 7 psi**
      Each tank was filled with fresh summer-time gasoline. The gasoline samples were tested in the ARB lab in El Monte to determine their actual RVPs. Most samples tested had RVP values in the range 6-7.
    - **M_V = 68 lb/lb-mole**
      This vapor molecular weight of gasoline is based on the corresponding RVP value of 7.
    - **V_V = 1/2 Tank Capacity**
      Each tank was half filled with gasoline. The volume of the vapor is equal to half the respective tank size.

Testing of each control technology combination on ASTs was done over a period of several days to see the repeatability of the test. The final configurations of the three tank sizes were tested for 2-3 months. The testing was done in summer months (May – October) with high ambient temperatures in the range of 90 °F – 106 °F which directly influence the fuel surface temperature in the ASTs. The ambient temperatures measured during the field study in 2005 are in the same range as ambient temperatures measured in the region over a period of ten years (1995-2005) as shown in Attachment 3.
Since insulating the tank seemed to provide maximum emission control, this control technology combination of PV + Insulation was tested on two different tanks (350 and 550 gallon) for verification purposes. In both cases, greater than 90% emission reductions were achieved as compared to emissions from an uncontrolled tank with just a flip top cap. Overall the emission measurements in all the tests were highly reproducible.

VI. Conclusion

The field study conducted in summer 2005 successfully evaluated the different control technology combinations. All control technologies tested were technologically feasible and effective in controlling evaporative losses also known as standing or storage losses from ASTs. Control configuration with PV valve + Insulation provided the maximum emission reduction of ~97% as compared to an uncontrolled AST. Retrofitting ASTs with these controls will prevent the loss of gasoline into the atmosphere, hence protect public health, environment and save money.

Attachment 1

AST Field Study Test Plan
Summer 2005

350 gallon AST Test Plan

*Test Tank Configuration	Tank ID#	Start Date	End Date	Test Duration
P/V valve	1	3-May	23-May	21 days
P/V valve + White Paint	1	11-Jun	27-Jun	17 days
P/V valve + White Paint + Shade	1	20-Jul	2-Aug	13 days
P/V valve + White Paint + Shade + Insulation	1	3-Aug	27-Aug	23 days
P/V valve + Insulation (Final Configuration)	1	1-Sep	26-Oct	~2months

*Each test tank configuration is tested with an uncontrolled tank (Tank ID# 2, open system with a flip top cap)
*Both test and uncontrolled tanks are refueled with fresh gasoline before the test of each tank configuration

550 gallon AST Test Plan

*Test Tank Configuration	Tank ID#	Start Date	End Date	Test Duration
P/V valve	3	3-May	23-May	21 days
P/V valve + White Paint	3	11-Jun	27-Jun	17 days
P/V valve + White Paint + Shade (Final Configuration)	7	26-Jul	26-Oct	3months
Carbon Canister (Final Configuration)	3	26-Jul	26-Oct	3months
P/V valve + Insulation (Final Configuration)	8	1-Sep	26-Oct	~2months

*Each test tank configuration is tested with an uncontrolled tank (Tank ID# 4, open system with a flip top cap)
*Both test and uncontrolled tanks are refueled with fresh gasoline before the test of each tank configuration

1000 gallon AST Test Plan

*Test Tank Configuration	Tank ID#	Start Date	End Date	Test Duration
P/V valve	5	1-May	23-May	23 days
P/V valve + White Paint	5	23-May	27-Jun	35 days
P/V valve + White Paint + Shade + Carbon Canister (Final Configu	5	26-Jul	26-Oct	3months

*Each test tank configuration is tested with an uncontrolled tank (Tank ID# 6, open system with a flip top cap)
*Both test and uncontrolled tanks are refueled with fresh gasoline before the test of each tank configuration

Attachment 2

350 Gallon ASTs Field Study, Fresno (Summer 2005)
PV Valve + Insulation Configuration
AP-42 Calculated Emissions (Using Fuel Surface Temperature)

Assumptions and Factors

AST Size =	350 Gallon	47	cuft.		
Vv =	23				
RVP =	7				
Mv =	68				
R =	10.73				
P_B:					
No Vapor Re0" of H_2O=		0	psi		
Phase I &II WC-(-8"W		0.396	psi	1"WC=	0.036 psi
Recovery					

Test Tank with P/V Valve + Insulation

Date	T_{LN}	T_{LX}	T_{LA}	ΔT_V	ΔP_V	P_{VA}	W_V	K_E	Ls
9/1/2005	538.98	545.43	542.20	6.45	0.65	5.39	0.0630	0.0392	0.06
9/2/2005	539.37	545.53	542.45	6.15	0.62	5.41	0.0633	0.0358	0.05
9/3/2005	539.08	544.53	541.81	5.46	0.55	5.35	0.0626	0.0262	0.04
9/4/2005	537.79	543.34	540.56	5.56	0.55	5.23	0.0613	0.0262	0.04
9/5/2005	537.29	544.44	540.86	7.15	0.71	5.26	0.0616	0.0461	0.07
9/6/2005	537.89	543.34	540.61	5.46	0.54	5.23	0.0613	0.0250	0.04
9/7/2005	536.69	541.06	538.88	4.37	0.42	5.06	0.0595	0.0105	0.01
9/8/2005	533.42	538.68	536.05	5.26	0.48	4.80	0.0567	0.0186	0.02
9/9/2005	532.13	536.00	534.06	3.87	0.34	4.62	0.0548	0.0022	0.00
9/10/2005	529.82	535.11	532.46	5.29	0.46	4.48	0.0533	0.0161	0.02
9/11/2005	528.62	534.91	531.76	6.29	0.54	4.42	0.0526	0.0259	0.03
9/12/2005	528.73	535.01	531.87	6.28	0.54	4.43	0.0527	0.0259	0.03
9/13/2005	528.73	535.21	531.97	6.48	0.56	4.43	0.0528	0.0280	0.03
								Average (lb	**0.03**
								Std Dev	**0.02**

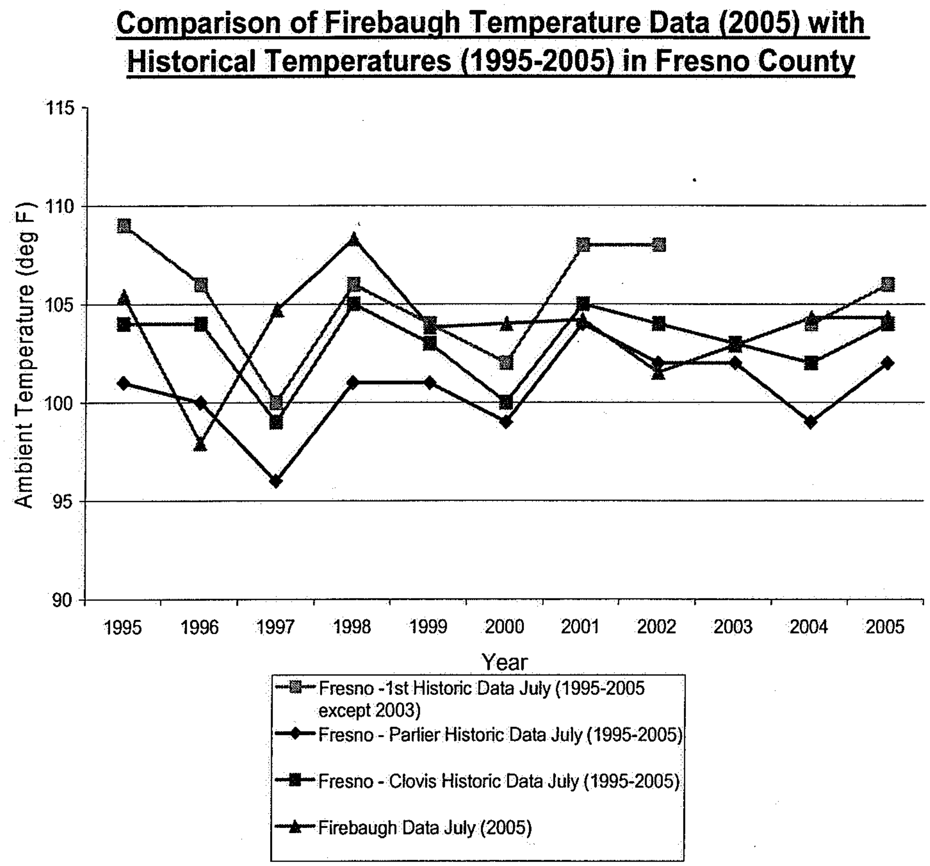
Uncontrolled Tank with Flip Top Cap

Date	T_{LN}	T_{LX}	T_{LA}	ΔT_V	ΔP_V	P_{VA}	W_V	K_E	Ls
9/1/2005	531.21	557.64	544.43	26.42	2.77	5.62	0.0654	0.3530	0.54
9/2/2005	531.90	556.85	544.38	24.95	2.61	5.61	0.0653	0.3328	0.51
9/3/2005	529.18	554.49	541.84	25.31	2.55	5.35	0.0626	0.3193	0.47
9/4/2005	527.26	553.61	540.44	26.35	2.60	5.21	0.0611	0.3225	0.46
9/5/2005	529.99	557.05	543.52	27.06	2.80	5.52	0.0644	0.3543	0.53
9/6/2005	528.89	553.32	541.10	24.43	2.43	5.28	0.0618	0.3032	0.44
9/7/2005	526.56	549.39	537.97	22.83	2.17	4.98	0.0586	0.2651	0.36
9/8/2005	523.42	546.64	535.03	23.21	2.11	4.70	0.0557	0.2539	0.33
9/9/2005	521.57	541.92	531.74	20.35	1.75	4.41	0.0526	0.2086	0.26
9/10/2005	520.29	543.39	531.84	23.10	2.00	4.42	0.0527	0.2374	0.29
9/11/2005	519.87	545.46	532.66	25.59	2.24	4.49	0.0535	0.2674	0.33
9/12/2005	520.97	544.77	532.87	23.80	2.09	4.51	0.0537	0.2496	0.31
9/13/2005	520.49	545.56	533.02	25.07	2.21	4.53	0.0538	0.2637	0.33
								Average (lb	**0.40**
								Std Dev	**0.10**

RVP: Reid Vapor Pressure
Vv: Vapor Space (cu ft)
Mv: Vapor Molecular wt.(lb/lb-mole)
Tamb.avg: Daily Average Ambient Temperature (°F)
Tamb.range: Daily Ambient Temperature Range(°F or °R)
T_{LA}: Daily Average Liquid Surface Temperature (°R)
T_{LN}: Daily Minimum Liquid Surface Temperature (°R)
T_{LX}: Daily Maximum Liquid Surface Temperature (°R)
R: Ideal Gas Constant (psia cuft/lb-mol-°R)
P_{VA}: Vapor Pressure @Daily Average Liquid Surface Temperature (psi)
P_B: Breather Vent Pressure Setting (psi)
W_V: Vapor Density (lb/cu ft)
ΔT_V: Daily Vapor Temperature Range (°R)
ΔP_V: Daily Vapor Pressure Range (psi)
K_E: Vapor Space Expansion Factor (dimensionless)
L_S: Standing Losses (lb)
L_W: Working Losses (Deliveries, Dispenses) (lb)

APPENDIX D

Attachment 3



APPENDIX E
SUMMARY OF ABOVEGROUND STORAGE TANK PRESSURE DECAY AND EFFICIENCY TESTING

Aboveground storage tanks (AST) were tested to evaluate currently adopted test procedures (TP) and proposed TPs. From 2001 to 2003, adopted TPs were used to determine the current level of efficiency and leak-tightness of ASTs. Many of the ASTs tested failed the static pressure performance test in as-found conditions and required repairs in order to meet the performance criteria. All of the ASTs passed the Phase I and Phase II efficiency testing performance standards currently in place (90 percent). Additional testing was conducted in 2007 to evaluate proposed TPs to determine the static pressure performance of ASTs and emission factor from processors for standing loss controls. The following tests were conducted on ASTs:

Test Procedures Conducted

- **TP-201.3B:** Determination of Static Pressure Performance of Vapor Recovery Systems of Gasoline Dispensing Facilities with Aboveground Storage Tanks (April 12, 1996)
- **TP-205.1:** Determination of Efficiency of Phase I Vapor Recovery Systems of Novel Facilities (March 17, 1999)
- **TP-205.2:** Determination of Efficiency of Phase II Vapor Recovery Systems of Novel Facilities (March 17, 1999)
- **TP-206.2:** Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks
- **TP-206.3:** Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks

The following table summarizes the results of the test procedures:

TP 201.3B *26-Feb-02*	**Natomas - Balance - Protected - 1K gallons** *failed* run one - prior to run lubricated primary vent o-ring. *failed* run two - prior to run tightened vapor adaptor and cleaned poppet face. *failed* run three - again prior to run, tightened vapor adaptor and cleaned poppet face. Observed tears in fuel coaxial hose. Pressure leaking at tear.	TP 205.1 ***08-Aug-02*** Trailer tank recovery efficiency 100% TP 205.2 *07-Aug-02* Fueling for drums avg 99.8% Fueling for vehicles avg 99.4%
15-Mar-02	*passed* Coaxial hose was replaced prior to run due to tears. Also conducted 2" WC steady state leak decay test. Introduced enough N2 to hold pressure @ 2" WC for 2 minutes. Leak rate was 1.6 SCFH.	
26-Mar-02	*passed* both - however, observed fuel in vapor side of coaxial hose; during first run noted leakage from fuel gage; prior to second run hand tightened locking nut on fuel gage. Followed with monitoring from 3-27-02 to 4-1-02.	
2-Apr-02	*failed* run one - prior to first run attempted repair of broken locking ring on tank gage. Test failed. *failed* run two - prior to run replaced tank gage. Post test ran several steady state flow test @ various pressures.	
19-Jun-02	*passed* run one however, noted fuel gage leaking. Post test removed gage and noted crack at base. Replaced gage. *passed* run two	
9-July-02	Pressure decay testing performed before monitoring started. System monitored from July 10 to 21. *failed* run one - noted leakage at vapor poppet and auxiliary 2" bung. Cleaned poppet and tightened bung (bung was hand tight. Delivery driver possibly used bung as stick port). *passed* run two - however, noticed spill bucket drain valve loose. Cleaned lubed and hand tightened. *passed* run three	
TP 201.3B *16-Oct-02* two runs *27-Aug-02* two runs *20-Feb-03* one run	**Stockton - Balance - Protected - 6K gallons** *failed* run one - breakaway was loose. Tightened post test. *passed* run two *failed* both - during first run observed substantial leakage from drop tube seal. Bagged fill adaptor and conducted 2nd run. Still did not pass test. *failed* - back of clock gage was leaking	

APPENDIX E
SUMMARY OF ABOVEGROUND STORAGE TANK PRESSURE DECAY AND EFFICIENCY TESTING

TP 201.3B *20-Aug-02* one run *22-Aug-02* one run	**Folsom - Processor – Single Wall - 4K gallons** passed *passed*	TP 205.1 ***21-22-Aug-02*** Trailer tank recovery efficiency 100% **TP 205.2** *21-22-Aug-02* Fueling for drums avg 97.2% Fueling for vehicles avg 97.9%
TP 201.3B *8-Jan-03*	**Dixon - Balance 2 point – Single Wall - 1K gallons** *failed* run one. P/V valve found on tank was a 3" +/- 0.5" and was replaced with a +8 ounce/ -0.5 ounce P/V valve prior to run one and two. Ran test with fill cap on and introduced N2 thru auxiliary fitting on P/V 2" coupler. *run two has no pass/fail.* It was run as a 10" decay test for informational purposes. Following run, lubricated emergency vent o-ring, downloaded data and put a +8 ounce/ -8" WC P/V on because the pressure profile of tank kept dropping, showing ingestion of air throughout the evening when the original 3" WC P/V was installed, causing venting throughout the day. Even with it being a cold and foggy morning (8:30 a.m.) the tank pressure was growing slowly.	
TP 201.3B *13-Aug-02* *14-Aug-02* *15-Aug-02* post TP 205.2	**Rocklin - Balance - Protected - 12K gallons** *failed* -couldn't pressurize tank *passed* this was pre-test to TP 205.2. Replaced defective P/V valve prior to run. *failed* run one- leaking at threaded joint on P/V. Tightened and used Teflon tape *failed* run two - leaking from emergency vent. Applied vacuum grease on brass-brass seat. *passed* run three of post-test **Note re: 205.1**: After starting 205.1, (truck tank offload) noted new out-of-the –box P/V vent hissing and evidence of vapors however, roots meter not measuring flow. After 2nd tank offloading began (trailer tank), removed P/V valve and rush of vapors came out of vent. P/V valve replaced and leakage con't. as noted before. Roots meter was now measuring a slow flow rate indicative of previously noted P/V valve leakage. Therefore two VR efficiencies calculated for venting during offloads. Both failed the 95% regulatory limit.	TP 205.1 *19-May-03* tank on trailer recovery efficiency 93.1% tank closest to cab recovery efficiency 93.0% (See Note re: 205.1) TP 205.2 *14-Aug-02* fueling for drums avg 93.1% fueling for vehicles avg 98.7%

APPENDIX E
SUMMARY OF ABOVEGROUND STORAGE TANK PRESSURE DECAY AND EFFICIENCY TESTING

TP 201.3B	**Carmichael - Balance - Protected - 1K gallon**	
10-SeP-01	*failed* ; could not pressurize due to defective P/V valve	
11-SeP-01	*failed* ; could not pressurize due to defective tank gage	
14-SeP-01	*failed* run one - prior to test replaced fuel gage cap and o-ring. *passed* run two - prior to running test lubed o-ring on emergency vent	
28-SeP-01	*passed*	
19-Oct-01	*passed* all three	
2-Nov-01	*passed* both	
16-Nov-01	*passed*	
30-Nov-01	*passed*	
14-Dec-01	*failed* run one in as-found condition *passed* run two when tank gage bagged	
20-Dec-01	*passed*	
3-Jan-02	*passed*	
18-Jan-02	*passed*	
TP 201.3B	**Folsom - Balance - Protected - 6K gasoline, 4Kdiesel**	
19-Mar-02	*passed*	
8-Apr-02	*passed*	
23-May-02	A. passed. Followed with monitoring from 5-24-02 to 5-29-02.	
31-Oct-02	*failed* run one in as-found condition. Leakage noted from back of clock gage. *passed* run two when clock gage bagged	
	Folsom - Balance - Protected - 3K gasoline, 1K diesel	
19-Mar-02	*passed*	
8-Apr-02	*passed. Followed with monitoring from 4-09-02 to 5-22-02.*	
23-May-02	*passed*	
TP 201.3B	**Sacramento - Balance - Protected - 500 gallons split** (two 250 gallon tank)	
10-May-02	Tank #1 ullage too small to conduct decay test. Bobtail truck just filled. Tank #2 ullage too small to conduct decay test. Bobtail truck just filled.	
15-May-02	*Tank #1* Based on leak rate criteria from TP the allowable final pressure at an ullage of 400 gallons is 0.30 "WC. Tank appears to have met this allowable pressure during testing. Its final pressure after 5 minutes was 0.30"WC **Tank #2 ullage too small to conduct decay test.**	
3-Jun-02	Tank #1 run one. Vapor test cap left on. Based on leak rate criteria from TP the allowable final pressure at an ullage of 400 gallons is 0.3 "WC. Tank appears to have met this allowable pressure during testing. Its final pressure after 5 minutes was 0.30" WC. *run two-- Vapor test cap removed and final pressure after 5 minutes was 0.07" WC* *run three -- Left vapor system cap on and introduced N2 and measured pressure at coupler. Final pressure after 5 minutes was 0.50" WC.*	

APPENDIX E
SUMMARY OF ABOVEGROUND STORAGE TANK PRESSURE DECAY AND EFFICIENCY TESTING

TP 201.3B	**Stockton - Balance - Protected - 2K gallon**	
14-Jan-03	*passed* Initial seal of emergency vent had to be obtained by stepping onto vent, then stepping off, after which we began test. (Previously maint tech had used pipe sealant on emergency vent to get system to pass.)	
31-Jan-03	*failed* run one due to leaking vapor poppet	
	passed run two after cleaning vapor poppet	
18-Feb-03	*passed*	
20-Feb-03	*passed* (following test it was noticed that the flow restrictor was loose. Restrictor was tightened)	
6-Mar-03	*failed* run one due to leaky poppet (vapor adaptor and leaky nozzle) Expanded bellows on nozzle and leak stopped, cleaned poppet.	
	passed run two But poppet still leaking, and unable to stop leak. Engaged the nozzle check valve multiple times and nozzle still leaked. Contacted maintenance to replace nozzle and vapor adaptor.	
11-Apr-03	*passed*	
19-Jun-03	*failed* system leaking thru emergency vent. Maintenance contacted regarding need to clean and lube emergency vent.	
TP 201.3B	**Stockton - Balance - Protected - 10K gallon**	
6-Feb-03	*passed* Final pressure was equal to Allowable Final Pressure	
20-Feb-03	*passed*	
6-Mar-03	*passed* However, smelled vapors at P/V valve	
	Bakersfield - Vacuum Assist-Processor - Vaulted	
13-Nov-03	Pressure monitoring beginning 13 Nov 03	
TP-206.2	**Folsom – Hirt Processor – 4K gallon**	
TP-206.2	**ARB – Carbon Canister – 300 gallon**	

APPENDIX F
Proposed Vapor Recovery Definitions, Certification, and Test Procedures for Aboveground Storage Tanks

Available separately are the following:

D-200, Vapor Recovery Definitions

CP-206, Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks

TP-201.2, Efficiency and Emission Factor for Phase II Systems

TP-206.1, Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks

TP-206.2, Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks

TP-206.3, Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks

APPENDIX G
Temperature Attenuation Field Study Correlation

I. INTRODUCTION

The goal of the Field Study is to determine the relationship between the fuel surface temperature:ambient temperature ratio (attenuation factor) and standing loss emissions to define the performance standard for Standing Loss Control vapor recovery systems. Standing loss emissions can be controlled by minimizing the effect ambient temperature change has on fuel surface temperature of the gasoline in the AST.

II. EXPERIMENTAL

Standing losses are emissions during periods of no gasoline transfer. These are evaporative emissions through open vent pipes and leaks in the AST caused by increased internal tank pressure as a result of diurnal temperature changes. Ambient temperature changes throughout a day change the fuel surface temperature. As fuel surface temperature increases so does the internal tank pressure. When the internal tank pressure increases, gasoline volatilizes and is released into the atmosphere.

a. STUDY

There are two components associated with the determination of proposed performance standard: temperature ratio and emissions.

During the summer of 2005, ARB staff conducted a field study to evaluate various technologies to control standing loss emissions. In the field study, three sizes of single wall ASTs were retrofitted with technologies to control standing loss emissions by attenuating the ambient temperature effects on fuel surface temperatures. Controlling the fuel surface temperature controls the internal tank pressure and reduces emissions through the vent pipe and leaks in the system. Emissions were both measured directly through fuel weight losses and calculated theoretically using empirical equations.

<u>Temperature Ratio</u>

Each retrofitted tank was installed with a thermocouple attached to a cork float on a stainless steel rod. The rod was placed inside the tank through a cam lock fitting at the top of the tank. The thermocouple was connected to a data logger and temperature data was collected at second intervals and stored as one minute averages. An ambient temperature probe was also collocated within 10 feet of the ASTs, connected to a data logger, which collected temperature data at second intervals and stored one minute averages. Each sized AST was collocated with a same sized AST without retrofits (control tank). Each control tank was configured with a thermocouple and connected to a data logger. Temperature data for the control tanks was collected at the same time averaged interval as the test tanks.

Emissions

Emissions from the ASTs were determined theoretically using U.S. EPA Method AP-42, developed by the American Petroleum Institute. Method AP-42 calculates emissions from single wall storage tanks based on ambient temperatures by region and can be found on the U.S. EPA website at:

http://www.epa.gov/ttn/chief/ap42/ch07/indes.html

Emissions were also measured gravimetrically using a load cell at the beginning, middle and end of the test duration for each technology. Each tank was weighed empty at the beginning of the study and then filled with gasoline to half ullage and weighed again. The tank was re-weighed during the study to provide preliminary data. Finally the AST was weighed at the end of the study to determine the amount of gasoline lost.

b. TEMPERATURE ATTENUATION

The ratio of the fuel surface temperature range to the ambient temperature range is defined as the attenuation factor (A_f). The range of temperature is the difference between the daily maximum and daily minimum temperature during a 24-hour period. The attenuation factor is calculated using Equation II-1, as follows:

$$A_f = \frac{(\sum_{1}^{n} T_f^{Range} / n)}{(\sum_{1}^{n} T_a^{Range} / n)} \qquad \text{[Equation II-1]}$$

Where:

$\sum_{1}^{n} T_f^{Range}$ = The sum of daily fuel surface temperature range

$\sum_{1}^{n} T_a^{Range}$ = The sum of daily ambient temperature range

n = number of data sets (days)

c. DATA

Equation II-1 was used to calculate the attenuation factor associated with the different control technologies. The attenuation factor for each control technology was determined from a minimum 30 days of daily fuel surface and ambient temperature minimums and maximums, a minimum seven days during which the temperature was greater than 90°F. Table II-1 summarizes the data for each tank size and control technology.

Table II-1
Attenuation Factor and Emissions

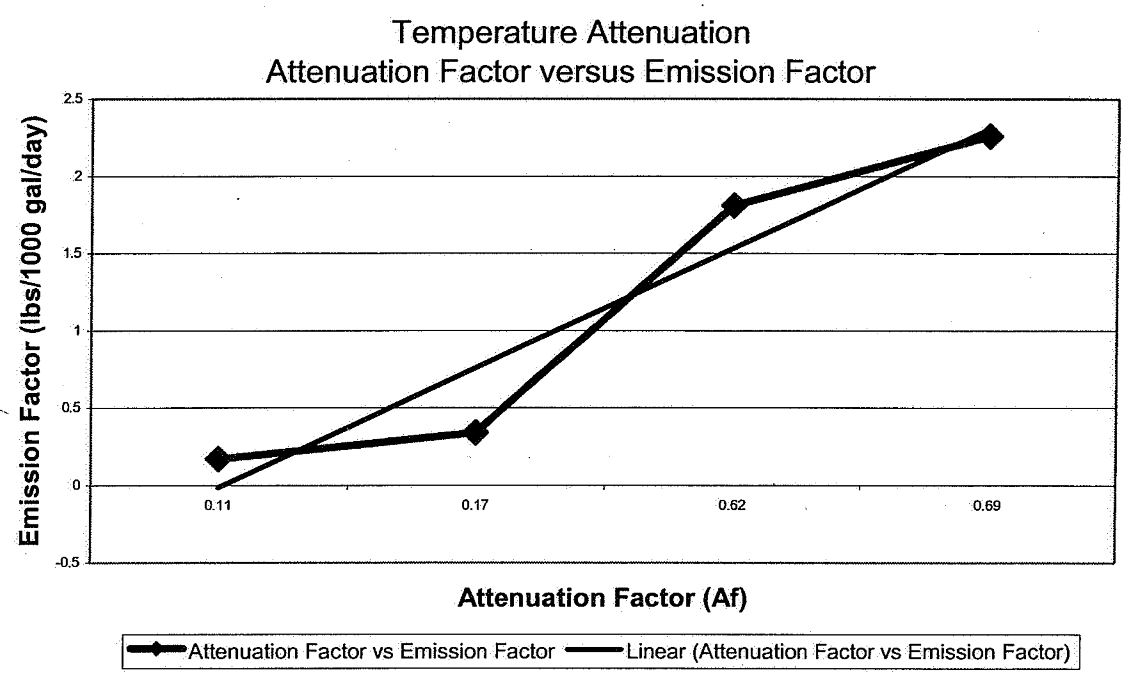
AST Size (gal.)	Control Technology	Attenuation Factor	Percent Reductions	Emission Factor (lbs/1000 gal/day)
550	insulation	0.11	97%	0.17
350	insulation	0.17	94%	0.34
550	paint/shade	0.62	68%	1.81
350	paint/shade	0.69	60%	2.26

APPENDIX G
Temperature Attenuation Field Study Correlation

III. RESULTS AND DISCUSSION

The comparison of the temperature attenuation to the AST emission factor is graphically displayed in Figure III-1. A linear correlation was determined and the "best fit" relationship was determined, as shown by the black line.

Figure III-1



The relationship between the attenuation factor for a particular Standing Loss Control technology and the associated emission factor can be expressed as a linear function with a correlation of 0.993 and standard error of ±0.11. The emission factor can be calculated using the attenuation factor (A_f) from Equation III-1, as follows:

Emission Factor (lbs/1000 gal/day) = $3.48 \times A_f - 0.23$ [Equation III-1]

IV. RECOMMENDATIONS

Staff recommends that the relationship between temperature attenuation factor and emission factor be used to develop a test procedure (TP-206.1) to evaluate Standing Loss Control technologies.

APPENDIX G
Temperature Attenuation Field Study Correlation

V. REFERENCES

1. "Test Report for Control Technology Feasibility Study on Aboveground Storage Tanks," July 27, 2006

APPENDIX H
AST POPULATION SURVEY

I. INTRODUCTION

Determining emission reductions associated with the proposed AST controls is dependent on knowing the statewide population of AST. In addition to knowing the statewide population, an estimate of the number of tanks in regions of the state for which daily temperature data is available in AP-42 is also needed.

The goal of the population estimate was also to estimate the distribution of tanks by size, type and level of control. The following discussion takes the reader on a step-by-step journey through the process of making the estimate.

II. SURVEY DECISION

Staff explored several ways to estimate the population of ASTs in California. For example in 2003 staff collected databases used for district permitting activities as well as information from the State Water Resources Control Board, tank manufacturers and fuel carriers. The results from the various sources reviewed in 2003 are summarized in Table H-1 below.

Table H-1
AST Population Survey Summary

Source	Protected Tank	Single Wall Tank	Total Reported (in CA)
Districts	-	-	1,892
Water Board	-	-	3,899
AST Manufacturers	3,598	2,407	6,005
Fuel Carriers	2,873	4,760	7,633

Staff decided to resurvey the fuel carriers again because of the following reasons:
1. The recognition that the previous survey of fuel carriers did not ask questions about the type of AST or the level of vapor recovery controls, and
2. Fuel carriers are currently in a State-owned database, and
3. A belief that carriers possessed information that would provide an estimate of the number of AST in California as well as the type of AST (single wall or insulated) and the level of vapor recovery control on the AST.

Staff obtained a copy of the database of fuel carriers from the Enforcement Division's cargo tank program. Staff contacted each of the listed carriers by phone to determine if the carrier delivered gasoline to ASTs. Ultimately, of the approximately 475 carriers in the cargo tank program, 188 carriers were surveyed because they said they deliver gasoline to AST in California. While fuel carriers were being identified, staff worked with the California Independent Oil Marketers Association (CIOMA) to develop a survey that would get the information that was needed to make an estimate of the California AST population without creating an undue hardship on the fuel carrier filling out the survey. In addition to seeking population information, the survey asked questions about type of tank and level of vapor recovery controls. See attachment H-1

APPENDIX H
AST POPULATION SURVEY

In cooperation with CIOMA, 32 fuel carriers were chosen to participate in a pilot survey. A pilot survey is used to determine if the survey asks the questions necessary to obtain the information needed. Fourteen surveys (≈ 44%) were returned identifying 466 ASTs. Based on responses to the pilot, the survey was revised and then sent to the remaining 156 fuel carriers.

Table H-2 summarizes the survey results.

Table H-2
Summary of Survey Respondents

	Combined Survey Results	Pilot Survey	Final Survey
Number of surveys sent out	188	32	156
Number of surveys returned	62	14	48
Number of surveys respondents that deliver gasoline to AST	44	7	37
Number of surveys respondents that do not deliver gasoline to AST	18	7	11
Number of tanks reported	3,160	466	2,694
Average number of tanks per reporting company	72	67	73
Estimated number of companies that deliver to AST	133		
Estimated number of AST in state	9,582		

After the surveys were returned staff performed an analysis on the responses.

APPENDIX H
AST POPULATION SURVEY

III. SURVEY RESULTS

The following information was reported in the surveys and was used to analyze the survey data:

- 188 Number of companies surveyed
- 62 Number of survey respondents
- 44 Number of survey respondents that deliver gasoline to AST
- 18 Number of survey respondents that do not deliver gasoline to AST
- 3,160 Number of tanks reported in the survey

The following information was derived from the survey responses:

- 71% Percentage of survey respondents that deliver gasoline to AST [(44/62)X100]
- 72 Average number of AST per reporting company (3160/44)
- 133 Estimated number of fuel carriers that deliver to ASTs (71% X 188)
- 9,582 Estimated number of ASTs in California (72 X 133)

APPENDIX H
AST POPULATION SURVEY

IV. ESTIMATION EXTRAPOLATION METHODOLOGY

Based on the responses to the survey and the information derived from the responses staff was able to make an estimate of the number of tanks in each of 15 regions of the state that have temperature data contained in AP-42.

The following assumption was made with respect to making an estimate of the population:

- **Survey non-respondents look like the survey respondents for the purpose of determining the statewide population estimate.**

Bakersfield will be used for illustrating the methodology used to estimate the number of tanks in each of the 15 regions and then the size distribution in each region and then the type of tank and level of control for AST in each region.

Staff started with the number of tanks reported in the survey for the state and for the Bakersfield region

- 3,160 Number of tanks reported in survey statewide
- 262 Number of tanks reported in survey in Bakersfield.

This information was used to determine the approximate percentage of tanks statewide located in the Bakersfield region.

- 8.3% Percentage of tanks in the Bakersfield region [(262/3160) X 100]

This percentage and the number of tanks estimated to be in the state enabled an estimate of the total number of tanks in the Bakersfield region.

- 794 Total number of tanks in the Bakersfield region (0.083 X 9,582).

After the number of tanks in Bakersfield was estimated a size distribution was estimated based on the distribution in the survey returns as follows:

- 262 Number of tanks reported in survey in the Bakersfield region.
- 57 Number of tanks reported in survey in the Bakersfield region ≤350 gallons.
- 22% Approximate percentage of tanks in the Bakersfield region ≤350 gallons [(57/262) X 100]
- 173 Estimated number of tanks in the Bakersfield region ≤350 gallons (0.22 X 794)

The methodology for extrapolating the numbers for type of tank and for vapor recovery controls for the Bakersfield region and for the rest of the state is the same as for the previous exercises.

APPENDIX H
AST POPULATION SURVEY

Attachment H-1
AST Population Survey

An Aboveground Storage Tank (AST) is a tank not covered by dirt or other fill. An AST can have many different looks and configurations. But the common factor in all AST's is that they are not buried, the sides and tops have air touching them not dirt or other types of fill. **This survey applies to gasoline deliveries only.**

Fuel Carrier:	**Number of gallons of gasoline you delivered to all AST's between:**
Contact Name:	
Phone Number:	**April 2003 & October 2003**
FAX:	**November 2003 & March 2004**
email:	**Or the total gallons delivered in 2003**

The following information is needed for gasoline deliveries only to aboveground storage tanks (AST)

City (or county) where the AST(s) is/are located[1]	Tank size in gallons	Number of ASTs	Single Wall Steel Tank (on the ground or on a stand)				Insulated[2] or double wall (such as concrete)				Tank Location		
			Unknown vapor recovery	No vapor recovery	Phase I vapor recovery only	Phase I & Phase II vapor recovery	Unknown vapor recovery	No vapor recovery	Phase I vapor recovery only	Phase I & Phase II vapor recovery	farm	marina	other
	350 or less												
	351 to 500												
	501 to 750												
	751 to 1000												
	1001 to 2000												
	2001 to 6000												
	6001 or greater												
	350 or less												
	351 to 500												
	501 to 750												
	751 to 1000												
	1001 to 2000												
	2001 to 6000												
	6001 or greater												

[1]You can use a block on the form to group the AST(s) by the city or county where they are located or use a separate block for each tank.
[2]For this survey a tank encased in concrete is an insulated tank.

APPENDIX H
AST POPULATION SURVEY
TABLE H-3

AST FUEL CARRIER SURVEY (2004)

AP-42 Cities	Tank size in gallons	number of ASTs	Single Wall Steel Tank: Unknown vapor recovery	Single Wall Steel Tank: No vapor recovery	Single Wall Steel Tank: Phase I vapor recovery only	Single Wall Steel Tank: Phase I & Phase II vapor recovery	Insulated Tank: Unknown vapor recovery	Insulated Tank: No vapor recovery	Insulated Tank: Phase I vapor recovery only	Insulated Tank: Phase I & Phase II vapor recovery	Location: farm	Location: marina	Location: other
Bakersfield	0350 or less	173		132	38				3		139	9	24
Bakersfield	0351 to 500	12		9		3					12		
Bakersfield	0501 to 750	409		209	173					27	315	18	76
Bakersfield	0751 to 1000	143		27	61	39			3	12	91	18	33
Bakersfield	1001 to 2000	36			3	18				15	6		30
Bakersfield	2001 to 6000	21			6	6				9	9		12
Bishop	0350 or less												
Bishop	0351 to 500												
Bishop	0501 to 750												
Bishop	0751 to 1000												
Bishop	1001 to 2000												
Bishop	2001 to 6000	6				3				3			6
Bishop	6001 or greater	3				3							3
Eureka	0351 to 500	155		155							106		49
Eureka	1001 to 2000	6		6									6
Eureka	2001 to 6000	3		3									3
Eureka	350 or less	79		79							45		33
Eureka	501 to 750	112		106				6			67		45
Eureka	6001 or greater	15		6	6					3	6		9
Eureka	751 to 1000	27		21				6			3		24
Fresno	0350 or less	188		153	34						188		
Fresno	0351 to 500	197		158	31	8					176		21
Fresno	0501 to 750	306		219	60					27	294		12
Fresno	0751 to 1000	115		82	21	12					115		
Fresno	1001 to 2000	45		3	21					21	30		15
Fresno	2001 to 6000	64			42	13				9	52		12
Fresno	6001 or greater	0											
Long Beach	1001 to 2000	12								12			12
Long Beach	2001 to 6000	6								6			6
Long Beach	350 or less	6		6									6
Los Angeles C.O.	0350 or less	52		3	9			9	6	24	9		42
Los Angeles C.O.	0351 to 500	118		21	21	3				73	42		76
Los Angeles C.O.	0501 to 750	64		39		9		3		12	21		42
Los Angeles C.O.	0751 to 1000	91		18	6					67	12		79
Los Angeles C.O.	1001 to 2000	12								12			12
Los Angeles C.O.	2001 to 6000	12		3						9	3		9
Los Angeles C.O.	6001 or greater	15								15			15
Mount Shasta	0350 or less	303		288				12		3	158		146
Mount Shasta	0351 to 500	97		79				4	7	7	45	3	49
Mount Shasta	0501 to 750	355		309				45			194		161
Mount Shasta	0751 to 1000	91		49				35	7		30		61
Mount Shasta	1001 to 2000	55		27				19		8	9	9	36
Mount Shasta	2001 to 6000	36		6				30			6	9	21
Mount Shasta	6001 or greater	52		30				7	7	7	38	6	9
Redding	0350 or less	139		139							112		27
Redding	0351 to 500	67		36				3	27		21		45
Redding	0501 to 750	294		291				3			221		73
Redding	0751 to 1000	85		76					9		64		21
Redding	1001 to 2000	39		18					14	7	24		15
Redding	2001 to 6000	36		12				12	6	6	12		24
Redding	6001 or greater	24		6	6				12		18	3	3
Sacramento	0350 or less	497		481	7				9		376	15	106
Sacramento	0351 to 500	39		30	7			3			12		27
Sacramento	0501 to 750	1177		579	324			6	18	249	764	12	400
Sacramento	0751 to 1000	124		70				6	6	42	64	3	58
Sacramento	1001 to 2000	494		200	97			3		194	318	27	149
Sacramento	2001 to 6000	273		55		6		12		200	176	33	64
Sacramento	6001 or greater	6			6						6		
San Diego	0350 or less	82		48	10			3	18	3	27		55
San Diego	0351 to 500	88		3	30			7	31	17	27		61
San Diego	0501 to 750	152		139	3				3	6	118		33
San Diego	0751 to 1000	85		38	4				11	32	42		42
San Diego	1001 to 2000	45		3	6	15		3	9	9	6		39
San Diego	2001 to 6000	33		3					15	15	3		30
San Diego	6001 or greater	9		9							9		
San Francisco AP	0350 or less	45		39					6		36		9
San Francisco AP	0351 to 500	49		42					6		42		6
San Francisco AP	0501 to 750	182		124					12	45	127		55
San Francisco AP	0751 to 1000	58		36					9	12	36		21
San Francisco AP	1001 to 2000	39							15	24			39
San Francisco AP	2001 to 6000	9							9				9
San Francisco AP	6001 or greater	3							3				3
San Francisco CO	0501 to 750	24		3						21	3		21
San Francisco CO	1001 to 2000	15								15			15
San Francisco CO	351 to 500	3							3				3
San Francisco CO	751 to 1000	6								6			6
Santa Barbara	0351 to 500	76			73				3		73		3
Santa Barbara	0501 to 750	3			3						3		
Santa Barbara	6001 or greater	6			6								6
Santa Maria	0350 or less	45		45							45		
Santa Maria	0351 to 500	139		133					3	3	133		6
Santa Maria	0751 to 1000	91		82						9	82		9
Santa Maria	1001 to 2000	12						12			9		3
Santa Maria	2001 to 6000	12		3					9		12		
Santa Maria	501 to 750	182		69	114						182		
Stockton	0350 or less	476		321	118	36					449		27
Stockton	0351 to 500	215		106	45	24			39		176		39
Stockton	0501 to 750	385		252	112			3	18		285		100
Stockton	0751 to 1000	130		27	73	3		3	18	6	91		39
Stockton	1001 to 2000	24		6	15				3		21		3
Stockton	2001 to 6000	18			12	3			3		12		6
Stockton	6001 or greater	49			6	27		6		9			49
	Column Totals	9582	0	5777	1610	233	0	263	383	1315	6465	167	2950

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DISTRICT PERMITTED AST SURVEY (2006)												
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Amador	0350 or less	4	0	0	0	0	0	0	4	0	Unknown
Amador	0351 to 500	0	0	0	0	0	0	0	0	0	Unknown
Amador	0501 to 750	1	0	0	0	0	0	0	1	0	Unknown
Amador	0751 to 1000	5	0	0	0	0	0	0	5	0	Unknown
Amador	1001 to 2000	6	0	0	0	0	0	0	6	0	Unknown
Amador	2001 to 6000	1	0	0	0	0	0	0	1	0	Unknown
Amador	6001 or greater	1	0	0	0	0	0	0	1	0	Unknown
Antelope Valley	0350 or less	0	0	0	0	0	0	0	0	0	Unknown
Antelope Valley	0351 to 500	9	0	0	0	0	0	0	9	0	Unknown
Antelope Valley	0501 to 750	1	0	0	1	0	0	0	0	0	Unknown
Antelope Valley	0751 to 1000	5	0	0	0	0	0	0	5	0	Unknown
Antelope Valley	1001 to 2000	6	0	0	0	1	0	0	5	0	Unknown
Antelope Valley	2001 to 6000	4	0	0	0	0	0	0	4	0	Unknown
Antelope Valley	6001 or greater	1	0	0	0	0	0	0	1	0	Unknown
Bay Area	350 or less	1	0	0	0	0	0	0	1	0	Unknown
Bay Area	351 to 500	70	2	2	3	0	0	0	63	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Bay Area	501 to 750	10	0	0	0	0	0	0	10	0	Unknown
Bay Area	751 to 1000	85	0	0	3	0	0	0	82	0	Unknown
Bay Area	1001 to 2000	40	0	0	1	0	0	0	39	0	Unknown
Bay Area	2001 to 6000	41	0	0	7	0	2	0	32	0	Unknown
Bay Area	6001 or greater	38	0	0	4	0	3	0	31	0	Unknown
Butte*	0350 or less	0	0	0	0	0	0	0	0	0	Unknown
Butte*	0351 to 500	0	0	0	0	0	0	0	0	0	Unknown
Butte*	0501 to 750	1	0	0	0	0	1	0	0	0	Unknown
Butte*	0751 to 1000	12	9	0	0	0	3	0	0	0	Unknown
Butte*	1001 to 2000	6	3	0	0	0	3	0	0	0	Unknown
Butte*	2001 to 6000	8	4	0	0	0	4	0	0	0	Unknown
Butte*	6001 or greater	16	14	0	0	0	2	0	0	0	Unknown
Calaveras	350 or less	0	0	0	0	0	0	0	0	0	0
Calaveras	351 to 500	0	0	0	0	0	0	0	0	0	0
Calaveras	501 to 750	0	0	0	0	0	0	0	0	0	0
Calaveras	751 to 1000	12	2	0	0	0	0	0	0	0	10
Calaveras	1001 to 2000	0	0	0	0	0	0	0	0	0	0

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Calaveras	2001 to 6000	4	4	0	0	0	0	0	0	0	0
Calaveras	6001 or greater	3	2	0	0	0	0	0	1	0	0
Colusa	0350 or less	0	0	0	0	0	0	0	0	0	Unknown
Colusa	0351 to 500	0	0	0	0	0	0	0	0	0	Unknown
Colusa	0501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Colusa	0751 to 1000	0	0	0	0	0	0	0	0	0	Unknown
Colusa	1001 to 2000	1	1	0	0	0	0	0	0	0	Unknown
Colusa	2001 to 6000	5	2	0	0	0	3	0	0	0	Unknown
Colusa	6001 or greater	15	7	0	0	0	8	0	0	0	Unknown
El Dorado	0350 or less	3	0	0	1	0	0	0	2	0	Unknown
El Dorado	0351 to 500	5	0	0	2	0	0	0	3	0	Unknown
El Dorado	0501 to 750	0	0	0	0	0	0	0	0	0	Unknown
El Dorado	0751 to 1000	9	0	0	8	0	0	0	1	0	Unknown
El Dorado	1001 to 2000	4	0	0	1	0	0	0	3	0	Unknown
El Dorado	2001 to 6000	9	0	0	3	0	0	0	6	0	Unknown
El Dorado	6001 or greater	16	0	0	6	0	0	0	10	0	Unknown
Feather River	0350 or less	6	1	0	5	0	0	0	0	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Feather River	0351 to 500	12	8	0	4	0	0	0	0	0	Unknown
Feather River	0501 to 750	2	0	0	2	0	0	0	0	0	Unknown
Feather River	0751 to 1000	10	4	0	4	0	0	0	2	0	Unknown
Feather River	1001 to 2000	10	4	0	4	0	0	0	2	0	Unknown
Feather River	2001 to 6000	9	1	0	1	0	0	0	7	0	Unknown
Feather River	6001 or greater	18	1	0	11	0	0	0	6	0	Unknown
Glenn	0350 or less	1	1	0	0	0	0	0	0	0	0
Glenn	0351 to 500	3	3	0	0	0	0	0	0	0	0
Glenn	0501 to 750	2	2	0	0	0	0	0	0	0	0
Glenn	0751 to 1000	0	0	0	0	0	0	0	0	0	0
Glenn	1001 to 2000	4	1	0	0	0	0	0	0	0	3
Glenn	2001 to 6000	10	7	0	0	0	3	0	0	0	0
Glenn	6001 or greater	11	0	0	0	0	9	0	2	0	0
Great Basin	0350 or less	4	4	0	0	0	0	0	0	0	Unknown
Great Basin	0351 to 500	0	0	0	0	0	0	0	0	0	Unknown
Great Basin	0501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Great Basin	0751 to 1000	13	0	0	13	0	0	0	0	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)

			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Great Basin	1001 to 2000	8	0	0	8	0	0	0	0	0	Unknown
Great Basin	2001 to 6000	10	0	0	10	0	0	0	0	0	Unknown
Great Basin	6001 or greater	11	0	0	11	0	0	0	0	0	Unknown
Imperial	0350 or less	0	0	0	0	0	0	0	0	0	0
Imperial	0351 to 500	14	7	0	0	0	1	0	6	0	0
Imperial	0501 to 750	54	3	0	0	0	0	0	1	0	50
Imperial	0751 to 1000	7	3	0	0	0	0	0	4	0	0
Imperial	1001 to 2000	3	1	0	0	0	0	0	2	0	0
Imperial	2001 to 6000	13	7	0	0	0	4	0	1	0	1
Imperial	6001 or greater	40	17	0	0	0	19	0	4	0	0
Kern	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Kern	351 to 500	5	5	0	0	0	0	0	0	0	Unknown
Kern	501 to 750	3	3	0	0	0	0	0	0	0	Unknown
Kern	751 to 1000	16	0	0	2	0	1	0	13	0	Unknown
Kern	1001 to 2000	5	0	0	2	0	1	0	2	0	Unknown
Kern	2001 to 6000	8	0	0	0	0	1	0	7	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Kern	6001 or greater	0	0	0	0	0	0	0	0	0	Unknown
Lake*	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Lake*	351 to 500	3	3	0	0	0	0	0	0	0	Unknown
Lake*	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Lake*	751 to 1000	7	7	0	0	0	0	0	0	0	Unknown
Lake*	1001 to 2000	2	2	0	0	0	0	0	0	0	Unknown
Lake*	2001 to 6000	6	5	0	0	0	1	0	0	0	Unknown
Lake*	6001 or greater	21	16	0	0	0	5	0	0	0	Unknown
Lassen	0350 or less	0	0	0	0	0	0	0	0	0	0
Lassen	0351 to 500	0	0	0	0	0	0	0	0	0	0
Lassen	501 to 750	0	0	0	0	0	0	0	0	0	0
Lassen	0751 to 1000	0	0	0	0	0	0	0	0	0	0
Lassen	1001 to 2000	0	0	0	0	0	0	0	0	0	0
Lassen	2001 to 6000	0	0	0	0	0	0	0	0	0	0
Lassen	6001 or greater	0	0	0	0	0	0	0	0	0	0
Mariposa	0350 or less	3	0	0	0	0	3	0	0	0	Unknown
Mariposa	0351 to 500	2	1	0	0	0	1	0	0	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Mariposa	0501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Mariposa	0751 to 1000	5	2	0	0	0	3	0	0	0	Unknown
Mariposa	1001 to 2000	2	1	0	0	0	1	0	0	0	Unknown
Mariposa	2001 to 6000	4	0	0	0	0	4	0	0	0	Unknown
Mariposa	6001 or greater	2	0	0	0	0	2	0	0	0	Unknown
Mendocino	350 or less	0	0	0	0	0	0	0	0	0	0
Mendocino	351 to 500	1	0	0	0	0	0	0	0	0	1
Mendocino	501 to 750	0	0	0	0	0	0	0	0	0	0
Mendocino	751 to 1000	18	0	14	0	0	0	0	0	0	4
Mendocino	1001 to 2000	4	0	2	0	0	0	0	0	0	2
Mendocino	2001 to 6000	3	0	0	0	0	0	0	0	2	1
Mendocino	6001 or greater	17	0	0	0	0	0	0	0	3	14
Modoc	350 or less	2	0	0	2	0	0	0	0	0	Unknown
Modoc	351 to 500	4	0	0	4	0	0	0	0	0	Unknown
Modoc	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Modoc	751 to 1000	2	0	0	0	0	0	0	2	0	Unknown
Modoc	1001 to 2000	4	0	0	0	0	0	0	4	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)

			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Modoc	2001 to 6000	0	0	0	0	0	0	0	0	0	Unknown
Modoc	6001 or greater	0	0	0	0	0	0	0	0	0	Unknown
Mojave Desert*	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Mojave Desert*	351 to 500	20	0	0	0	0	0	0	20	0	Unknown
Mojave Desert*	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Mojave Desert*	751 to 1000	36	0	0	0	0	0	0	36	0	Unknown
Mojave Desert*	1001 to 2000	14	0	0	0	0	0	0	14	0	Unknown
Mojave Desert*	2001 to 6000	16	0	0	0	0	0	0	16	0	Unknown
Mojave Desert*	6001 or greater	14	0	0	0	0	0	0	14	0	Unknown
Monterey Bay	350 or less	2	0	0	0	0	0	0	2	0	Unknown
Monterey Bay	351 to 500	157	0	0	4	0	0	0	153	0	Unknown
Monterey Bay	501 to 750	3	0	0	0	0	0	0	3	0	Unknown
Monterey Bay	751 to 1000	47	0	0	0	0	0	0	47	0	Unknown
Monterey Bay	1001 to 2000	21	0	0	0	0	0	0	21	0	Unknown
Monterey Bay	2001 to 6000	12	2	0	0	0	0	0	10	0	Unknown
Monterey Bay	6001 or greater	10	8	0	0	0	0	0	2	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
North Coast	350 or less	0	0	0	0	0	0	0	0	0	0
North Coast	351 to 500	0	0	0	0	0	0	0	0	0	0
North Coast	501 to 750	0	0	0	0	0	0	0	0	0	0
North Coast	751 to 1000	3	0	0	1	0	0	0	0	0	2
North Coast	1001 to 2000	8	0	0	1	0	0	0	3	0	4
North Coast	2001 to 6000	4	0	0	0	0	0	0	0	0	4
North Coast	6001 or greater	5	0	0	0	0	2	0	1	0	2
North Sierra	350 or less	0	0	0	0	0	0	0	0	0	0
North Sierra	351 to 500	0	0	0	0	0	0	0	0	0	0
North Sierra	501 to 750	5	5	0	0	0	0	0	0	0	0
North Sierra	751 to 1000	19	5	0	0	0	0	0	10	0	4
North Sierra	1001 to 2000	6	3	0	0	0	0	0	0	0	3
North Sierra	2001 to 6000	0	0	0	0	0	0	0	0	0	0
North Sierra	6001 or greater	3	0	0	0	0	0	0	0	0	3
North Sonoma	350 or less	1	0	1	0	0	0	0	0	0	Unknown
North Sonoma	351 to 500	1	0	0	0	0	0	0	1	0	Unknown
North Sonoma	501 to 750	1	0	1	0	0	0	0	0	0	Unknown
North Sonoma	751 to 1000	2	0	0	0	0	0	0	2	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
North Sonoma	1001 to 2000	4	0	0	1	0	0	0	3	0	Unknown
North Sonoma	2001 to 6000	5	0	0	1	0	0	0	4	0	Unknown
North Sonoma	6001 or greater	0	0	0	0	0	0	0	0	0	Unknown
Placer	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Placer	351 to 500	32	0	0	4	0	0	0	28	0	Unknown
Placer	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Placer	751 to 1000	65	0	0	2	0	0	0	63	0	Unknown
Placer	1001 to 2000	7	0	0	0	0	0	0	7	0	Unknown
Placer	2001 to 6000	11	0	0	3	0	0	0	8	0	Unknown
Placer	6001 or greater	18	0	0	0	0	0	0	18	0	Unknown
Sacramento	350 or less	4	0	0	0	0	0	0	4	0	Unknown
Sacramento	351 to 500	1	0	0	1	0	0	0	0	0	Unknown
Sacramento	501 to 750	30	0	0	0	0	0	0	30	0	Unknown
Sacramento	751 to 1000	51	0	0	0	0	0	0	51	0	Unknown
Sacramento	1001 to 2000	6	0	0	2	0	0	0	4	0	Unknown
Sacramento	2001 to 6000	5	0	0	1	0	0	0	4	0	Unknown
Sacramento	6001 or greater	8	0	0	3	0	0	0	5	0	Unknown

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
San Diego	350 or less	16	1	0	0	0	0	0	0	0	15
San Diego	351 to 500	91	0	0	0	0	1	0	0	0	90
San Diego	501 to 750	8	4	0	0	0	0	0	0	0	4
San Diego	751 to 1000	50	33	0	0	0	17	0	0	0	0
San Diego	1001 to 2000	20	8	0	0	0	12	0	0	0	0
San Diego	2001 to 6000	21	5	0	0	0	16	0	0	0	0
San Diego	6001 or greater	9	2	0	0	0	7	0	0	0	0
San Joaquin	350 or less	9	6	0	0	0	0	0	3	0	Unknown
San Joaquin	351 to 500	191	31	1	41	0	0	0	118	0	Unknown
San Joaquin	501 to 750	42	33	1	0	0	0	0	8	0	Unknown
San Joaquin	751 to 1000	333	55	9	35	0	3	0	231	0	Unknown
San Joaquin	1001 to 2000	113	14	4	0	0	0	0	95	0	Unknown
San Joaquin	2001 to 6000	87	17	5	2	0	3	0	60	0	Unknown
San Joaquin	6001 or greater	118	11	1	5	0	44	0	57	0	Unknown
San Luis Obispo	350 or less	0	0	0	0	0	0	0	0	0	0
San Luis Obispo	351 to 500	4	0	0	0	0	0	0	0	0	4
San Luis Obispo	501 to 750	0	0	0	0	0	0	0	0	0	0
San Luis Obispo	751 to 1000	7	0	0	0	0	0	0	0	0	7

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DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
San Luis Obispo	1001 to 2000	6	0	0	0	0	0	0	6	0	0
San Luis Obispo	2001 to 6000	6	0	0	0	0	0	0	6	0	0
San Luis Obispo	6001 or greater	4	0	0	0	0	0	0	4	0	0
Santa Barbara	350 or less	19	0	0	0	0	0	0	1	0	18
Santa Barbara	351 to 500	19	1	0	0	0	0	0	10	0	8
Santa Barbara	501 to 750	7	0	0	0	0	0	0	0	0	7
Santa Barbara	751 to 1000	32	0	0	0	0	0	0	12	0	20
Santa Barbara	1001 to 2000	17	0	1	0	0	0	0	13	0	3
Santa Barbara	2001 to 6000	4	0	0	0	0	0	0	4	0	0
Santa Barbara	6001 or greater	15	0	0	0	0	9	0	2	0	4
Shasta	350 or less	0	0	0	0	0	0	0	0	0	0
Shasta	351 to 500	1	0	0	1	0	0	0	0	0	0
Shasta	501 to 750	0	0	0	0	0	0	0	0	0	0
Shasta	751 to 1000	5	2	0	0	0	0	0	2	0	1
Shasta	1001 to 2000	1	0	0	1	0	0	0	0	0	0
Shasta	2001 to 6000	8	0	0	4	0	0	0	0	0	4

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			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Shasta	6001 or greater	21	0	0	8	0	7	0	0	0	6
Siskiyou	350 or less	0	0	0	0	0	0	0	0	0	0
Siskiyou	351 to 500	0	0	0	0	0	0	0	0	0	0
Siskiyou	501 to 750	0	0	0	0	0	0	0	0	0	0
Siskiyou	751 to 1000	0	0	0	0	0	0	0	0	0	0
Siskiyou	1001 to 2000	0	0	0	0	0	0	0	0	0	0
Siskiyou	2001 to 6000	1	0	0	0	0	0	0	1	0	0
Siskiyou	6001 or greater	11	5	0	0	0	2	0	2	0	2
South Coast	350 or less	11	0	0	0	0	0	0	11	0	Unknown
South Coast	351 to 500	74	0	0	0	0	0	0	73	1	Unknown
South Coast	501 to 750	15	0	0	0	0	0	0	15	0	Unknown
South Coast	751 to 1000	118	0	0	0	0	0	0	118	0	Unknown
South Coast	1001 to 2000	99	0	0	0	0	0	0	99	0	Unknown
South Coast	2001 to 6000	74	0	0	0	0	0	0	74	0	Unknown
South Coast	6001 or greater	46	0	0	0	0	0	0	46	0	Unknown
Tehama	350 or less	0	0	0	0	0	0	0	0	0	Unknown

APPENDIX H
AST POPULATION SURVEY
TABLE H-4

DISTRICT PERMITTED AST SURVEY (2006)											
			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Tehama	351 to 500	0	0	0	0	0	0	0	0	0	Unknown
Tehama	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Tehama	751 to 1000	0	0	0	0	0	0	0	0	0	Unknown
Tehama	1001 to 2000	1	0	0	0	0	0	0	1	0	Unknown
Tehama	2001 to 6000	0	0	0	0	0	0	0	0	0	Unknown
Tehama	6001 or greater	3	1	0	0	0	2	0	0	0	Unknown
Tuolumne	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Tuolumne	351 to 500	0	0	0	0	0	0	0	0	0	Unknown
Tuolumne	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Tuolumne	751 to 1000	0	0	0	0	0	0	0	0	0	Unknown
Tuolumne	1001 to 2000	0	0	0	0	0	0	0	0	0	Unknown
Tuolumne	2001 to 6000	0	0	0	0	0	0	0	0	0	Unknown
Tuolumne	6001 or greater	7	2	0	0	0	5	0	0	0	Unknown
Ventura*	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Ventura*	351 to 500	4	0	0	4	0	0	0	0	0	Unknown
Ventura*	501 to 750	2	0	0	1	0	0	0	1	0	Unknown
Ventura*	751 to 1000	28	0	0	13	0	0	0	15	0	Unknown

APPENDIX H
AST POPULATION SURVEY
TABLE H-4

DISTRICT PERMITTED AST SURVEY (2006)

			Phase I Controls				Phase I and Phase II Controls				Non Permitted/ No Controls
AP-42 Districts	Tank size in gallons	Total number of ASTs	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	Single Wall Tanks	Single Wall Ag Tanks	Protected Tanks	Protected Ag Tanks	All Tanks
Ventura*	1001 to 2000	14	0	0	2	0	0	0	12	0	Unknown
Ventura*	2001 to 6000	11	0	0	1	0	0	0	10	0	Unknown
Ventura*	6001 or greater	2	0	0	0	0	0	0	2	0	Unknown
Yolo-Solano*	350 or less	0	0	0	0	0	0	0	0	0	Unknown
Yolo-Solano*	351 to 500	19	6	0	0	0	13	0	0	0	Unknown
Yolo-Solano*	501 to 750	0	0	0	0	0	0	0	0	0	Unknown
Yolo-Solano*	751 to 1000	23	8	0	0	0	15	0	0	0	Unknown
Yolo-Solano*	1001 to 2000	6	4	0	0	0	2	0	0	0	Unknown
Yolo-Solano*	2001 to 6000	9	4	0	0	0	5	0	0	0	Unknown
Yolo-Solano*	6001 or greater	11	3	0	0	0	8	0	0	0	Unknown
	Total	**3412**	**449**	**42**	**265**	**1**	**261**	**0**	**2087**	**6**	**301**
			491		**266**		**261**		**2093**		
Total Permitted ASTs		**=**	**3111**								
* District does not distinguish between single wall and protected tanks.											

APPENDIX I

AST Emissions Inventory

1. Emissions Inventory

Monitoring and Laboratory Division (MLD) with the assistance of Planning Technical and Support Division (PTSD) has developed the statewide emissions inventory to support the enhanced vapor recovery rulemaking on ASTs. The inventory was developed using the population estimates and emission factors calculated for different types of ASTs. Based on this data, there are approximately 9,582 ASTs in California with annual average emissions of approximately 3.31 tons/day. Emissions from ASTs vary depending on their size, type and vapor recovery configuration. Appendix H contains the detail information on population estimates of ASTs. Attachment A contains a detailed report that describes the development of regional tank specific emission factors. The fully detailed spreadsheets used in the calculations are available from ARB upon request.

A. AST Population Distribution

The number of ASTs in California was determined through regional surveys of Districts, Fuel Carriers, AST manufacturers, and the State Water Resources Control Board. The surveys identified AST categories that included single wall and protected tanks. The survey data is summarized in Table 1.

Table 1
AST Population Survey Summary

Source	Year	Single Wall	Protected	Total
AST Manufacturer	2002	2,407	3,398	6,005
Districts*	2003	n/a	n/a	1,892
Districts*	2006	752	2,359	3,111
Fuel Carriers	2003	4,760	2,873	7,633
Fuel Carriers**	2004	7,620	1,962	9,582
Water Board	2003	n/a	n/a	3,899

*District survey data only included permitted tanks; all other surveys included both permitted and non permitted tanks.
**Raw data from the 2004 Fuel Carrier survey was extrapolated based on the percentage of respondents to the survey (approximately 33 percent).

The 2002 AST Manufacturer, 2003 District, Fuel Carrier, and Water Board surveys were not comprehensive enough to quantify the number of tanks in California. Specific categories had to be identified. The 2004 Fuel Carrier and 2006 District surveys addressed this deficiency and further categorized single wall and protected ASTs into ASTs with no vapor recovery, Phase I vapor recovery, and Phase I and Phase II vapor recovery. These breakdowns are summarized in Table 2.

APPENDIX I
AST Emissions Inventory

Table 2
Vapor Recovery Categories of Single Wall and Protected ASTs

Survey	Single Wall Tanks			Protected Tanks		
	No VR	Phase I	Phase I/II	No VR	Phase I	Phase I/II
Fuel Carriers	5777	1610	233	264	383	1315
Districts*	301	491	261	0	266	2093

*Permitted tanks only, except for the 301 single wall tanks with no vapor recovery.

Appendix H contains the table titled "AST Fuel Carrier Survey (2004)" with the complete breakdown of this survey and also contains the table titled "District Permitted AST Survey (2006)" with detail information on the population data collected for all the tanks permitted by the districts. The 2004 Fuel Carrier Survey also identified ASTs by location and application: farm (agriculture), marina, and other (retail gasoline dispensing facility and municipalities). Staff assumed that ASTs in the marina (167) and other (2,950) categories are District permitted tanks and that the farm (6465) category includes District non-permitted tanks due to California Health and Safety Code exemptions since removed by Senate Bill 700 (Florez, 2003). Therefore the number of ASTs permitted by Districts according to the 2004 Fuel Carrier Survey was 3117, and the number of permitted ASTs identified by the 2006 District Survey was 3111. The average percent difference of permitted tanks between the two surveys is approximately 0.2%.

Based on the survey data compiled from Fuel Carriers (2004) and Districts (2006), staff estimates that there are 9,582 ASTs in California. Of these tanks, 3117 ASTs are District permitted and 6465 ASTs are not permitted by Districts.

B Emission Factors

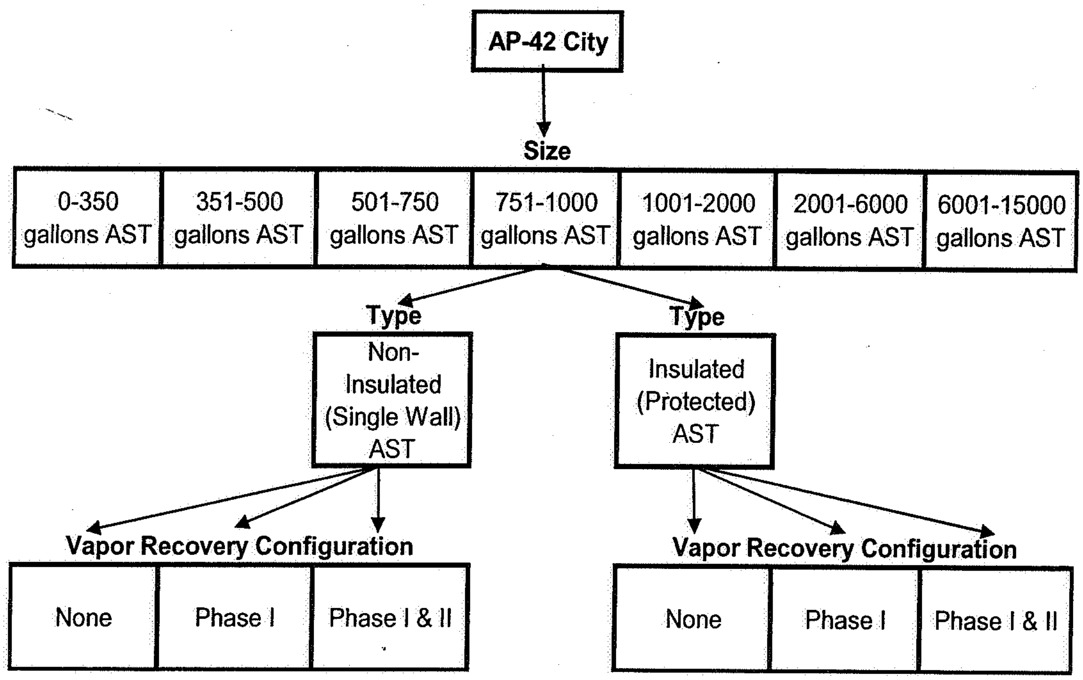
AP-42 Methodology, developed by American Petroleum Institute and approved by US Environmental Protection Agency (EPA), was used to calculate the emission factors for ASTs. This methodology consists of detailed method of calculating emissions from single wall storage tanks and can be found on the U.S EPA website:

http://www.epa.gov/ttn/chief/ap42/ch07/index.html

This document also consists of monthly ambient temperature profiles for 15 cities in California. These ambient temperature profiles are tabulated in Attachment B. Each AST, identified in the 2004 Fuel Carrier Survey discussed in the previous section, was linked to the closest AP-42 city and the corresponding temperature data was used to calculate the emissions. However, some equations in the original AP-42 methodology were modified based on the AST configurations being evaluated. Attachment A contains a detailed report titled "Air Resources Board's Approach to Estimating Aboveground Storage Tank Emission Factors using the AP-42 Method" that describes these modifications and the assumptions made in performing the calculations. Emission factors for ASTs were calculated based on their location, size, type, and vapor recovery configurations as shown in Figure 2.

Figure 2

Emission Factors Calculated for Each Region, Size, Type and Vapor Recovery Configuration of ASTs



As described in detail earlier, there are three main types of emissions from ASTs. Emission factors were calculated for all types of emissions or losses from ASTs:

Standing Losses: Emission factors for these losses were calculated using AP-42 methodology for all the sizes, types and vapor recovery configurations as shown in figure 2. Standing losses contribute to 2.95 tons/day out of the total statewide emissions from ASTs as shown in Table 3. Some equations in AP-42 methodology were modified based on data obtained from studies conducted by staff at Air Resources Board (ARB) as described below.

- Attenuation Factors: In 2004, ARB staff collected almost four months of daily ambient temperature and daily fuel surface temperature data for various single wall and protected tanks located in the greater Sacramento region. Attenuation factors were derived using this data and applied in the AP-42 calculations of emission factors for these types of tanks (see Attachment A). The average attenuation factor was calculated to be 0.11 for a single wall AST and 0.90 for a protected AST.

- Correction Factor: U.S. EPA approved AP-42 Methodology applies to a closed system i.e. tank with a pressure vacuum vent (PV) valve. The 2004 AST Fuel Carrier Survey (Table 2) indicated that there are several tanks which had no vapor recovery or PV valve and are open to the atmosphere. Results from a field study, conducted by ARB staff in 2005 (see Appendix D), concluded that AP-42 methodology underestimates emissions from an open system (AST with no PV valve) by a factor of 1.6 as compared to a closed system (AST with a PV valve). Therefore, a correction factor of 1.6 was applied to emission factors calculated using AP-42 methodology for ASTs with no PV valve.

Working (Phase I) Losses and Vapor Displacement (Phase II) Losses: These emissions depend on the fuel throughput which was assumed to be four tank fillings each year with each refilling amounting to 80% of the tank volume (Attachment A). These emissions are much smaller (~10%) than the standing loss emissions (~90%). Moreover, ASTs with Phase I and Phase II vapor recovery systems have even smaller emissions. Phase I vapor recovery controls about 95% of the working loss emissions and Phase II vapor recovery controls about 90% of the vapor displacement emissions. The population survey indicated that the majority of the ASTs did not have any vapor recovery systems. Emission factors were calculated for ASTs with no vapor recovery, with Phase I and with Phase I & Phase II vapor recovery systems.

Working losses and vapor displacement losses contribute to 0.14 tons/day and 0.20 tons/day respectively out of the total statewide emissions from ASTs as shown in Table 3.

Spillage Losses: These losses occur during pre-fueling, fueling and post fueling operations. The emission factor used for spillage losses was 0.64lb/1000 gallon for ASTs with no vapor recovery and ASTs with only Phase I vapor recovery systems and 0.42 lb/1000 gallon for ASTs with Phase II vapor recovery systems. Spillage losses contribute to only 0.02 tons/day out of the total statewide emissions from ASTs as shown in Table 3.

Emission factors were calculated for all the above listed emission types and applied to ASTs located statewide. As stated earlier in this section, each AST was linked to the nearest AP-42 city due to the availability of daily ambient temperature data that was used to calculate the emissions. Therefore, emission factors calculated for each AP-42 city actually represent a particular region in the state. Combination of all these regional emissions contributes to the statewide emissions inventory for ASTs as shown in Table 3.

Table 3
Statewide AST Emissions Inventory (2004)

AP-42 City/Region	Throughput (1000 gal)	Breathing Losses (tons/day)	Working Losses (tons/day)	Vapor Displacement Losses (tons/day)	Spillage Losses (tons/day)	Total AST Emissions (tons/day)
Bakersfield*	1,778	0.25	0.01	0.01	0.00	0.27
Bishop	180	0.02	0.00	0.00	0.00	0.02
Eureka	1,133	0.06	0.01	0.01	0.00	0.08
Fresno*	2,342	0.37	0.01	0.02	0.00	0.40
Long Beach	139	0.00	0.00	0.00	0.00	0.00
Los Angeles C.O.	1,295	0.04	0.00	0.00	0.00	0.05
Mount Shasta	3,727	0.32	0.02	0.03	0.00	0.37
Redding	2,466	0.33	0.02	0.02	0.00	0.37
Sacramento	9,106	0.82	0.04	0.05	0.01	0.92
San Diego	1,658	0.11	0.01	0.01	0.00	0.13
San Francisco AP	1,025	0.05	0.00	0.01	0.00	0.06
San Francisco C.O.	142	0.00	0.00	0.00	0.00	0.00
Santa Barbara	313	0.03	0.00	0.00	0.00	0.03
Santa Maria	1,050	0.13	0.01	0.01	0.00	0.14
Stockton*	3,675	0.42	0.01	0.02	0.00	0.46
Statewide	***30,029***	***2.95***	**0.14**	**0.20**	***0.02***	**3.31**

* San Joaquin Valley region = 1.13 tons/day

Attachment A
Air Resources Board's Approach to Estimating Aboveground Storage Tank Emission Factors using the AP-42 Method

Introduction

The California Air Resources Board (ARB) has developed a statewide emission inventory of Aboveground Storage Tanks (AST) as part of its Enhanced Vapor Recovery Rulemaking. ARB staff used the equations in AP-42, developed by the American Petroleum Institute, to determine AST emission factors from single-wall and protected ASTs with different sizes and configurations. The statewide AST emission inventory is based on these emission factors.

AP-42, a document published by the U.S. Environmental Protection Agency (EPA), consists of a detailed method for calculating emissions losses from single-wall storage tanks. AP-42 can be viewed under section "Organic Liquid Storage Tanks" (Background Document) on the U.S EPA's website at http://www.epa.gov/ttn/chief/ap42/ch07/index.html. To use AP-42 for protected tanks, fuel surface temperatures are required. In 2004, ARB staff monitored several protected ASTs of various sizes (see the November 3, 2004 presentation on the AST vapor recovery website at http://www.arb.ca.gov/vapor/ast/ast.htm for more information). The purpose of monitoring these tanks was to acquire the fuel surface temperature information needed for the AP-42 equations.

This document presents the stepwise approach used in calculating the emission factors for single-wall (Non-Insulated) and protected (Insulated) ASTs, using AP-42 methodology. However, some equations used in AP-42 methodology were modified based on the AST configurations being evaluated. These modifications were based on some assumptions which are listed along with the respective equation.

Total Losses from Storage Tanks

The following equations apply to horizontal aboveground storage tanks (ASTs) that store organic liquids i.e. gasoline. These tanks must be substantially liquid and vapor-tight and must operate at atmospheric pressure. Total losses from ASTs, equal to the sum of the standing storage loss and working loss (including vapor displacement loss), are calculated for each month:

$$L_T = L_S + L_W$$

Where:
L_T = total losses, lb/month
L_S = standing storage loss, lb/month

L_W = working loss and vapor displacement loss, lb/month

<u>Standing Storage or Breathing Loss</u>

$$L_S = nV_VW_VK_EK_S$$

Where:
L_S = Standing storage losses, lb/month
n = number of days in the respective month
V_V = vapor space volume of the ullage, ft^3
W_V = vapor density, lb/ft^3
K_E = vapor space expansion factor, dimensionless
K_S = vented vapor saturation factor, dimensionless

- **<u>Tank vapor space volume, V_V</u>**, is considered to be equal to the ullage volume and was estimated as:

Assumption: <u>The ASTs being considered in this evaluation are horizontal with no roof outage or vapor space outage factor. The AST is half-full so therefore V_v is half the AST capacity. When a range of tank capacities are considered, the average tank capacity is used and divided by 7.481 to convert gallons into ft^3. The following equation is a modified version of the AP-42 equation.</u>

$$V_V = \tfrac{1}{2} \text{ tank capacity } (ft^3)$$

Example: Tank capacity range = 751-1000 gallons
Average tank capacity = 875.5 gallons = 875.5/7.481 = 117 ft^3
V_v = 1/2*117=58.5 ft^3

- **<u>Vapor Density, W_V</u>**, is the density of the vapor and was calculated using the following equation:

$$W_V = M_VP_{VA} / RT_{LA}$$

Where:
W_V = vapor density, lb/ft^3
M_V = vapor molecular weight, lb/lb-mole
R = the ideal gas constant, 10.731 psia·ft^3/lb-mole·°R
P_{VA} = vapor pressure at daily average liquid-surface temperature, psia
T_{LA} = daily average liquid (gasoline) surface temperature, °R

  - **Molecular weight of the vapor (M_V)** was obtained from the Table 3-2 in AP-42, listing the physical properties of gasoline. The molecular weight of gasoline changes with the change in Reid Vapor Pressure (RVP).

Assumption: The RVP of gasoline for the summer months (April to October) is 7.0 psi, for the winter months (November to February) is 11.0 psi and for the month of March is 9.0 psi.
Listed below are the molecular weights of gasoline for each corresponding RVP:

April-October – RVP = 7 psi, M_V = 68
November-February – RVP = 11 psi, M_V = 65
March – RVP = 9 psi, M_V = 67

- **True vapor pressure (P_{VA})** of gasoline stocks, at the daily average liquid surface temperature, can be determined using the following equation:

$$P_{VA} = \exp\left[A - (B/T_{LA})\right]$$

Where:
exp = exponential function
T_{LA} = daily average liquid (gasoline) surface temperature, °R
Figure 3-5 in AP-42 shows the equations used to determine vapor pressure constants, A (dimensionless) and B (°R) for each corresponding RVP of gasoline:

RVP = 7 psi, A = 11.83 and B = 5500.90 °R
RVP = 9 psi, A = 11.75 and B = 5314.31 °R
RVP = 11 psi, A = 11.69 and B = 5166.94 °R

- **Daily average liquid (gasoline) surface temperature (T_{LA})** was calculated using the following equation:

$$T_{LA} = (T_{LN} + T_{LX})/2$$

Where:
T_{LN} = daily minimum liquid (gasoline) surface temperature, °R
T_{LX} = daily maximum liquid (gasoline) surface temperature, °R

These values were obtained from the ambient temperature data available in the AP-42 "TANKS" software. This software has ambient temperature data in (°F) for sixteen cities in California. Using this data, the following was determined for ASTs within each of the sixteen cities (Attachment B):

Tamb.avg = daily ambient average temperature, °F
Tamb.range = daily ambient temperature range, °F or °R

Study conducted to determine the effect of daily ambient temperatures on gasoline surface temperatures (T_{LN} and T_{LX}):

In 2004, ARB staff conducted a four-month study to measure ambient temperatures and gasoline surface temperatures for existing single wall (non-insulated) and protected (insulated) ASTs in the greater Sacramento region. Daily maximum and minimum temperature data was collected for ambient and gasoline surface inside both types of ASTs. The difference between the daily maximum and daily minimum temperature determined the change in the daily temperature. This data was used to derive an attenuation factor, as shown below, which determines the correlation between ambient and gasoline surface temperatures for a particular type of AST.

$$\text{*Attenuation Factor} = \frac{\text{delta Ambient} - \text{delta Fuel Surface}}{\text{delta Ambient}}$$

Where,

delta Ambient = Change in Daily Ambient Temperature

delta Fuel Surface = Change in Daily Fuel Surface Temperature

*Note that this formula is different from the one used in Appendix G where Attenuation Factor = delta Fuel Surface/delta Ambient
However, when applied to AP-42 equations for calculating the minimum (T_{LN}) and the maximum (T_{LX}) temperatures as shown below, it comes out to be the same as the formula used in Appendix G.

Single Wall (Non-Insulated) ASTs:

The attenuation factor was determined to be **0.11**, which means that the ambient temperature was attenuated by only a small amount in a single wall or non-insulated AST. This study concluded that the diurnal changes in ambient temperature have the same diurnal effect on the gasoline surface temperature inside a single wall AST, as shown in Figure 1.

Protected (Insulated) ASTs:

The average attenuation factor was determined to be **0.90**, which means that the ambient temperature was attenuated significantly in a protected or insulated AST. This study concluded that the diurnal changes in ambient temperature have a very small effect on the gasoline surface temperature inside a protected AST, as shown in Figure 2.

Using the above attenuation factors and ambient temperature data, the daily minimum and maximum liquid (gasoline) surface temperatures were estimated for both non-insulated and insulated ASTs as follows: Please note that amb.avg temperature is converted from °F to °R by adding 460.

The daily minimum liquid (gasoline) surface temperature (T_{LN}) was calculated as:

$$\mathbf{T_{LN} = [Tamb.avg+460] - [(1\text{-}Attenuation\ factor)*(Tambrange/2)]}$$

The daily maximum liquid (gasoline) surface temperature (T_{LX}) was calculated as:

$$\mathbf{T_{LX} = [Tamb.avg+460] + [(1\text{-}Attenuation\ factor)*(Tambrange/2)]}$$

- **Vapor Space Expansion Factor, K_E**- the vapor space expansion factor was calculated using the following equation:

$$\mathbf{K_E = [(\Delta T_V/T_{LA})] + [(\Delta P_V - \Delta P_B)/(14.7 - P_{VA})]}$$

Where:
K_E = dimensionless factor
ΔT_V = daily vapor temperature range, °R
ΔP_V = daily vapor pressure range, psi
ΔP_B = breather vent pressure setting range, psi
14.7 = atmospheric pressure, psi
P_{VA} = vapor pressure at daily average liquid surface temperature, psi (derived earlier)
T_{LA} = daily average liquid (gasoline) surface temperature, °R (derived earlier)

- **The daily vapor temperature range, ΔT_V,** was calculated below using the daily maximum and daily minimum liquid (gasoline) surface temperatures (derived earlier):

  Assumption: The vapor temperature range is equal to the liquid (gasoline) surface temperature range.

$$\mathbf{\Delta T_V = T_{LX} - T_{LN}}$$

- **The daily vapor pressure range, ΔP_V,** was calculated using the following equation:

$$\mathbf{\Delta P_V = P_{VX} - P_{VN}}$$

Where:
P_{VX} = vapor pressure P_{VA} at daily maximum liquid (gasoline) surface temperature, psi
P_{VN} = vapor pressure P_{VA} at daily minimum liquid (gasoline) surface temperature, psi

Using the daily maximum and daily minimum liquid (gasoline) surface temperatures, the respective vapor pressures were calculated as:

$$P_{VX} = \exp[A-(B/T_{LX})]$$

$$P_{VN} = \exp[A-(B/T_{LN})]$$

Where:
RVP = 7 psi, A = 11.83 and B = 5500.90 °R
RVP = 9 psi, A = 11.75 and B = 5314.31 °R
RVP = 11psi, A = 11.69 and B = 5166.94 °R

- **The breather vent pressure setting range, delta P_B**, was calculated using the following equation:

$$\Delta P_B = P_{BP} - P_{BV}$$

Where:
ΔP_B = breather vent range (psi)
P_{BP} = breather vent pressure setting (psi)
P_{BV} = breather vent vacuum setting (psi)

For ASTs with a pressure/vacuum vent valve
P_{BP} = 3 in$H_2O \cong$ 0.108 psi
P_{BV} = -8 in$H_2O \cong$ - 0.288 psi

For ASTs with no pressure/vacuum vent valve
P_{BP} = 0 in$H_2O \cong$ 0 psi
P_{BV} = 0 in$H_2O \cong$ 0 psi

- **The vapor pressure at daily average liquid (gasoline) surface temperature, P_{VA},** was calculated as shown earlier.

- **The daily average liquid (gasoline) surface temperature, T_{LA},** was calculated as shown earlier.

- **<u>Vented Vapor Saturation Factor, K_S</u>** – The vented vapor saturation factor was calculated using the following equation:

$$Ks = \frac{1}{1+(0.053*P_{VA}*H_{VO})} = 1$$

Where:
Ks = dimensionless factor
P_{VA} = vapor pressure at daily average fuel surface temperature, psi
H_{VO} = vapor space outage = 0 ft
(As mentioned earlier, the ASTs being considered in this evaluation are horizontal with no roof outage or vapor space outage factor)

Working Loss and Vapor Displacement Loss

Working loss is the mass of vapors emitted during the transfer of gasoline from the cargo tank to the AST (Deliveries).

Vapor displacement loss occurs during the transfer of gasoline from the AST to the vehicle (Dispenses).

The general equation for working loss is as follows:

$$L_W = L_{W\ (Deliveries)} + L_{W\ (Dispenses)}$$

Where:
L_w = total working loss, lb/month
$L_{W\ (Deliveries)}$ = working loss due to deliveries made into an AST, lb/month
$L_{W\ (Dispenses)}$ = vapor displacement loss due to dispenses from an AST into vehicle tank, lb/month

Working loss and vapor displacement losses can be minimized by controlling displaced vapors during gasoline deliveries into AST (Phase I) or during gasoline dispenses into a vehicle (Phase II). In California, the air quality districts regulate whether or not an AST is required to have Phase I and/or Phase II controls. Therefore, the ASTs may have no vapor recovery controls, Phase I vapor recovery control only, or both Phase I and Phase II vapor recovery controls. The total loss from working loss and vapor displacement loss will be different for each of these three configurations.

Assumptions: The AST is 80% empty when the cargo tank delivers gasoline into it. The number of deliveries per year is 4. The volume of gasoline delivered to the AST is equal to the volume of gasoline dispensed from the AST into vehicle tanks. The volume of gasoline delivered to the AST was calculated as follows:

$$V_{(Delivered)} = N_{(Deliveries)} * (AST\ Capacity * 0.80)$$

Where:

$V_{(Delivered)}$ = volume of the gasoline delivered to AST
$N_{(Deliveries)}$ = number of deliveries made per year to AST
AST capacity, ft^3 (derived earlier)

- **No Vapor Recovery Control, Phase I = 0, Phase II = 0**

For ASTs with no Phase I and Phase II vapor recovery control, the volume of vapors displaced during a delivery and dispensing is equal to the volume of gasoline delivered to the AST and dispensed to a vehicle tank respectively. All the vapors displaced during the delivery and dispensing are lost to the atmosphere. The loss due to dispenses is equal to the loss due to deliveries.

$$L_{W\,(Deliveries)} = (V_{(Delivered)} * W_V)/12$$
$$L_{W\,(Dispenses)} = (V_{(Delivered)} * W_V)/12$$

Where:
W_V = vapor density, lb/ft^3 (derived earlier)
12 = number of months in a year

Phase I Vapor Recovery Control, Phase I = 0.95, Phase II = 0

For ASTs with only Phase I vapor recovery control, 95% of the volume of vapors displaced during a delivery is returned to the cargo tank. The remaining 5% is lost to the atmosphere. Due to no Phase II control, volume of vapors displaced during a dispense is equal to the volume of gasoline dispensed to the vehicle. Therefore, all the vapors displaced during a dispense are lost to the atmosphere.

$$L_{W\,(Deliveries)} = [V_{(Delivered)} * W_V)/12](1 - 0.95)$$
$$L_{W\,(Dispenses)} = (V_{(Delivered)} * W_V)/12$$

Phase I and Phase II Vapor Recovery Control, Phase I = 0.95, Phase II = 0.90

For ASTs with Phase I and Phase II vapor recovery control, 95% of the volume of vapors displaced during a delivery are returned to the cargo tank and 90% of the volume of vapors displaced during a dispense are returned to the AST respectively. The remaining percent of vapors are lost to the atmosphere.

$$L_{W\,(Deliveries)} = (V_{(Delivered)} * W_V)/12] * [1 - 0.95]$$
$$L_{W\,(Dispenses)} = (V_{(Delivered)} * W_V)/12] * [1 - 0.90]$$

Conclusion

The above described AP-42 method of calculating emission factors for aboveground storage tanks (ASTs) accounted for two significant factors:

Seasonal Variation – **Emissions from ASTs were higher during summer months than during winter months. This is as expected because temperatures are higher and have a greater range in the summer months.**

Tank Characteristics – **An insulated (protected) tank generated lower emissions than a non-insulated (single wall) tank. Figures 1 and 2 clearly show that the influence of diurnal swings in ambient temperature has less effect on gasoline surface temperature in an insulated tank vs. a non-insulated tank. The gasoline surface temperature remains very stable in an insulated tank and therefore causes much lower emissions.**

ARB staff applied this approach to various categories of ASTs by size, type, vapor recovery configuration, and location for determining the various emission factors. This approach was presented at AST workshops to get comments from the different stakeholders. Some comments were received and were incorporated in the calculations. The statewide emissions inventory was developed using these emission factors and tank population estimates.

Figure 1- Ambient Temperature Compared to Gasoline Surface Temperature in a Single-Wall (Non-Insulated)Tank

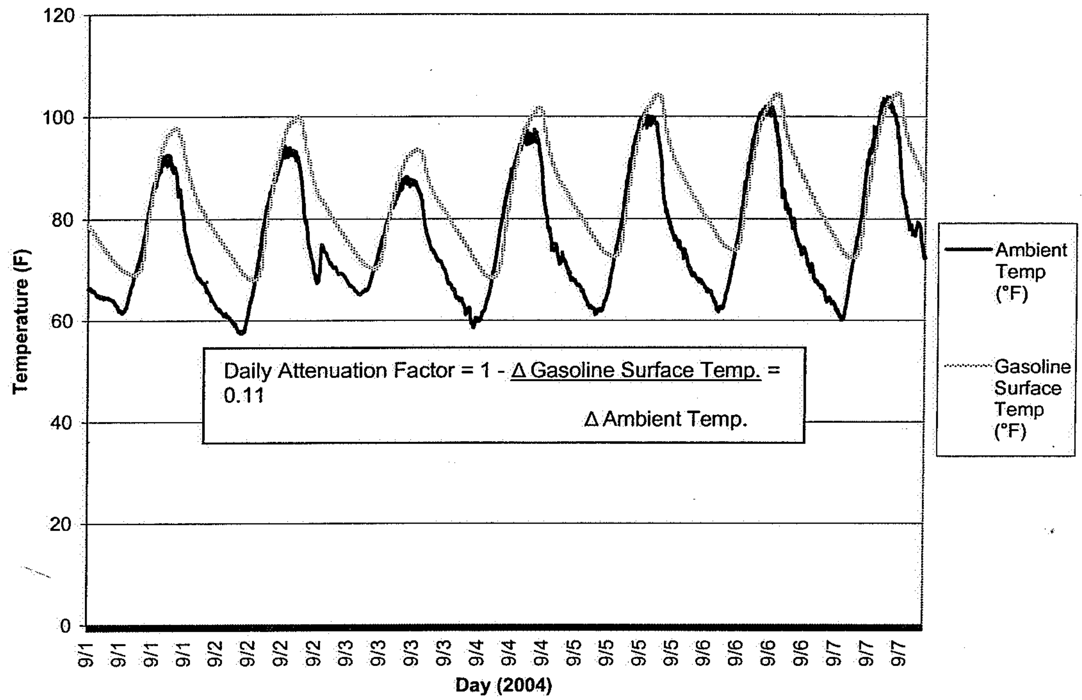
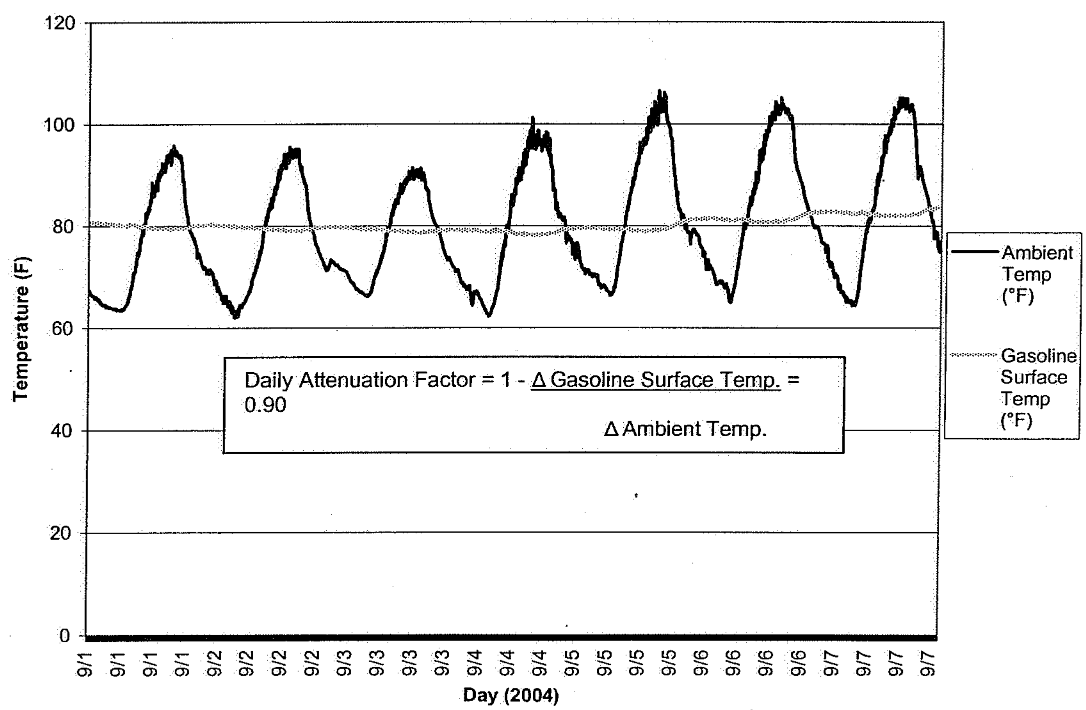


Figure 2- Ambient Temperature Compared to Gasoline Surface Temperature in a Protected (Insulated)Tank



Attachment B
Ambient Temperature Data For AP-42 Cities

AP-42 City	Month	Average Ambient Temp (F)	Ambient Temp (F) Range
Bakersfield	January	47.75	18.30
Bakersfield	February	53.25	21.30
Bakersfield	March	57.35	23.10
Bakersfield	April	63.00	25.80
Bakersfield	May	70.95	27.30
Bakersfield	June	78.20	28.40
Bakersfield	July	84.05	28.90
Bakersfield	August	82.55	28.10
Bakersfield	September	76.80	26.60
Bakersfield	October	67.75	25.90
Bakersfield	November	55.75	22.10
Bakersfield	December	47.40	18.20
Bishop	January	37.75	31.50
Bishop	February	42.40	32.20
Bishop	March	46.80	33.20
Bishop	April	53.40	35.40
Bishop	May	62.20	36.80
Bishop	June	70.85	39.30
Bishop	July	76.65	41.10
Bishop	August	74.55	40.70
Bishop	September	66.80	40.00
Bishop	October	56.85	38.90
Bishop	November	45.10	34.60
Bishop	December	37.75	32.10
Eureka	January	47.95	12.90
Eureka	February	49.25	12.70
Eureka	March	49.40	12.00
Eureka	April	50.10	11.60
Eureka	May	52.70	10.40
Eureka	June	55.45	9.70
Eureka	July	57.05	9.50
Eureka	August	57.85	9.50
Eureka	September	57.30	11.40
Eureka	October	54.70	12.20
Eureka	November	51.65	12.90
Eureka	December	48.40	12.80
Fresno	January	45.75	16.70
Fresno	February	51.10	21.20
Fresno	March	55.00	23.20
Fresno	April	61.20	27.80
Fresno	May	68.95	30.50
Fresno	June	76.55	32.30
Fresno	July	81.85	33.50
Fresno	August	80.25	32.90

APPENDIX I

AP-42 City	Month	Average Ambient Temp (F)	Ambient Temp (F) Range
Fresno	September	74.45	31.30
Fresno	October	65.20	29.00
Fresno	November	53.60	22.20
Fresno	December	45.40	16.60
Los Angeles C.O.	January	58.30	18.80
Los Angeles C.O.	February	60.00	18.80
Los Angeles C.O.	March	60.65	17.70
Los Angeles C.O.	April	63.25	18.10
Los Angeles C.O.	May	65.80	16.20
Los Angeles C.O.	June	69.70	17.20
Los Angeles C.O.	July	74.25	19.50
Los Angeles C.O.	August	75.10	18.80
Los Angeles C.O.	September	73.65	18.10
Los Angeles C.O.	October	69.65	18.70
Los Angeles C.O.	November	62.95	18.90
Los Angeles C.O.	December	58.30	19.00
Mount Shasta	January	34.45	17.90
Mount Shasta	February	38.10	19.20
Mount Shasta	March	40.65	21.50
Mount Shasta	April	45.85	25.30
Mount Shasta	May	53.50	28.00
Mount Shasta	June	61.20	29.60
Mount Shasta	July	67.20	34.40
Mount Shasta	August	66.05	34.50
Mount Shasta	September	59.85	32.70
Mount Shasta	October	50.95	28.10
Mount Shasta	November	40.10	19.40
Mount Shasta	December	34.60	17.40
Redding	January	45.50	19.60
Redding	February	50.65	21.30
Redding	March	52.10	20.80
Redding	April	57.95	23.90
Redding	May	66.40	28.20
Redding	June	76.10	28.60
Redding	July	81.50	33.60
Redding	August	79.40	32.60
Redding	September	74.05	30.50
Redding	October	63.40	28.40
Redding	November	51.75	20.70
Redding	December	44.95	19.50
Sacramento	January	45.20	15.00
Sacramento	February	50.70	18.60
Sacramento	March	53.60	20.80
Sacramento	April	58.30	25.60
Sacramento	May	65.30	30.00
Sacramento	June	71.55	32.50
Sacramento	July	75.65	35.10

AP-42 City	Month	Average Ambient Temp (F)	Ambient Temp (F) Range
Sacramento	August	75.05	34.10
Sacramento	September	71.50	31.60
Sacramento	October	64.15	27.50
Sacramento	November	53.25	19.70
Sacramento	December	45.25	14.90
San Diego	January	57.40	17.00
San Diego	February	58.60	15.80
San Diego	March	59.55	13.50
San Diego	April	62.00	12.80
San Diego	May	64.10	10.00
San Diego	June	66.75	9.70
San Diego	July	70.95	10.50
San Diego	August	72.55	10.50
San Diego	September	71.35	11.50
San Diego	October	67.75	13.70
San Diego	November	61.90	16.00
San Diego	December	57.45	17.30
San Francisco AP	January	48.70	13.80
San Francisco AP	February	52.20	14.40
San Francisco AP	March	53.30	15.00
San Francisco AP	April	55.55	16.70
San Francisco AP	May	58.10	16.80
San Francisco AP	June	61.45	17.70
San Francisco AP	July	62.75	17.70
San Francisco AP	August	63.65	17.30
San Francisco AP	September	64.40	18.40
San Francisco AP	October	60.95	18.30
San Francisco AP	November	54.75	15.30
San Francisco AP	December	49.40	13.40
San Francisco C.O.	January	51.05	10.50
San Francisco C.O.	February	54.35	11.30
San Francisco C.O.	March	54.90	11.80
San Francisco C.O.	April	55.95	12.30
San Francisco C.O.	May	56.60	12.20
San Francisco C.O.	June	58.35	11.50
San Francisco C.O.	July	59.05	11.10
San Francisco C.O.	August	60.10	11.00
San Francisco C.O.	September	62.30	12.80
San Francisco C.O.	October	61.95	13.50
San Francisco C.O.	November	57.15	11.10
San Francisco C.O.	December	51.70	9.40
Santa Barbara	January	52.00	23.40
Santa Barbara	February	53.90	21.40
Santa Barbara	March	55.25	20.10
Santa Barbara	April	57.25	20.30
Santa Barbara	May	59.35	18.50
Santa Barbara	June	62.40	17.60

APPENDIX I

AP-42 City	Month	Average Ambient Temp (F)	Ambient Temp (F) Range
Santa Barbara	July	65.40	17.00
Santa Barbara	August	66.80	17.20
Santa Barbara	September	65.85	18.70
Santa Barbara	October	62.30	21.60
Santa Barbara	November	56.60	23.80
Santa Barbara	December	52.25	24.30
Santa Maria	January	51.05	25.50
Santa Maria	February	52.55	24.30
Santa Maria	March	52.75	22.90
Santa Maria	April	54.70	24.40
Santa Maria	May	57.10	21.40
Santa Maria	June	60.65	20.70
Santa Maria	July	63.10	20.40
Santa Maria	August	64.00	20.20
Santa Maria	September	63.55	22.50
Santa Maria	October	60.95	25.90
Santa Maria	November	55.50	26.40
Santa Maria	December	51.00	26.40
Stockton	January	45.00	16.00
Stockton	February	50.50	20.40
Stockton	March	54.05	22.90
Stockton	April	59.30	27.20
Stockton	May	66.70	29.80
Stockton	June	73.30	31.60
Stockton	July	77.65	33.50
Stockton	August	76.80	32.20
Stockton	September	72.70	30.40
Stockton	October	64.55	27.50
Stockton	November	53.05	20.70
Stockton	December	44.95	15.70
Long Beach	January	55.85	21.90
Long Beach	February	57.30	20.80
Long Beach	March	58.50	19.00
Long Beach	April	61.65	19.70
Long Beach	May	64.80	17.00
Long Beach	June	68.40	17.20
Long Beach	July	73.05	19.30
Long Beach	August	74.40	19.20
Long Beach	September	72.40	19.40
Long Beach	October	68.10	20.60
Long Beach	November	61.25	21.70
Long Beach	December	56.00	22.00

Cost Analysis

The cost of Phase I, Phase II, and Standing Loss Control vapor recovery were determined separately. For Phase I and Phase II, vapor recovery equipment manufacturers were surveyed for pre-EVR and EVR costs. From these surveys the absolute and incremental costs of the proposed regulation to install and/or upgrade pre-EVR systems to EVR systems was determined over the lifetime of the tank (15 years, assuming five year component lifetime). The costs were annualized using the Capital Recovery Factor assuming a five percent discount rate over the 15 year projected lifetime of the tank to take into consideration the opportunity cost of capital and depreciation. Table J-1 summarizes these costs:

Table J-1
Lifetime and Annual Costs for Phase I/II and Standing Loss Control Vapor Recovery Systems

Standing Loss Control - 60%	Cost		
No VR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 330.00	$ 1,545.00	$ 1,875.00
Annualized	$ 31.79	$ 148.85	$ 180.64
Standing Loss Control - 76%	Cost		
No VR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 2,370.00	$ 1,545.00	$ 3,915.00
Annualized	$ 228.33	$ 148.85	$ 377.18
Standing Loss Control - 90%	Cost		
No VR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 3,660.00	$ 1,545.00	$ 5,205.00
Annualized	$ 352.61	$ 148.85	$ 501.46

Phase I	Cost		
No VR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 4,768.02	—	$ 4,768.02
Annualized	$ 459.36	—	$ 459.36
Phase I	Cost		
Pre-EVR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 121.18	—	$ 121.18
Annualized	$ 11.68	—	$ 11.68

Phase II	Cost		
No VR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 5,275.21	—	$ 5,275.21
Annualized	$ 508.23	—	$ 508.23
Phase II	Cost		
Pre-EVR to EVR	w/o P/V valve	P/V valve	Total
Lifetime	$ 361.88	—	$ 361.88
Annualized	$ 34.86	—	$ 34.86

Additionally, the absolute cost of installing Phase I, Phase II, and Standing Loss Control vapor recovery systems was determined from the survey. Table J-2 summarizes the absolute costs:

Table J-2
Absolute Cost for Phase I/II and Standing Loss Control Vapor Recovery Systems

EVR	Single Wall Tanks			Protected Tanks		
	No VR	**Phase I**	**Phase II**	**No VR**	**Phase I**	**Phase II**
Standing Loss Control	$1,880	$1,880	$1,880	—	—	—
Phase I EVR	$4,770	$120	$120	$4,770	$120	$120
Phase II EVR	$5,280	—	$360	$5,280	—	$360
TOTAL (per tank)	**$11,930**	**$2,000**	**$2,360**	**$10,050**	**$120**	**$480**

*assuming 60 percent control level

These costs were then distributed among the AST population to determine the cost effectiveness of the regulation.

The cost analysis and AST applicability is based on generally conservative assumptions to calculate "worst case" scenarios. The assumptions are described in detail below.

Assumption 1: Existing single wall tanks will need to be retrofitted with Standing Loss Control EVR technologies at the 60 percent emission reduction level.

Staff assumes that upon full implementation, all single wall tanks not exempt by District rules (5226) will need to be retrofitted with Standing Loss Control technologies such as white paint and a P/V relief valve. The annualized cost per tank for 60 percent emission reductions is estimated at $181 per year over the 15 year lifetime of the tank for a total cost of $1,875 per tank. The cost is based on a 550 gallon AST.

Assumption 2: Existing protected tanks will not need to be retrofitted with Standing Loss Control EVR technologies to achieve the 60 percent emission reduction level.

Staff assumes that protected tanks will meet the 60 percent emission reduction level based on testing performed by ARB. Staff met with manufacturers of protected tanks and believes that most of these tanks will meet the 76 percent emission reduction level for retrofits and some will meet the 90 percent emission reduction level for new installations. The cost associated with protected tanks to meet the Standing Loss Control vapor recovery requirements will be the cost of the P/V valve annualized at $149 per year over the 15 year lifetime of the tank for a total cost of $1545 per tank.

Assumption 3: Some single wall and protected tanks that currently have Phase I vapor recovery systems will need to upgrade to Phase I EVR systems.

Staff assumes upon full implementation, single wall (1843) and protected (1698 in California) tanks that currently have Phase I vapor recovery systems required by District rules will need to replace those systems with Phase I EVR systems. The annualized cost per tank for Phase I EVR was estimated to be $12 per year over the 15 year lifetime of the tank for a total cost of $121 per tank. This represents the incremental cost between Phase I and Phase I EVR systems.

Assumption 4: Some single wall and protected tanks that currently do not have vapor recovery systems will be required to install Phase I EVR systems based on District requirements.

Staff assumes upon full implementation, single wall (3383) and protected (225) tanks that currently do not have vapor recovery systems installed, but are required to under current District rules, will need to install Phase I EVR. The annualized cost per tank to install Phase I EVR is estimated to be $459 per year over the 15 year lifetime of the tank for a total cost of $4768 per tank. This represents the absolute cost to purchase a Phase I EVR system. Currently, these tanks may not be in compliance with District rules and only enforcement of those rules by Districts will trigger these costs.

Assumption 5: Some single wall and protected tanks that currently have Phase II vapor recovery systems will need to upgrade to Phase I EVR systems.

Staff assumes upon full implementation, single wall (233) and protected (1315) tanks that currently have Phase II vapor recovery systems required by District rules will be required to replace those systems with Phase II EVR systems. The annualized cost per tank for Phase II EVR is estimated to be $35 per year over the 15 year lifetime of the tank for a total cost of $362 per tank. This represents the incremental cost between Phase II and Phase II EVR.

Assumption 6: Some single wall and protected tanks that currently have no vapor recovery systems will continue to be exempt from vapor recovery requirements per District rules.

Staff assumes upon full implementation, single wall (2394) and protected (39) tanks that currently are not required to have vapor recovery systems (Phase I and/or Phase II) due to District rule exemptions will continue to remain exempt. The annualized cost for Standing Loss Control, Phase I EVR, and Phase II EVR is estimated to be $0 per year. Should District change these rules, Standing Loss Control is estimated to cost $181 per year (Total: $1875), Phase I EVR is estimated to cost $459 per year (Total: $4768), and Phase II EVR is estimated to cost $508 per year (Total: $5275) over the 15 year lifetime of the tank. These costs represent the absolute cost of installing Standing Loss Control, Phase I

EVR, and Phase II EVR and are not included in the cost effectiveness section of the proposed regulation.

California Environmental Protection Agency

Air Resources Board

Proposed for Amendment

Vapor Recovery Definitions

D-200

DEFINITIONS FOR VAPOR RECOVERY PROCEDURES

Adopted: April 12, 1996
Amended: March 17, 1999
Amended: February 1, 2001
Amended: July 3, 2002
Amended: October 8, 2003
Amended: May 25, 2006
Amended: [insert date of amendment]

Note: Test is proposed for amendment. Test proposed for addition is shown in underline. Text proposed for deletion is shown in ~~strikethrough~~.

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Definitions

D-200

Definitions for Vapor Recovery Procedures

1 APPLICABILITY

The terms and acronyms contained herein are applicable for the *Certification and Test Procedures for Vapor Recovery Systems at Gasoline Dispensing Facilities, Gasoline Bulk Plants, Gasoline Terminals, Cargo Tanks, ~~and~~ Novel Facilities, and Aboveground Storage Tanks*. They are intended as a clarification of the terms and acronyms used throughout the Certification and Test Procedures.

2 TERMS

abbreviated operational tests
operational tests that are conducted for a duration of less than 180 days.

aboveground storage tank
a system that uses a gasoline storage tank that is intended for fixed installations, without backfill, that is located above or below grade ~~and requires emergency relief venting~~.

airport refueller
a cargo tank which: has a total capacity no greater than 5000 gallons; exclusively transports avgas and jet fuel; and is not licensed for public highway use.

assist
a vapor recovery system, which employs a pump, blower, or other vacuum inducing devices, to collect and/or process vapors at a subject facility.

balance
a vapor recovery system which uses direct displacement to collect and/or process vapors at a subject facility.

below-grade vaulted tank
an aboveground storage tank that is below the level of the earth's surface contained in an enclosure, without backfill, and requires continuous ventilation.

blend valve
the valve in a dispenser that typically creates specific product grade by blending two other product grades in a ratio.

bootless nozzle
identifies a type of vapor recovery nozzle that does not have a bellows, or "boot," over the length of the nozzle spout.

bulk plant
an intermediate gasoline distribution facility where delivery to and from storage tanks is by cargo tank.

cargo tank
any container, including associated pipes and fittings, that is used for the transportation of gasoline on any highway and is required to be certified in accordance with Section 41962 of the California Health and Safety Code.

certification procedures
document certified performance standards and performance specifications for vapor recovery systems, and document test procedures for determining compliance with such standards and specifications.

The purpose of such procedures is to provide certified performance standards and performance specifications for performance levels equal to or greater than those levels required by federal, state, and local statutes, rules, and regulations applicable at the time that any ARB Executive Order certifying a system is signed.

certification tests
any test conducted as part of the certification process. Certification tests include operational tests, vapor recovery equipment defect tests, challenge mode tests, and any bench testing conducted during a system or component certification.

challenge mode testing
testing to verify that the system will meet applicable standards and specifications under various GDF operating conditions.

compartment
a liquid-tight division of a cargo tank.

compliance tests
tests which, as required by an ARB Executive Order, are performed after certification to determine compliance with a certified performance standard or specification.

district

any of California's local air pollution agencies, including the air pollution control districts and air quality management districts.

effective date

the date on which a provision has the effect of state law. The effective date "starts the clock" for the period of continuing use of installed vapor recovery systems/equipment under Health and Safety Code section 41956.1. The period may be up to four years after which the component and/or system may no longer be used.

emission factor

a performance standard expressed as pounds of hydrocarbon per 1,000 gallons of gasoline dispensed.

engineering evaluation

an evaluation by the Executive Officer of the relationship that vapor recovery system and/or system component design, operation, and defects, have on the performance of the vapor recovery system. The evaluation may include, but is not limited to, an analysis based on physical science, chemistry, and engineering data from test procedures, in-use performance audits, challenge mode tests, or observations conducted by the Executive Officer or technical or other information made available to the Executive Officer.

Executive Order

a document issued by the Executive Officer that certifies a vapor recovery system.

existing installation

any gasoline dispensing facility that is not a new installation.

expired certification

any system or component certification that has reached the end of it's certification period and has not been renewed or extended by the Executive Officer.

fugitive emissions

those emissions of hydrocarbon vapors emitted from a GDF due to evaporative loss from spillage or may also include those pressure-related fugitive emissions as defined below.

full operational tests

operational tests where the complete complement of test procedures are conducted to demonstrate compliance with all the applicable standards and specifications in CP-201.

gastight
exhibiting no vapor leak(s).

gasoline
any petroleum distillate having a Reid vapor pressure of four pounds or greater and meeting the requirements of title 13, California Code of Regulations, division 3, chapter 5, article 1, beginning with section 2250.

gasoline dispensing facility
a gasoline dispensing facility (GDF) is a stationary source which receives gasoline from cargo tanks and/or dispenses gasoline directly into the fuel tanks of motor vehicles.

hold-open latch
a certified device which is an integral part of the dispensing nozzle and is manufactured specifically for the purpose of dispensing gasoline without requiring the consumer's physical contact with the nozzle during refueling operations.

incinerator
any assist processor designed to control hydrocarbon emissions by any kind of oxidation which generates exhaust which is so hot and variable in volume that such volume can only be determined by correlated measurements and thermodynamic principles, rather than direct measurement.

insertion interlock
any certified mechanism which is an integral part of a bellows-equipped dispensing nozzle which prohibits the dispensing of fuel unless the bellows has been compressed.

in-station diagnostics (ISD)
equipment that provides continuous real-time monitoring of critical emission-related vapor recovery system parameters and components, and alerts the station operator when a failure mode is detected so that corrective action is taken.

leak detection solution
any solution containing soap, detergent or similar materials which promote formation of bubbles, and which is used to wet joints or surfaces from which gas may be leaking, and which causes bubbles to form at the site of any escaping gas.

leak free
liquid leak of no greater than three drops per minute.

limited operational tests
operational tests where only the test procedures appropriate for a specific

component(s) are conducted to demonstrate compliance with specific standards and specifications.

liquid condensate trap (knock-out pot, thief port)
a device designed to collect liquid that condenses in the vapor return line in a manner that allows it to be evacuated and ensures that the vapor return line will not be blocked by the accumulation of liquid.

liquid leak
the dripping of liquid organic compounds at a rate in excess of three (3) drops per minute from any single leak source other than the liquid fill line and vapor line disconnect operations. For cargo tanks, a liquid leak from liquid product line and vapor line disconnect operations is defined to be:

more than two (2) milliliters liquid drainage per disconnect from a top loading operation; or

more than ten (10) milliliters liquid drainage from a bottom loading operation. Such liquid drainage for disconnect operations shall be determined by computing the average drainage from three consecutive disconnects at any one permit unit.

liquid removal device
a device designed specifically to remove liquid from the vapor return portion of a vapor hose.

liquid retain
any liquid gasoline retained in the vapor passage of the nozzle/hose assembly, on the atmospheric side of the vapor check valve.

lower explosive limit (LEL)
the minimum volumetric fraction of combustible gas, in air, which will support the propagation of flame; commonly expressed in units of percent (%) or parts per million (ppm).

Standard references for physical properties of combustible gases differ by a few percent in their listed values for lower explosive limit (LEL) and differ also in terms employed. For clarity:

"LEL" shall mean the same as "lower limit of flammability," "lower end of the explosive range", and other related terms in common technical discourse.

The authoritative reference for determination of LEL values shall be the chapter GASEOUS FUELS, by C. C. Ward, pages 7-21 to 7-24 of *Marks' Standard Handbook for Mechanical Engineers*, Eighth Edition, McGraw Hill, New York, 1978.

The LEL for propane is 2.1% (21,000 ppm).
The LEL for methane is 5.0 % (50, 000 ppm)

major modification

the modification of an existing GDF that makes it subject to the same requirements to which a new installation is subject.

Modification of the Phase I system that involves the addition, replacement, or removal of an underground storage tank, or modification that causes the tank top to be unburied, is considered a major modification of the Phase I system.

Modification of the Phase II system that involves the addition, replacement or removal of 50 percent or more of the buried vapor piping, or the replacement of dispensers, is considered a major modification of the Phase II system. The replacement of a dispenser is not a major modification when the replacement is occasioned by end user damage to a dispenser.

Phase II system upgrades to make the systems ORVR compatible do not constitute a major modification. Phase II system upgrades to comply with the under-dispenser containment requirement (CCR, Title 23, section 2636(h)(1)) initiated before January 1, 2004 do not constitute a major modification. Modifications to dispensers may require use of unihose configurations as described in CP-201 section 4.10.

<u>The replacement of an aboveground storage tank is a major modification. The installation of an AST after retrofitting with standing loss controls or the exchange of an AST for a standing loss control retrofitted AST of equal capacity to comply with the requirements of CP-206 is not a major modification.</u>

mini-boot

a device used on vapor recovery nozzles to enhance collection efficiency without requiring a tight seal at the vehicle fillpipe.

multi-product dispenser (MPD)

a dispenser of multiple products with one or more hoses per dispenser side.

motor vehicle

as defined in Section 39039 of the Health and Safety Code.

National Institute of Standards and Technology

the United States Department of Commerce, National Institute of Standards and Technology (NIST) which, through its Standard Reference Materials (SRM) Program, provides science, industry, and government with a source of well-characterized materials certified for chemical composition or for some chemical or physical property. These materials are designated SRMs and are used to calibrate instruments and to evaluate analytical methods and systems, or to produce scientific data that can be referred readily to a common base.

new installation

a gasoline dispensing facility that is not constructed as of the operative date of the latest amendments to Certification Procedures CP-201or CP-206, or a gasoline dispensing facility constructed as of the operative date of the latest amendments to Certification Procedures CP-201 or CP-206 that has undergone a major modification on or after the operative date of the amendments.

novel

a modifier which indicates a vapor recovery system (or system feature) or facility to which the written procedures (of general applicability) do not apply; for such a novel system or facility, new system-specific or facility-specific performance specifications and test procedures shall be developed and required as conditions of certification.

nozzle bellows (nozzle boot)

the flexible device around the spout of some vapor recovery nozzles, utilized to contain the vapor displaced from the vehicle.

on-board refueling vapor recovery system

vehicle based system required by title 13, California Code of Regulations, section 1978, or Part 86, Code of Federal Regulations.

operational test

testing conducted for the purpose of certification of a vapor recovery system or component where the vapor recovery equipment is installed in an operating GDF. Also see the definitions for "abbreviated", "full", and "limited" operational tests. The term "operational test" is intended to imply certification tests conducted on a GDF operating under normal conditions. This definition excludes vapor recovery equipment defect and bench tests conducted as part of a system certification. Challenge mode testing may be conducted during an operational test if the Executive Officer determines that such testing will not impact the operational test.

operative date

the date on which a regulated person is first required to act or is prohibited from acting. The operative date determines when new installations and facilities undergoing major modifications must use equipment that meets the applicable performance standard and/or performance specification.

over-fill prevention device
a device designed to stop the delivery of product to a storage tank to prevent the over-filling of the tank and potential spillage.

phase I
control of vapors during the transfer of gasoline from the cargo tank to the gasoline dispensing facility.

phase II
the control of vapors during the transfer of gasoline from the gasoline dispensing facility to the vehicle and storage of gasoline at the gasoline dispensing facility.

portable fuel container
any container or vessel that is designed or used primarily for receiving, transporting, storing, and dispensing fuel.

pressure-related fugitive emissions
those emissions of hydrocarbon vapors emitted from a GDF due to a positive gauge pressure in the headspace (ullage) of the gasoline storage tank. These emissions do not include transfer emissions at the nozzle/fillpipe interface nor the emissions from the vent pipe P/V valve, provided that the cracking pressure of the P/V valve has been exceeded.

processor
a vapor processor, either destructive or non-destructive, that operates to manage the pressure of the vapor in the gasoline storage tank within specified limits.

Reid Vapor Pressure
the absolute vapor pressure of volatile petroleum liquids, except liquefied petroleum gases, as determined in accordance with ASTM D323-89.

renewed certification
an Executive Order for vapor recovery equipment or system reviewed and approved for renewal by the Executive Officer on or before the expiration date as stated in the Executive Order.

revoked certification
an Executive Order for vapor recovery equipment or system which has been determined by the Executive Officer to not be in compliance with the applicable performance standards and specifications.

rigid piping
any piping material with a bend radius that exceeds six feet as determined by TP-201.2G.

spillage

liquid which enters the environment from a dispensing facility, except for liquid which leaves such dispensing facility in a vehicle tank or cargo tank.

The following definitions apply for the determination of spillage as defined above:

pre-dispensing spillage

spillage which occurs between:

the time when a dispensing nozzle is removed from a dispenser and

the time when the dispensing nozzle is inserted into the tank receiving the dispensed liquid

dispensing spillage

spillage which occurs between

the time when the dispensing nozzle is inserted into the tank receiving the dispensed liquid and

the time when the dispensing nozzle is withdrawn from the tank receiving the dispensed liquid

post-dispensing spillage

spillage which occurs between

the time when the dispensing nozzle is withdrawn from the tank receiving the dispensed liquid and

the time when the dispensing nozzle is returned to a dispenser.

spitback

the forcible ejection of liquid gasoline upon activation of the nozzle's primary shutoff mechanism.

spitting

liquid gasoline dispensed or released from the nozzle spout when the trigger is depressed without the dispenser being activated

static torque of phase I adaptor

the amount of torque, measured as pound-inches, required to start the rotation of a rotatable phase I adaptor as measured in accordance with TP-201.1B.

<u>standing loss control</u>

<u>the control of vapors from ASTs when no Phase I or Phase II gasoline transfers are occurring.</u>

submerged fillpipe

any fillpipe which has its discharge opening entirely submerged when the liquid level is six inches above the bottom of the tank.

when referring to a tank which is loaded from the side, any fillpipe which has its discharge opening entirely submerged when the liquid level is 18 inches above the bottom of the tank.

superseded certification

an Executive Order (EO) that has been replaced by a revised version of the Executive Order that reflects changes in the vapor recovery equipment or system.

summer fuel

fuel that is required to comply with the requirements of title 13, California Code of Regulations, section 2262.4.

<u>temperature attenuation</u>

<u>a standing loss control for aboveground storage tanks that controls the effects of diurnal ambient temperature or solar radiation on fuel surface temperature.</u>

test procedures

specify equipment and techniques for determining the performance and compliance status of vapor recovery systems relative to certified performance standards and associated certified performance specifications.

terminal

a primary distribution facility for the loading of cargo tanks that deliver gasoline to bulk plants, service stations and other distribution points; and where delivery to the facility storage tanks is by other than by cargo tank.

terminated certification

status of certification of any systems or any system components certified under performance standards in effect prior to the adoption of revised standards and installed prior to the operative date of the revised standards.

top off

the attempt to dispense gasoline to a motor vehicle or utility equipment fuel tank after the dispensing nozzle primary shutoff mechanism has engaged. The filling of a class of vehicle tanks which, because of the configuration of the fill pipe, cause premature activation of the primary shutoff, shall not be considered topping off.

transition flow
the flow rate at which a transition occurs in the slope of the plot of flow rate versus pressure for a valve tested per TP-201.2B.

ullage
the empty volume of any container. For example, the ullage of a tank designed primarily for containing liquid is the volume of the tank minus the volume of the liquid.

underground storage tank
any one or combination of tanks, including pipes connected thereto, which is used for the storage of gasoline, which is substantially or totally beneath the surface of the ground and does not have an emergency vent.

unihose dispenser
a multi-product dispenser that has only one hose and nozzle per dispenser side.

vapor guard (see mini-boot)

vapor leak
a vapor leak measured as greater than 10,000 parts per million on a methane calibrated gas detector, measured at a minimum distance of one centimeter from the source in accordance with EPA Reference Method 21, compliance with the static pressure integrity requirements as determined by TP-201.3, bagging of individual components, or the presence of bubbles using a liquid leak detector solution.

vapor recovery system
a vapor gathering system capable of collecting the hydrocarbon vapors and gases discharged and a vapor disposal system capable of processing such hydrocarbon vapors and gases so as to prevent their emission into the atmosphere, with all tank gauging and sampling devices gastight except when gauging or sampling is taking place.

vapor recovery system for gasoline dispensing facility (GDF)
all equipment used at a GDF to recover, contain, and transfer gasoline vapors generated by refueling vehicle tanks, gasoline storage tanks, and portable fuel containers, including, but not limited to, dispensing equipment, couplers, fittings, processors, control boards, gauges, and monitors.

vent
any plumbing which conveys an air/vapor mixture from a vapor recovery system to the atmosphere.

winter fuel
fuel that is not required to comply with the regulations that are applicable to summer fuel.

3 ACRONYMS

ACF
actual cubic feet (see CF, CFH, and CFM) at sampling conditions.

APCD
one of California's Air Pollution Control Districts.

AQMD
one of California's Air Quality Management Districts.

A/L Ratio or A/L
air to liquid ratio.

ARB
Air Resources Board.

ARB Executive Officer or Executive Officer
the Executive Officer of the ARB or his or her authorized representative or designate.

AST
aboveground storage tank.

CARB
California Air Resources Board.

CCR
California Code of Regulations.

CF
cubic feet.

CFR
Code of Federal Regulations.

CT#
cargo tank number issued by the Executive Officer.

CFH
cubic feet per hour.

CFM
cubic feet per minute.

DMS
California Department of Food and Agriculture, Division of Measurement Standards.

DOSH
California Department of Industrial Relations, Division of Occupational Safety and Health.

Eng. Eval.
engineering evaluation.

EO
Executive Order.

FID
flame ionization detector.

GC/FID
gas chromatograph with flame ionization detector.

GDF
gasoline dispensing facility.

H&SC
California Health and Safety Code.

ID
inside diameter.

ID#
identification number.

ISD
In-Station Diagnostics.

LDS
leak detection solution.

LEL
lower explosive limit.

LPM
liters per minute.

mmHg
millimeters of mercury (unit of pressure).

MPD
multi-product dispenser.

N_2
nitrogen gas.

NDIR
non-dispersive infrared.

NEMA
National Electrical Manufacturers Association

NIST
National Institute of Standards and Technology.

NPT
National pipe threads

ORVR
onboard refueling vapor recovery.

PV or P/V Valve
pressure/vacuum relief vent valve.

QA/QC
quality assurance/quality control

SFM
California State Fire Marshal.

Sec.
section.

SLC
Standing Loss Control

Spec.
specification.

Std.
standard.

SWRCB
State Water Resources Control Board.

UST
underground storage tank.

VRED
vapor recovery equipment defect.

WC
water column (unit of pressure normally expressed in inches).

WC_g
water column, gauge (unit of pressure normally expressed in inches).

California Environmental Protection Agency

Air Resources Board

Proposed for Amendment

Vapor Recovery Test Procedure

TP-201.2

Efficiency and Emission Factor for Phase II Systems

Adopted: April 12, 1996
Amended: February 1, 2001
Amended: July 25, 2001
Amended: October 8, 2003
Amended: [insert date of amendment]

[Note: The text is shown in ~~strikeout~~ to indicate that it is proposed for deletion and underline to indicate that it is proposed for addition. [Bracketed text] is not part of the proposed amendments.]

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-201.2

Efficiency and Emission Factor for Phase II Systems

Definitions common to all certification and test procedures are in:

D-200 Definitions of Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the State of California Air Resources Board, and the term "ARB Executive Officer" refers to the Executive Officer of the ARB or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

The purpose of this procedure is to quantify the representative Phase II vapor recovery mass efficiency and/or mass emission factor, during the CARB Certification Process for Phase II vapor recovery systems at gasoline dispensing facilities (GDF). It is applicable to the determination of compliance with the Phase II performance standards for the maximum allowable mass emission factor and the minimum required vapor recovery mass efficiency as defined in the Certification Procedure (CP-201).

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

While fueling 200 vehicles, the vapor recovery mass efficiency and/or mass emission factor is determined by direct measurement of the mass of hydrocarbons at the following test point locations: (1) emitted at nozzle/vehicle interface, (2) returned through the vapor passage of the hose, (3) emitted from the pressure/vacuum (P/V) valve(s) on the underground storage tank (UST) vent pipe(s), (4) emitted from the assist processor (4_{inlet} and 4_{outlet}), if applicable, and (5) emitted as pressure related fugitives, as determined using TP-201.2F (see Figure 1). Using the results of the direct hydrocarbon measurements, both the Phase II mass efficiency (in units of percent by weight) and mass emission factor (in units of pounds of hydrocarbon emissions per 1,000 gallons dispensed) may be calculated.

3. BIASES AND INTERFERENCES

3.1 Failure to test a vehicle matrix representing the vehicle population in the State of California may bias the test toward either compliance or noncompliance. This bias is removed by requiring that the testing be based on the most recent representative vehicle matrix, as determined by TP-201.2A.

3.2 Vehicles which do not conform to CARB specifications for fillpipes and openings of motor vehicle fuel tanks, title 13, CCR, section 2235 shall be excluded from the test matrix.

3.3 Vehicle fuel tanks that demonstrate a leak rate greater than 0.01 cfm at 0.5"WC shall be excluded. ORVR vehicles are exempt from this requirement. Other exceptions may be approved by the Executive Officer if the vehicle matrix required by TP-201.2A cannot otherwise be filled.

3.4 Vehicles failing the sleeve leak check requirement shall be excluded.

3.5 Vehicle fueling episodes during which less than six gallons of gasoline are dispensed shall be excluded.

3.6 Vehicle fueling episodes in which the nozzle sleeve is contaminated with liquid gasoline as a result of inappropriate action such as topping off or depressing the nozzle trigger when the nozzle is not properly inserted in the vehicle fill-pipe shall be excluded.

4. RANGE AND MEASUREMENT ERROR

4.1 This procedure can generate emission factors in the range of 0.00 to greater than 15.0 lbs/1000 gallons and efficiencies in the range of 0% to 100%.

4.2 The maximum emission factor error is calculated to be 13%. The maximum efficiency error is calculated to be 1.0%.

5. EQUIPMENT

Alternatives to the required equipment shall only be used subject to prior written approval by the ARB Executive Officer.

5.1 Hydrocarbon (HC) Analyzer(s). Depending on the test point location of the HC measurement, the HC analyzer shall be capable of continuously measuring HC concentrations as follows:

5.1.1 100 ppm to 80 percent by volume using propane as a calibration gas, or 75 ppm to 60 percent by volume using butane as a calibration gas.

5.1.2 Analyzers at test points 1, 3 and 4_{outlet} shall use a destructive detection principle, such as a flame ionization detector (FID). The analyzer at test points 2 and 4_{inlet} shall use a non-destructive detection principle, such as non-dispersive infrared (NDIR). A sufficient number of hydrocarbon analyzers shall be used to provide for simultaneous, and continuous, measurements at all applicable test points. The Executive

Officer may allow other measurement methods if it is determined that equivalent results can be obtained.

5.1.3 Hydrocarbon Calibration Gases. Cylinders of certified, or NIST traceable, calibration gases using propane (or butane) in nitrogen capable of providing calibration for the analyzer ranges recommended in Table 5-1.

Table 5-1
Recommended Continuous Analyzer Concentration Ranges

Test Point (Fig.1)	HC Measurement	Ranges	Usable Concentration Range
1	FID	0 to1,000 ppm 0 to 5,000 ppm 0 to 1.0% 0 to 5.0%	100 to 950 ppm 500 to 4,750 ppm 1,000 ppm to 9,500 ppm 5,000 ppm to 4.75%
2	NDIR	0 to 10.0% 0 to 50.0%	1.0% to 9.5% 5.0% to 47.5%
3	FID	0 to 1,000 ppm 0 to 5,000 ppm 0 to 1.0% 0 to 5.0% 0 to 10.0% 0 to 50.0%	100 to 950 ppm 500 to 4,750 ppm 1,000 to 9,500 ppm 5,000 ppm to 4.75% 1.0% to 9.5% 5% to 48%
4_{inlet}	NDIR	0 to 10.0% 0 to 50.0%	1% to 9.5% 5% to 47.5%
4_{outlet}	FID	0 to10 ppm 0 to 100 ppm 0 to 1,000 ppm 0 to 5,000 ppm 0 to 1.0% 0 to 5.0%	1.0 to 9.5ppm 10 to 95 ppm 100 to 950 ppm 500 to 4,750 ppm 1,000 to 9,500 ppm 5,000 ppm to 4.75%
	Destructive Processor	Ranges	Usable Concentration Range
4_{outlet}	CO	0 to 500 ppm	50 to 475 ppm
4_{outlet}	CO_2	0 to 5.0% 0 to 10.0%	5,000 ppm to 4.75% 1.0% to 9.5%

Each range requires three calibration gases:

(1) High-Range Gas: Concentration between 80 and 100% of range.
(2) Mid-Range Gas: Concentration between 40 and 60% of range.
(3) Zero Gas: Nitrogen with a hydrocarbon concentration less than 0.25% of range.

5.1.4 Gas Dilution System. A gas dilution system which meets the requirements of EPA Method 205, Verification of Gas Dilution Systems for Field Instrument Calibrations, CFR 40, Part 51, Appendix M, may be used to provide low-level calibration gases from a high-level calibration gas. The calibration gas used with a gas dilution system shall be an EPA Protocol gas. A gas dilution system which meets the requirements of EPA Method 205 may be used for all analyzer calibrations and sampling system bias checks. If a diluter is used, it must be included in the calibration of the analyzer(s).

5.1.5 Sample lines. Constructed of Teflon or other material that does not absorb or otherwise alter the sample gas.

5.1.6 Additional Analyzers for Systems with Vapor Processors: If processor exhaust flowrate is to be determined by USEPA Method 2B 40 CFR, Part 60, App.A, then the following additional analyzers are needed for Test Point 4_{outlet}.

5.1.6.1. Carbon Monoxide (CO) analyzer: As specified in ARB Method 100, title 17, CCR, section 94114, or USEPA Method 10, "Determination of Carbon Monoxide Emissions From Stationary Sources", 40 CFR Part 60, App. A.

5.1.6.2 Carbon Dioxide (CO_2) analyzer: As specified in ARB Method 100 or USEPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)", 40 CFR Part 60, App. A.

5.2 Data Acquisition System/Data Recorder: Provide a permanent record of hydrocarbon analyzer data using a strip chart recorder. A datalogger or another electronic data acquisition is also recommended. Data shall be collected at intervals not to exceed one second. Any electronic data acquisition system must be capable of integration at a ten-second interval. The strip chart, as well as the data acquisition system, must have a resolution of 0.5 percent of the analyzer range.

5.3 Volumetric Flow Rate Meters. Recommended volume meter ranges for each test point are shown in Table 5-2.

Table 5-2
Volume Meter Specifications

Test Point	Typical Range Measured (cfm)	Recommended Meter Range (cfh)
1	2 to 5	0 to 800
2	0.5 to 1.4	0 to 800
3	Vent sleeve sweep: 2 to 20 Vent : 0 to 5	0 to 800 0 to 800
4_{inlet}	System specific	Determined during evaluation
4_{outlet}	System specific	Determined during evaluation

The volume meters are positive displacement or turbine meters that meet the following requirements:

5.3.1 Backpressure limits (BPL):

(a) Meters with a manufacturer specified maximum flow rating of greater than 1000 CFH shall demonstrate BPL < 1.10 inches WC at a flow rate of 3,000 CFH or the maximum flow rating specified by the manufacturer, whichever is less and BPL < 0.05 inches WC at a flow rate of 30 CFH.

(b) Meters with a manufacturer specified maximum flow rating of less than 1000 CFH shall demonstrate BPL < 0.70 inches water column at a flow rate of 800 CFH and BPL < 0.04 inches WC at a flowrate of 16 CFH.

5.3.2 The error of the meter shall be less than 2% of the true volume over the entire range of flow rates for which it will be used.

5.3.3 The meter shall be equipped with taps to accommodate the following as applicable for the specific Test Point:

(a) Inlet side: thermocouple with a range of 0 to 200 deg F.

(b) Inlet side: concentration sampling and pressure measurement

(c) Inlet and outlet sides: differential pressure gauge with a full-scale range of less than or equal to four times the backpressure limit.

5.3.4 Pressure Measurement Devices for Volume Meters

Transducers, liquid manometers, Magnahelic gauges or equivalent with a design range suitable for the pressure being measured (see Section 5.3.1). The error of the pressure measuring device shall not exceed 3% of the true pressure over the range of pressures to be quantified.

5.3.5 Temperature Measurement Device for Volume Meters

Thermocouple or thermometer with a design range suitable for the temperature being measured (see Section 5.3.3(a)). The error in the temperature measurement shall not exceed 4 degrees Fahrenheit.

5.4 Vehicle Leak Check Equipment (see Figure 2)

5.4.1 Fill pipe Interface: A plug which provides a seal at the fill pipe outlet equipped with two taps. One tap for pressurizing the fill pipe and vehicle tank with nitrogen, the second tap for connection to a pressure measurement device.

5.4.2 Flow meter: Appropriately sized for measuring 0.01 cfm (283 ml/min).

5.4.3 Pressure Measurement Device: Transducer, liquid manometer, Magnehelic gauge or equivalent with range of 0.0 to 1.0 inch WC.

5.4.4 Pressurizing System: Nitrogen cylinder (commercial grade), two stage pressure regulator with gauges indicating cylinder pressure and supply line pressure, a coarse control valve for regulating the pressure in the supply line to the flow meter, a fine control valve for adjusting the flow through the flow meter and a hose for supplying nitrogen to the vehicle tank.

5.4.5 Fillpipe with Closed End: A stand-alone vehicle fill-pipe, at least 18 inches in length, which has been closed off at one end. This fill-pipe is used to check for leaks in the pressurizing apparatus.

5.5 Nozzle Sleeve and Nozzle Sleeve Leak Check Equipment (see Figures 3 through 7)

5.5.1 Nozzle Sleeve: A sleeve fabricated using a material compatible with California gasolines which captures the entire mass of gasoline vapors emitted at the nozzle/vehicle interface. An example design for the sleeve is shown in Figures 3 through 5.

Other designs may be used if demonstrated to produce less than 0.01 inches WC vacuum inside the sleeve at a sleeve sweep rate of five cubic feet per minute (cfm) and receive prior approval by the Executive Officer.

5.5.2 Sleeve Tubing: The sample tubing shall be Teflon, or equivalent, and as lightweight as practical so that the behavior of the nozzle operator is minimally affected by testing activities. The unanalyzed portion of sample flow shall be safely discharged to the atmosphere.

5.5.3 Sleeve Sample Pump: Carbon vane, metal bellows or other pump design which does not provide a source of or sink for hydrocarbon vapors, capable of 5 cfm.

5.5.4 Leak check portable analyzer: A combustible gas detector that complies with the requirements of USEPA Method 21, "Determination of Volatile Organic Compounds Leaks", 40 CFR Ch.1, Part 60, App. A or TP-204.3.

5.6 Vapor Return Line (Test Point 2): See Figures 8 to 11.

5.6.1 Liquid trap for volume meter: A transparent liquid trap shall be installed at the lowest point in the plumbing installed on the inlet side of the meter. The liquid trap shall be designed and installed to allow for the removal of any liquid gasoline after each refueling event. The quantity of liquid gasoline shall be measured and recorded after each vehicle fueling. The trap shall be designed to allow liquid removal with minimal effort or tools. Ball valves shall be installed at the inlet to the liquid trap and at the exhaust of the vapor return in order to isolate the meter if servicing is required during the test.

5.6.2 Test Manifold: Piping inserted between liquid trap and volume meter with taps to allow measurement of temperature, pressure and hydrocarbon concentration.

5.6.3 Isolation valves: Non-restrictive ball valve of appropriate size to allow removal of test apparatus at Test Point 2 during non-test intervals.

5.6.4 In-line plumbing: Test apparatus piping shall be compatible with gasoline and adaptable to various vapor line configurations to allow total measurement of the vapor return line volume as well as routing and return of a portion of the vapor to the non-destructive hydrocarbon analyzer.

5.6.5 Vapor return line sample pump: Carbon vane, metal bellows or other pump design which does not provide a source or sink for HC vapors, capable of 0.5 to 2 cfm.

5.6.6 Vehicle Fuel Tank Temperature Probe. Apparatus for measuring temperature of vapors in vehicle fuel tank, which consists of an intrinsically safe thermocouple or thermometer on a nozzle spout so that the temperature sensor is near the tip of the spout.

5.7 Vent Sleeve Sampling Apparatus (Test Point 3): See Figure 12

5.7.1 A sleeve that captures the entire mass of gasoline emitted at the storage tank vent pipe(s). Other designs may be used if demonstrated to produce less than 0.01"WC inside the sleeve and within one inch of the outer surface of the tank vent or tank vent PV valve at a sleeve rate of 20 cfm and receive prior approval by the Executive Officer. Sleeves must be tested before use in the field to validate the collection efficiency of the sleeve and accuracy of the hydrocarbon mass calculation. Testing shall occur at two flow rates as described below. CAUTION: Ensure that the exhaust from the vent sleeve pump and vent sleeve analyzers are directed to a safe location and that hazards associated with exposure to gasoline and gasoline vapors are addressed.

5.7.1.1 High flow rate (3-7 cfm). Bubble nitrogen through gasoline filled impingers and then through a roots meter (equipped with meter temperature and pressure monitoring) at inlet of simulated vent pipe discharging to the vent sleeve sample apparatus equipped with vent sleeve hydrocarbon analyzers. Quantify HC concentration of flow from simulated vent line by sampling at outlet of gasoline impingers with NDIR analyzer with 0 to 80% range. Determine volume of flow into the simulated vent pipe and vent sleeve using a volume meter installed at the simulated vent line inlet. The mass of HC entering the vent sleeve must be $\pm$5% of the mass of HC collected from the vent sleeve as determined by the vent sleeve sampling apparatus volume, temperature, pressure and HC concentration measurements and data recording system and mass calculation algorithms.

5.7.1.2 Low flow rate (@200 ml/min). Run propane calibration gas with a concentration of 10 to 20% by volume through a mass flow controller (a bubble meter or precision rotameter with sufficient accuracy is acceptable) and into the inlet of the simulated vent pipe discharging to the vent sleeve sample apparatus equipped with vent sleeve HC analyzers. Determine the time that calibration gas was allowed to enter the sleeve and calculate the mass of propane entering the sleeve from the flow rate determined from the mass flow controller and the known calibration gas concentration. The mass of HC entering the vent sleeve must be $\pm$5% of the mass of HC collected from the vent sleeve sampling apparatus volume, temperature, pressure and HC concentration measurements and the data recording system and mass calculation algorithms.

5.7.2 Sleeve Tubing: Teflon. Care should be taken that a representative sample of the sleeve flow is routed to the analyzer. The unanalyzed portion of sample flow shall be safely discharged to the atmosphere.

5.7.3 Sleeve Sample Pump: Carbon vane, metal bellows or other pump designs which do not provide a source of or sink for hydrocarbon vapors, capable of 2 to 20 cfm.

5.7.4 Ball Valve: Installed upstream of volume meter to allow closing off vent pipe for testing purposes.

5.8 Vapor Processor (Test Point 4)

5.8.1 Processor inlet sample pump: Carbon vane, metal bellows or other pump design which do not provide a source or sink for hydrocarbon vapors, capable of 2 cfm during sampling.

5.8.2 Processor outlet sample probe: Use equipment specified in TP-201.1A.

5.9 Pressure Related Fugitive Emissions (Test Point 5). Use equipment specified in TP-201.2F.

5.10 Ambient Temperature Measurement: Use a temperature measurement device capable of measuring ambient temperature with a resolution of 2 deg F.

5.11 Ambient Pressure Measurement: Use a pressure measurement device capable of measuring atmospheric pressure to within 2.5 mm Hg.

5.12 Gasoline Containers for RVP Samples: As specified in Section 2296 of title 13, CCR.

5.13 Stopwatch: Use a stopwatch accurate to within 0.2 seconds to measure the dispensing rate.

5.14 Vehicle Fillpipe Check Equipment: A rod, level, protractor and clearance gauge to determine compliance with the "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks", title 13, CCR, section 2235.

6. CALIBRATIONS

All measurement devices shall be calibrated as described below. A record of all calibrations shall be maintained.

6.1 Analyzers: Calibration curves shall be produced no longer than six months before testing using ARB's SOP 054, "Standard Operating Procedure for the Multilevel Calibrations of Pollutant Gas Analyzers". Field calibrations during testing shall be conducted as described in Section 8.1.1.

6.2 Calibration Gases:

6.2.1 Certification. The calibration gases must be certified according to one of the following options:

6.2.1.1 The EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (40 CFR Part 75, App. H), or

6.2.1.2 To an analytical accuracy of $\pm$ 2% percent, traceable to a reference material approved by the National Institute of Standards and Technology (NIST) and recertified annually.

6.2.2 Documentation. Information on calibration gas cylinders shall be entered into a log identifying each cylinder by serial number. Sufficient information shall be maintained to allow a determination of the certification status of each calibration gas and shall include: (1) the data put in service, (2) assay result, (3) the dates the assay was performed, (4) the organization and specific personnel who performed the assay, and (5) the date taken out of service.

6.3 Volume Meters: All volume meter calibrations shall be NIST traceable. Volume meters shall be calibrated on an annual basis against a bell type spirometer at flow rates representing 1, 10, 30, 60, and 90% of the meter capacity. The accuracy of the meter shall be 2% of the true volume measured over the range of flow rates encountered in application of this test procedure. Alternatively, the field volume meter may be calibrated against a transfer meter. The transfer meter shall be calibrated against the bell type spirometer or wet test meter and may not be used in the field as a working meter.

6.4 Pressure Measurement Devices: Calibrate pressure measurement devices prior to and immediately following the test period with a static pressure calibrator for five points over a range of – 10 to +10 inches water or appropriate range of operation. The accuracy of the device shall be 5%. Alternatively, pressure measurement devices may be calibrated in accordance with manufacturer's specifications with a documentation of the specifications and the calibrations in the certification test report. Pressure measurement devices used to determine fugitive emissions shall meet the requirements of TP-201.2F.

6.5 Temperature Measurement Devices: Temperature measurement devices shall be checked semi-annually using an ice bath, ambient air, and boiling water. This accuracy check shall be conducted by comparison to a NIST traceable measurement device.

7. PRE-TEST REQUIREMENTS

7.1 Vehicle Test Matrix. The matrix of vehicles to be tested is defined by TP-201.2A. The test matrix must be approved by the ARB Executive Officer before testing begins.

7.2 Certified Phase I System and Phase II System Documentation. Verify that the test site has a certified Phase I system. Document the Phase I and Phase II system information on a form such as provided in Figure 13.

7.3 Pre-test Pressure Integrity Test. TP-201.3 shall be conducted preceding test equipment installation. First, check UST pressure. If at a vacuum, add N2 to bring UST pressure up to zero gauge pressure, then proceed with TP-201.3. Document test results.

7.4 Equipment Set-up at Test Site. Select dispenser(s) to be tested and ensure dispenser has valid Weights and Measures approval seal (sticker). Set-up equipment as described below. Use safety cones to divert vehicle traffic during set-up, however, place sampling equipment so that test can be conducted while fueling vehicles normally. Testing activities should be conducted so that alterations to the system and facility are minimized.

7.4.1 Vehicle Leak Check Apparatus: Assemble the vehicle leak check equipment as shown in Figure 2. Conduct a leak check of the sampling arrangement by pressurizing the apparatus to 1.0 inch WC using the closed-off fillpipe. Apparatus shall maintain 1.0 inch WC for 20 seconds.

7.4.2 Test Point 1 – Nozzle/Vehicle Interface: See Figure 1. Assemble the nozzle sleeve sampling apparatus as shown in Figure 3.

7.4.3 Test Point 2 – Vapor Return Line: See Figure 1. Install the sampling equipment as shown in Figures 8 through 10. The volume meter is inserted into the vapor return line at the vapor hose or dispenser vapor manifold connection to the vapor riser. Plumbing in the vapor return line should:

(1) Minimize the length of the vapor return line between the nozzle and the sampling point to reduce biases related to entry of condensation from the vapor return line into the volume meter.

(2) Minimize the pressure drop for flow through added plumbing and the volume meter.

(3) Return the entire volume of any sample extracted from the vapor return line.

7.4.3.1 Pressure Drop Check: Measure the backpressure from the nozzle to the sampling apparatus using TP-201.4. Then connect the sampling apparatus and measure the backpressure again. The backpressure added by the test equipment shall not increase the backpressure by more than 10%. Record the actual backpressure measurements.

7.4.3.2 Verify that the flowrate through the analyzer (using rotameter at analyzer inlet) and the pressure of the sampled vapors or calibration gas in the analyzer (pressure gauge at analyzer outlet) are identical both during sampling and calibration.

7.4.4 Test Point 3 – Vent Pipe: See Figure 1. Assemble the vent sleeve and sampling equipment as shown in Figures 12 through 13. All test sites are required to manifold their vent pipes to one P/V valve. Before replacing the P/V valve, determine the positive and negative cracking pressures as described in TP-201.2B.

7.4.5 Test Point 4_{inlet} and 4_{outlet} - Vapor Processor: See Figure 1. Install sampling equipment upstream and downstream of vapor processor.

7.4.5.1 Inlet to Vapor Processor: The vapor processor inlet sample and temperature and pressure measurements must be taken from a sample manifold attached to the inlet side of the volume meter which has been inserted in the inlet line. The installation of test equipment shall not interfere with the normal operation of the vapor incinerator. The total volume of sample taken from the processor inlet for the purpose of hydrocarbon concentration measurement must be returned, unaltered to the sample manifold.

7.4.5.1 Outlet of Vapor Processor: Sampling points at the processor ideally should be at least eight stack diameters downstream and two stack diameters upstream of any flow disturbance. If these criteria cannot be met without altering the stack, a sampling point which is at least two stack diameters downstream and one diameter upstream of any flow disturbance may be used. Sampling locations that do not meet these minimum criteria must be approved in advance of testing by the ARB Executive Officer. Hydrocarbon concentrations are measured at this test point for all vapor processors. CO and CO_2 concentrations are also measured for destructive processors if using USEPA Method 2B, "Determination of Exhaust Gas Volume Flow Rate from Gasoline Vapor Incinerators", 40 CFR Part 60, App. A.

7.5 The certification engineering evaluation may have identified additional parameters beyond those listed in TP-201.2 to be monitored during the test. Verify that all equipment needed to monitor any additional parameters is calibrated and installed. Prepare additional data forms if necessary.

7.6 Post-Installation Facility Leak Test: After all test equipment is installed, conduct a pressure decay test in accordance with TP-201.3. Corrective action shall be taken as necessary until facility meets TP-201.3 requirements.

7.7 Test Point 5 - Fugitive Emissions: See Figure 1. ~~Initiate Fugitive Emissions Determination. Wait at least 24 hours after completing the pressure decay test described in 7.6 before beginning the fugitive emissions determination. Verify that there have been no Phase I deliveries within the three hours prior to initiating TP-201.2F. Verify that acceptable ullage is present. Conduct a pressure decay test and initiate pressure measurements as specified in TP-201.2F. It is recommended that a preliminary fugitive emission calculation be conducted using historical test site pressure data as systems will fail if fugitive emissions are more than 50% of the maximum allowable emission factor.~~ Determine fugitive emissions as specified in TP-201.2F.

7.8 System Equilibration. After completing 7.~~7~~6, wait at least 16 hours before data collection. Take steps to ensure facility and system operations are minimally disturbed by the test equipment in the period between equipment installation and the start of the test.

8. DAILY PRE-TEST PROCEDURES

8.1 Field Calibration

8.1.1 Hydrocarbon Analyzers: Follow manufacturer's instructions concerning warm-up time and adjustments. On each test day, prior to data collection, zero the analyzer with a zero gas and span with known concentrations of calibration gases at levels which are 40 to 60% and 80 to 100% of the concentration ranges to be used for the test.

Conduct the analyzer calibration error check by sequentially introducing the three calibration gases (high-range, mid-range and zero gas) and recording the analyzer response to each calibration gas. Make no adjustments to the sampling/analysis system except those necessary to achieve the proper calibration gas flowrate. The analyzer calibration error for any calibration gas shall not exceed ±2 percent of the range. If needed, take corrective action until acceptable performance is achieved.

Perform a leak check on the vacuum side of the assembly at the maximum pump vacuum. Correct any leaks found and repeat the leak check and correction procedure until no leak is detected.

8.1.2 CO and CO_2 Analyzers: Repeat instructions in 8.1.1 for CO and CO_2 analyzers if applicable.

8.1.3 Pressure Measurement Device: Prior to and immediately following each day of testing, record the pressure measuring device(s) response to the pressure generated by a static pressure calibrator at 0, 40, and

80% of the specified range of operation. If pressure differs more than 10%, recalibrate the device. Document instrument response before and after adjustment.

8.1.4 Temperature Measurement Device. Check the accuracy of the temperature measurement device(s) against an NIST traceable mercury-glass thermometer at ambient temperature prior to and immediately following each day of testing. If necessary, adjust the temperature read-out in accordance with manufacturer's instructions. Provide a copy of these instructions and document the instrument response before and after adjustment in the test report.

8.2 Determination of Nozzle Sleeve Response Time. This determination can be conducted once for Test Point 1. If the sampling apparatus or dispenser location for Test Point 1 is changed, the response time determination shall be repeated.

8.2.1 Set the sample flow rate at 5 cfm. Lower flowrates may be used if sleeve leak check requirements are met (see 9.4.4.2).

8.2.2 Introduce ambient air from a location removed from any potential gasoline vapor source into the sleeve until the analyzer reading has stabilized at a level at or near zero.

8.2.3 Move the sleeve over an open gasoline container or other HC source that has been demonstrated to produce vapor concentrations within the range of the nozzle sleeve hydrocarbon analyzers. Measure the time interval from the time the sleeve was moved to the vapor source to the time that 90% of the final stable analyzer reading is observed. Perform this test sequence 3 times, calculate the average and define the result as the "nozzle sleeve response time".

8.3 Sampling System Bias Checks: Check sampling set-up by introducing a known hydrocarbon concentration as close to the sample point as possible. If the difference between the analyzer field calibration and the sample system bias check exceeds +5% of the range for the high-level calibration gas, the system fails the bias check and corrective action must be taken. Calculate bias using Equation 8.3. All sampling points must pass the bias check before the test can proceed.

$$\text{Bias} = \left[\frac{(\text{Ca} - \text{Cb})}{\text{R}}\right] \text{x}100$$

where:

C_a = analyzer response for calibration gas for field calibration

C_b = analyzer response for calibration gas for sampling system bias check

R = analyzer range

8.4 Initiate Test Documentation:

8.4.1 Photographs shall be taken at each test point to document the equipment set-up. Any changes in configuration during the test shall also be documented by photographs, along with the date and time of the modification. A video demonstrating emission measurement during a vehicle fueling as described in sections 9.1 to 9.4 is recommended.

8.4.2 Testers shall maintain a test log which shall consist of a narrative documenting activities at the test site, such as Phase I fuelings, modifications to equipment and the reasons for testing decisions. The tester shall update the test log at least twice a day.

8.5 RVP Sample: If required by the ARB Executive Officer, collect gasoline samples of each grade as described in title 13, CCR, Section 2296.

9. TEST PROCEDURE

Collect data during refueling of vehicles as defined in the vehicle test matrix as described below. An example data sheet is given in Figure 15. The Executive Officer shall conduct the fueling. Hydrocarbon emissions at test points 3 (vent) and 4 (processor), if applicable, are to be monitored continuously (24 hours/day) throughout the duration of the test.

9.1 When a vehicle corresponding to a vacancy in the vehicle test matrix arrives at the instrumented dispenser, the tester shall explain that a test is underway and request that the consumer participate. If approval is obtained, proceed as follows:

9.1.1 Determine if the vehicle is equipped with onboard refueling vapor recovery (ORVR) by checking the emission label attached to the vehicle's hood (title 13, CCR, section 1965). Look for the "Evap Family" code. If the fifth digit is an "R", then the vehicle has ORVR. If the fifth digit is an "E" or "V", it does not have ORVR. Record on data sheet.

9.2 Install the nozzle sleeve on the nozzle at the instrumented dispenser as shown in Figure 5. Check liquid trap and remove any liquid collected. Record amount of liquid collected.

9.3 The vehicle fuel tank is checked for leaks using the apparatus shown in Figure 2. ORVR vehicles are exempt from the leak check.

9.3.1 Connect the fill-pipe interface to the vehicle fill pipe.

9.3.2 Open the main valve on the nitrogen cylinder. Use the two stage regulator to adjust the supply line pressure and the coarse flow control valve and the rotameter fine flow control valve to maintain a stable pressure reading of 0.5 inches WC in the vehicle fill-pipe. If 0.5 inches WC cannot be maintained for 10 seconds, record an unacceptable vehicle leak for the subject vehicle.

9.3.3 If the 0.5 inches WC can be maintained, determine the leak rate by observing the rotameter reading for 10 seconds. Record the rotameter reading. If a flow rate greater than 0.01 cfm (283 ml/min) was observed on the rotameter, record an unacceptable vehicle leak for the subject vehicle.

9.3.4 Disconnect the equipment from the vehicle fillpipe. Continue with the test procedure only if the vehicle passed the leak check.

9.3.5 Measure vehicle fuel tank temperature using apparatus described in 5.6.6.

9.4 Vehicle Fueling with Nozzle Sleeve

9.4.1 If necessary, move sleeve to nozzle grade desired by customer. Turn on the nozzle sleeve sampling pump. Record the initial volume meter reading. Hydrocarbon concentration data collection for a dispensing episode begins with the insertion of the nozzle into the vehicle.

9.4.2 The Executive Officer shall conduct the fueling. The fueling shall be conducted "hands off" at the high clip rate with no top-offs. Fuel is dispensed until the first nozzle shutoff after a minimum of six gallons is dispensed.

9.4.2.1 Start the stopwatch when the dispenser volume meter begins to move.

9.4.2.2 During the fueling, check that the sleeve is capturing emissions effectively using the portable hydrocarbon analyzer (see Figure 7). The sleeve flow rate must be high enough to prevent the presence of hydrocarbon vapors at concentrations greater than 10% of the LEL (2,100 ppm as propane as determined by USEPA Method 21, "Determination of Volatile Organic Compounds Leaks", 40 CFR Ch.1, Part 60, App. A or TP-204.3) at the air inlet ports near the top of the vent sleeve. If this concentration is exceeded, the data collected is invalid.

9.4.2.3 Stop the stopwatch when the dispenser volume meter stops moving. Record the volume dispensed and time elapsed during dispensing. Invalidate data if volume dispensed is less than six gallons and the dispensing flow rate is outside the range of 6.0 to 10.0 gallons/minute. Invalidate data if more than one premature shutoff occurs before a minimum of six gallons is dispensed.

9.4.3 After termination of product dispensing, the Executive Officer shall turn off the dispenser and remove the nozzle from the vehicle fill pipe to minimize the chance of contaminating the nozzle sampling sleeve with liquid gasoline. Document whether or not liquid gasoline is present in the sleeve. Invalidate the results if liquid is present. The nozzle with the sleeve shall be hung on the dispenser. Data shall continue to be collected from the termination of dispensing for the nozzle sleeve response time determined in Section 8.2. Then the nozzle sleeve sample pump is turned off, constituting the end of the dispensing episode. Record the final volume meter reading.

9.5 Vehicle Fillpipe Check: Verify that the vehicle meets the vehicle fillpipe specifications using the apparatus described in Section 5.14. Invalidate the data if fillpipe specifications are not met.

9.6 Repeat test sequence in Sections 9.1 through 9.5 until vehicle matrix is filled or until end of test day.

9.7 Phase I Deliveries: All Phase I deliveries occurring after Section 7.2 shall be observed by the Executive Officer.

9.7.1 All Phase I deliveries must be conducted by cargo tanks which have been certified by ARB. ARB certification shall be verified by obtaining a copy of the cargo tank vapor recovery application.

9.7.2 The Phase I vapor recovery system shall be operated during product deliveries so as to minimize the loss of vapors from the facility storage tank which may be under pressure. Provided it is not in conflict with established safety procedures, this shall be accomplished in the following manner:

9.7.2.1 The Phase I vapor return hose is connected to the delivery tank and to the delivery elbow before the elbow is connected to the facility storage tank;

9.7.2.2 The delivery tank is opened only after all vapor connections have been made, and is closed before disconnection of any vapor return hoses; and

9.7.2.3 The vapor return hose is disconnected from the facility storage tank before it is disconnected from the delivery tank.

9.7.2.4 Phase I deliveries shall be accomplished so as to ensure that there is at least one vapor connection between the cargo tank compartment headspace and the storage tank associated with the product delivery. There shall be no more than two product hoses used with one vapor hose connected, and no more than three product hoses used with two vapor hoses connected.

9.8 Data Recording: In addition to the data collection described above, the tester shall record the following parameters at the minimum frequency set forth below.

9.8.1 Ambient Temperature: Hourly

9.8.2 Ambient Barometric Pressure: Hourly

9.8.3 Station throughput (gallons dispensed to vehicles):

9.8.3.1 Daily

9.8.3.2 Between start and stop of testing intervals

10. END OF TEST DAY PROCEDURES

Several test days are normally necessary to complete the vehicle test matrix. These procedures are required at the end of each test day.

10.1 System Bias Checks: Conduct for all analyzers used that test day. Perform the sampling system bias check by alternately introducing zero gas and the calibration gas at the probe. Operate the system at the normal sampling rate and make no adjustments to the measurement system other than those necessary to achieve proper calibration gas flow rates through the sampling system to the gas analyzer.

The test run shall be considered invalid if the difference of zero or calibration gas measured for the bias check in section 10.1 and the zero or calibration gas bias check measured in section 8.3 exceeds ±5% of the range, as determined by equation 10.1.

$$\text{Bias} = \frac{(C_a - C_{fb})}{R} x100$$

Where:

C_{fb} = analyzer response for the zero or upscale calibration gas for post run sampling system bias check

C_a = analyzer response for the zero or upscale calibration for initial analyzer calibration

R = analyzer range

10.2 Zero and Calibration Drift: The test run shall be considered invalid if the difference of zero or calibration gas measured for the bias check in section 10.1 and the zero or calibration gas bias check measured in section 8.3 exceeds ±3% of the range as determined by equation 10.2 below.

$$\text{Drift} = \frac{(C_{ib} - C_{fb})}{R} x100$$

Where:

C_{fb} = analyzer response for the zero or upscale calibration gas for post run sampling system bias check

C_{ib} = analyzer response for the zero or upscale calibration for initial system bias check

R = analyzer range

10.3 Pressure Measurement Devices: Following each day of testing, record the pressure measuring device(s) response to the pressure generated by a static pressure calibrator at 0, 40, and 80% of the specified range of operation. If necessary, adjust the instrument response in accordance with the manufacturer's instructions. Provide a copy of these instructions and document the instrument response before and after adjustment in the Certification Test Report.

10.4 RVP Samples. If required by the Executive Officer, take samples of each gasoline grade in accordance with Section 2296 of title 13,CCR.

10.5 Log. Summarize the day's testing activities and document any problems encountered during testing in the testing log.

11. POST-TEST PROCEDURES

The test is completed when valid measurements have been recorded for each vehicle in the matrix. After completing the daily post-test activities in Section 10, continue as follows:

11.1 ~~End Field Portion of Fugitive Emissions Determinations~~. ~~Verify that there have been no Phase I deliveries within the last three hours.~~ Prior to dismantling test equipment, c~~C~~onduct a pressure decay test as specified in TP-201.3~~2F~~.

11.2 Dismantle equipment. Remove testing apparatus and carefully reconnect system plumbing to original configuration.

11.3 Pressure Decay Test. Conduct a pressure integrity test using TP-201.3. Initiate corrective action until meet TP-201.3 requirements.

12. CALCULATING RESULTS

Data from each test point is used to determine a mass emission factor in lbs/1000 gallons. Efficiency is calculated using the mass emission factors and the mass of vapor returned per 1000 gallons dispensed.

12.1 Test Point 1 - Nozzle Sleeve

An emission factor in lbs hydrocarbon/1000 gallons dispensed is calculated for each fueling. Overall emission factors are also calculated for ORVR vehicles, non-ORVR vehicles and the entire vehicle matrix.

12.1.1 The sample volumes shall be corrected to standard conditions for each dispensing episode as shown in Equation 12.1.1.

$$V = V_m \times \left(\frac{528}{T}\right) \times \left[\frac{P_{bar}\left(\frac{P}{13.6}\right)}{29.92}\right] \qquad \text{Equation 12.1.1}$$

where:

V	=	volume corrected to standard conditions (ft^3).
V_m	=	measured volume (ft^3).
P_{bar}	=	barometric pressure (in. Hg).
P	=	meter pressure (inches water column).
T	=	meter temperature (^oR).

12.1.2 The mass emission factor for each dispensing episode shall be calculated as follows:

$$M_{rate} = \frac{(V_i)(C_i)(MW)(1{,}000)}{(385)(G_i)} \qquad \text{Equation 12.1.2}$$

where:

M_{rate} = emission factor for dispensing episode *i* (lb HC/1,000 gallons)

V_i = volume for dispensing episode *i* corrected to standard conditions (ft^3).

C_I = hydrocarbon concentration for dispensing episode *i* (volume fraction, i.e. $ppm_v / 10^6$ or Volume % / 10^2)

MW = molecular weight of HC analyzer calibration gas (lb/lb-mole) e.g., 44 for propane

385 = standard volume (ft^3) of one lb-mole of ideal gas at standard temperature and pressure (528°R and 29.92 in. Hg)

G_i = gallons dispensed for dispensing episode i.

1,000 = Conversion factor to 1,000 gallons

12.2 Test Point 2. Vapor Return Line

The vapor return line data is not needed to calculate the emission factor, but is necessary to calculate the system efficiency.

12.2.1 Calculate the standard volume of vapor returned for each dispensing episode as shown in Equation 12.1.1.

12.2.2 Calculate the vapor returned in lbs/1000 gallons dispensed as shown in Equation 12.1.2.

12.3 Test Point 3. Vent Sleeve

The vent emissions shall be calculated over the time periods specified by the ARB Executive Officer. Knowledge of the total station gasoline throughput for the specified time period is necessary to calculate the emission factor.

12.3.1 Calculate the standard volume sampled over the time interval using Equation 12.1.1.

12.3.2 Calculate the emission factor in lbs/1000 gallons dispensed over the time interval selected using Equation 12.1.2.

12.4 Test Point 4 Processor

12.4.1 If a volume meter is used at Test Point 4_{outlet}, calculate the standard volume sampled of the time interval using Equation 12.1.1.

12.4.2 If a volume meter is used at Test Point 4_{inlet}, calculate the exhaust volume flow rate using USEPA Method 2B.

12.5 Test Point 5 Pressure-Related Fugitives: Calculate the emission factor as specified in TP-201.2F.

12.6 Phase II System Emission Factor: Calculate the Phase II system emission factor using Equation 12-6.

$$M_{total} = M_1 + M_3 + M_4 + M_5$$

Where: M_{total} = Phase II emission factor, lbs/1000 gallons
M_1 = Mass emission factor at Test Point 1, lbs/1000 gallons
M_3 = Mass emission factor at Test Point 3, lbs/1000 gallons
M_4 = Mass emission factor at Test Point 4, lbs/1000 gallons
M_5 = Mass emission factor at Test Point 5, lbs/1000 gallons

12.7 Phase II System Efficiency: Calculate the Phase II system efficiency using Equation 12-7.

$$\mathrm{EFF} = 1 - \frac{(M_1 + M_3 + M_4 + M_5)}{(M_1 + M_2 + M_3 + M_4 + M_5)} \times 100$$

[delete above equation and add equation below]

$$\mathrm{EFF} = 1 - \frac{(M_1 + M_3 + M_4 + M_5)}{(M_1 + M_2)} \times 100$$

Where: M_2 = Mass emission factor at Test Point 2, lbs/1000 gallons

13. REPORTING RESULTS

All data, forms, calculations and other test documentation shall be included in a test report.

14 ALTERNATIVE PROCEDURES

14.1 This procedure shall be conducted as specified. Any modifications to this test procedure shall not be used for certification unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

California Environmental Protection Agency

Air Resources Board

Proposed for Adoption

Vapor Recovery Test Procedure

TP-206.1

Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks

Adopted: [insert adoption date]

[Note: All text is proposed for adoption. As permitted by Title 2, California Code of Regulation, section 8, for ease of review underline to indicate adoption has been omitted]

California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-206.1

Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation Factor at Gasoline Dispensing Facilities with Aboveground Storage Tanks

1. APPLICABILITY

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designate.

1.1 This test procedure is used to determine the emission factor for Standing Loss Control vapor recovery systems installed at gasoline dispensing facilities (GDF) with aboveground storage tanks (AST) from the daily ratio of fuel surface temperature range to ambient temperature range.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

2.1 The AST shall be equipped with a thermocouple capable of floating on the fuel surface. An additional thermocouple or temperature probe shall be installed outside the tank and in the shade to measure ambient temperature. The system shall be continuously monitored at one minute intervals for a minimum of 30 days. The test period shall include a minimum of seven days when the maximum daily ambient temperature is between 90°F and 105°F. Daily maximum and minimum fuel surface and ambient temperatures shall be used to determine the fuel surface and ambient temperature ranges (difference between daily minimum and maximum). The ratio of these temperature ranges produces the Temperature Attenuation Factor, or A_f. The temperature attenuation factor is then used to calculate the emission factor. The test shall be conducted after proper installation of P/V valves and other components to maintain pressure integrity.

3. RANGE

3.1 The full-scale range of the thermocouples shall be 0.0-150.0°F with a minimum accuracy of ±2.0 °F.

4. INTERFERENCES

4.1 Other Phase I and Phase II certification and test procedures and fuel transfers (Phase I and II) may bias the results of this test. During the performance of other certification and test procedures, fuel surface temperatures will be invalidated for the 24 hour period following the running of these other procedures. Invalidated 24-hour periods will not be considered part of the minimum 30 day test duration.

4.2 All Standing Loss Control vapor recovery components that are part of the system shall be in place and operating properly during the collection of fuel surface and ambient temperature data. If any part of the vapor recovery system is not operating properly, fuel surface temperature data shall be invalidated for each 24-hour period that the system is in non-compliance with the certification and test procedures.

4.3 Thermocouples and temperature probes shall not be placed in direct sunlight as this may bias the results. Ambient temperature probes shall be shaded using a solar radiation shield to minimize the effects of solar and terrestrial radiation and provide accurate measurements.

5. APPARATUS

5.1 Thermocouples, temperature probes and associated wiring

Thermocouples will be fixed on floats attached to stainless steel guide rods that float on top of the fuel surface in each tank to be tested to measure fuel surface temperature (Figure 1). An additional thermocouple or temperature probe will be collocated with the test tank to measure ambient air temperature; this thermocouple or temperature probe shall be equipped with a radiation shield to prevent bias from direct sunlight. Associated wiring shall be used to connect the thermocouples and/or temperature probes to the data logger. All wiring and components used for testing will be intrinsically safe.

5.2 Data Logger

A data logger capable of recording continuous (minimum one-second interval) and storing (minimum one-minute average) temperature data will be attached to the thermocouples and temperature probes. Thermocouple and temperature probe compatibility with the data logger shall be established prior to the beginning of the test.

5.3 Leak Detection Solution

Any liquid solution designed to detect vapor leaks may be used to verify the pressure integrity of system components during this test.

6. PRE-TEST PROCEDURES

6.1 Thermocouples shall be calibrated with the data logger in accordance with the manufacturer's instructions. Calibrations a NIST standard or transfer standard traceable to National Institute of Standards and Technology (NIST) is required.

6.2 After the thermocouples and temperature probes are installed, TP-206.3 shall be conducted to verify the system complies with the static pressure decay test procedures. No fuel surface temperature data will be valid without the system successfully passing the requirements of TP-206.3.

6.3 The tank shall be filled to 50% of the total ullage through the top or side mounted product adaptor using a camlock fitting.

6.4 The test shall be conducted with the facility in normal operating mode, but without any dispensing. This includes all nozzles properly hung up in the dispenser boots and all dispenser cabinet covers in place.

6.5 When other certification and test procedures are run to evaluate the vapor recovery system, fuel surface temperature data shall be invalidated for the 24-hour period immediately after these tests.

6.6 No deliveries or dispensing shall be allowed during the minimum 30-day testing duration. If a delivery occurs the test will be terminated for a minimum 30 days.

6.7 Reid Vapor Pressure (RVP) of the fuel used to test the tank shall be measured at least 24 hours prior to the 30 day test period.

7. TESTING

7.1 Install thermocouple and float apparatus in the center of the tank opening and attach wiring to data logger. Install additional thermocouple or temperature probe with radiation shield within 10 linear feet of the tank and attach wiring to the data logger.

7.2 Turn on data logger and check in-put from each of the thermocouples and/or temperature probes to ensure they are functioning properly and recording data by conducting the steps listed in section 7.7.

7.3 Record start date and time.

7.4 Daily fuel surface and ambient temperature measurement data shall be recorded continuously a minimum 22 out of 24 hours beginning and ending at midnight during the same time period to maintain data set completeness.

7.5 Collect fuel surface and ambient temperature data for a minimum of 30 days during the summer months (June 1 through September 30) by completing Form 1.

7.6 On a weekly basis or an alternative period specified by the Executive Officer, download the data onto a computer for data reduction, validation, and analysis.

7.7 Once every 7 days or an alternative period specified by the Executive Officer, conduct a precision check of the thermocouple and temperature probes using the following procedure:

7.7.1 Remove the thermocouple and/or temperature probes.

7.7.2 Using a NIST traceable thermometer (mercury or electronic), collocate with the test equipment and record the temperatures on the Quality Assurance/Quality Control (QA/QC) form (Figure 2).

7.7.3 If the test thermocouples and/or temperature probes are within ± 2.0°F of the NIST traceable standard thermometer, return the test equipment, conduct TP-206.3 (Static Pressure Test), and continue monitoring the fuel surface and ambient temperatures. If the test equipment is not within ± 2.0°F of the standard, re-calibrate or replace the test equipment, conduct TP-206.3, and continue monitoring temperature. Temperature data shall be evaluated for validity from the last precision check if the test equipment does not meet the QA/QC criteria.

7.7.4 Invalidated data shall not be considered part of the minimum 30-day test duration.

8. POST-TEST PROCEDURES

8.1 Verify data completeness. A valid data set shall include:

8.1.1 A minimum of 30 days of 24-hour fuel surface and ambient temperature data that meet the conditions of section 7.3 of these test procedures.

8.1.2 A minimum of 30 days of valid data obtained during the summer months (June 1 to September 30) or period outside the summer months approved by the Executive Officer as provided by section 3.3.1 of CP-206.

8.1.3 At least seven days where the daily maximum ambient temperature shall be between 90°F and 100°F in order for data to be considered valid.

8.2 Remove temperature probe from the tank and replace with appropriate dust caps.

9. CALCULATIONS

9.1 Determine the daily fuel surface temperature range (difference between daily minimum and maximum temperatures) for each of the 30 consecutive days as follows:

Equation 9-1

$$T_f^{Range} = T_f^{Max} - T_f^{Min}$$

where:

T_f^{Range} = The daily fuel surface temperature range

T_f^{Max} = The daily maximum fuel surface temperature

T_f^{Min} = The daily minimum fuel surface temperature

9.2 Determine the average ambient temperature range (difference between daily minimum and maximum temperatures) for each of the 30 consecutive days as follows:

Equation 9-2

$$T_a^{Range} = T_a^{Max} - T_a^{Min}$$

where:

T_a^{Range} = The daily ambient temperature range

T_a^{Max} = The daily maximum ambient temperature

T_a^{Min} = The sum of the daily minimum fuel surface temperatures

9.3 Determine the attenuation factor as follows:

Equation 9-3

$$A_f = \frac{(\sum_1^n T_f^{Range} / n)}{(\sum_1^n T_a^{Range} / n)}$$

where:

A_f = Temperature Attenuation Factor

$\sum_1^n T_f^{Range}$ = sum of daily fuel surface temperature range

$\sum_1^n T_a^{Range}$ = sum of daily ambient temperature range

n = number of data sets (days)

10. REPORTING

10.1 The temperature Attenuation Factor can be applied to the equation in section 3.3.1 of CP-206 to determine the emission factor (pounds HC/1000 gallons/day) of the technology being tested.

10.2 Data shall be entered on the “Summary of Temperature Attenuation Factor Test Data” form (Form 1).

11 ATLERNATIVE TEST PROCEDURES

This procedure shall be conducted as specified. Any modifications to this test procedure shall not be used for certification unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 15 of Certification Procedure CP-206.

FORM 1

SUMMARY OF TEMPERATURE ATTENUATION FACTOR TEST DATA

SOURCE INFORMATION	
GDF Name and Address ____________________ ____________________ ____________________	GDF Representative and Title: Contact Phone No. ( )
Product Grade/RVP: Tank Capacity (gallons): Gasoline Volume (gallons): Ullage (gallons):	Vapor Recovery System Description: GDF # _______________ A/C #

Static Pressure Test Conducted:________________ (pre) Pass ☐ Fail ☐

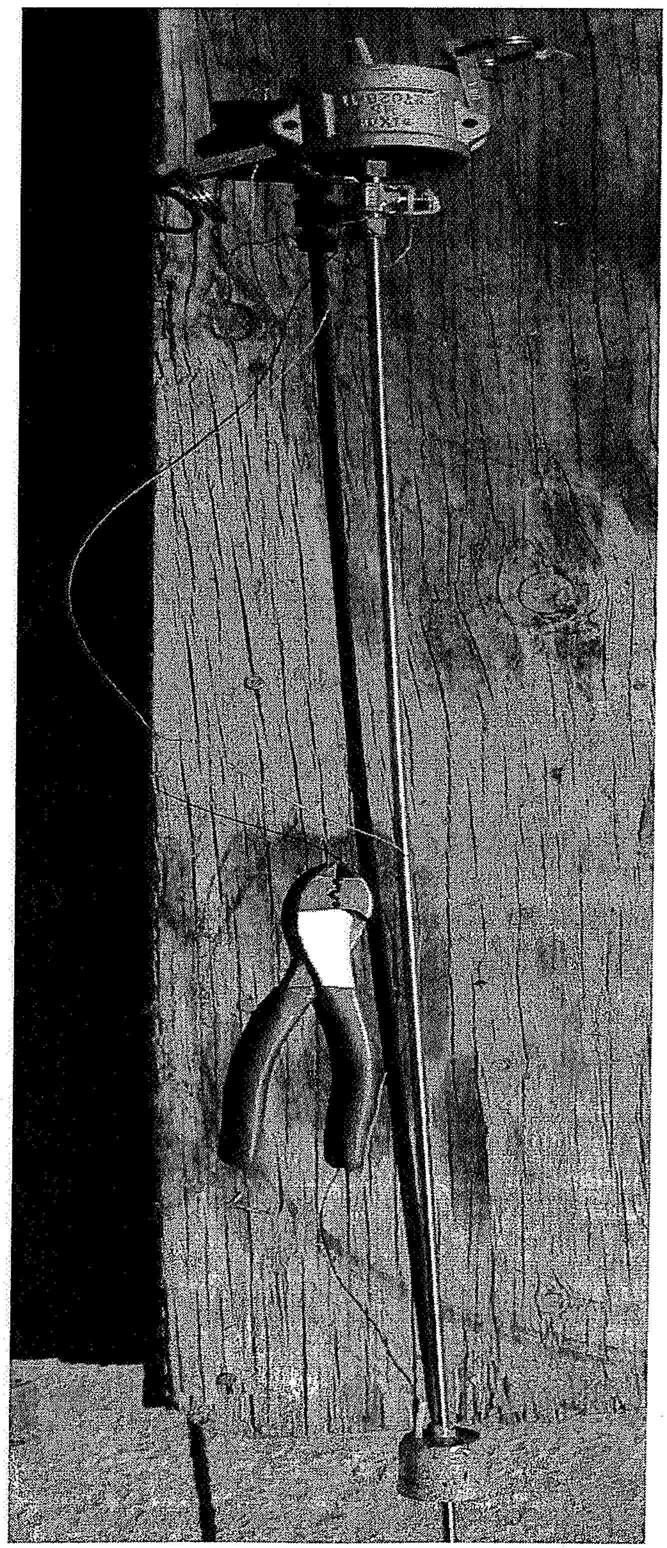
Temperature Attenuation Factor Data

Day	Comments	Hours of valid data	T_f (°F) Min	T_f (°F) Max	T_a (°F) Min	T_a (°F) Max
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Static Pressure Test Conducted:________________ (post) Pass ☐ Fail ☐

Test Conducted by:	Test Company:	Date of Test:

Figure 1
Fuel Surface Thermocouple on Float



California Environmental Protection Agency

Air Resources Board

Proposed for Adoption

Vapor Recovery Test Procedure

TP-206.2

Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks

Adopted: [insert adoption date]

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California Environmental Protection Agency
Air Resources Board

Vapor Recovery Test Procedure

TP-206.2

Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the Air Resources Board, and the term " Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

The purpose of this procedure is to quantify the Standing Loss Control emission factor for a processor used to control gasoline vapors from an aboveground storage tank (AST). This procedure is applicable to the determination of compliance with the Standing Loss Control performance standards specified in Certification Procedure, CP-206, Certification and Testing Procedures for Gasoline Vapor Recovery Facilities Using Aboveground Storage Tanks.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

During episodes of no transfers (Phase I or Phase II), the emission factor is determined by direct measurement of the mass of hydrocarbons at the following test point locations: (1) emitted through the hydrocarbon processor, and (2) emitted from the pressure/vacuum (P/V) valve(s) on the AST vent pipe(s). Using the results of the direct hydrocarbon measurements, the Standing Loss Control mass emission factor (in units of pounds of hydrocarbon emissions per 1,000 gallons ullage per day) may be calculated. The testing shall be conducted during the summer months (June 1 to September 30). The test period shall consist of a minimum 24-hour testing episode in which hydrocarbon emissions are continuously measured when daily maximum ambient temperature is between 90°F and 105°F.

3. BIASES AND INTERFERENCES

3.1 Failure to test a Standing Loss Control system that does not meet the Static Pressure Performance test requirements (TP-206.3) may bias the test toward either compliance or noncompliance.

3.2 Phase I and Phase II transfers shall not be permitted during the 24-hour testing episode.

4. RANGE AND MEASUREMENT ERROR

4.1 This procedure can generate emission factors in the range of 0.00 to greater than 15.0 lbs/1000 gallons.

4.2 The maximum emission factor error is calculated to be 13%. The maximum efficiency error is calculated to be 1.0%.

5. EQUIPMENT

Alternatives to the required equipment shall only be used subject to prior written approval by the ARB Executive Officer.

5.1 Hydrocarbon (HC) Analyzer(s). The HC analyzer(s) shall have the following characteristics and capabilities:

5.1.1 Depending on the test point location of the HC measurement, the HC analyzer shall be capable of continuously measuring HC concentrations for 100 ppm to 80 percent by volume using propane as a calibration gas, or 75 ppm to 60 percent by volume using butane as a calibration gas.

5.1.2 Analyzers at test points 1 and 2 shall use a destructive detection principle, such as a flame ionization detector (FID) or non-dispersive infrared (NDIR). A sufficient number of hydrocarbon analyzers shall be used to provide for simultaneous and continuous measurements at all applicable test points. The Executive Officer may allow other measurement methods if it is determined that equivalent results can be obtained.

5.1.3 Hydrocarbon Calibration Gases. Cylinders of certified, or NIST traceable, calibration gases using propane (or butane) in nitrogen capable of providing calibration for the analyzer ranges recommended in Table 5-1.

Table 5-1
Recommended Continuous Analyzer Concentration Ranges

Test Point (Fig.1)	Pollutant	Operating Priciple	Ranges	Usable Concentration Range
1	HC	FID or NDIR	0 to10 ppm 0 to 100 ppm 0 to 1,000 ppm 0 to 5,000 ppm 0 to 1.0% 0 to 5.0%	1.0 to 9.5ppm 10 to 95 ppm 100 to 950 ppm 500 to 4,750 ppm 1,000 to 9,500 ppm 5,000 ppm to 4.75%
2	HC	FID or NDIR	0 to 1,000 ppm 0 to 5,000 ppm 0 to 1.0% 0 to 5.0% 0 to 10.0% 0 to 50.0%	100 to 950 ppm 500 to 4,750 ppm 1,000 to 9,500 ppm 5,000 ppm to 4.75% 1.0% to 9.5% 5% to 48%
1*	CO	NDIR	0 to 500 ppm	50 to 475 ppm
1*	CO_2	NDIR	0 to 5.0% 0 to 10.0%	5,000 ppm to 4.75% 1.0% to 9.5%
1*	HC	FID or NDIR	0 to 1.0% 0 to 5.0%	1,000 ppm to 9500 ppm 5000 ppm to 4.75%

* destructive processor only

Each range requires three calibration gases:

(1) High-Range Gas: Concentration between 80 and 100% of range.
(2) Mid-Range Gas: Concentration between 40 and 60% of range.
(3) Zero Gas: Nitrogen with a hydrocarbon concentration less than 0.25% of range.

5.1.4 Gas Dilution System. A gas dilution system which meets the requirements of EPA Method 205, Verification of Gas Dilution Systems for Field Instrument Calibrations, CFR 40, Part 51, Appendix M (62 FR 32502, June 16, 1997) may be used to provide low-level calibration gases from a high-level calibration gas. The calibration gas used with a gas dilution system shall be an EPA Protocol gas. A gas dilution system which meets the requirements of EPA Method 205 may be used for all analyzer calibrations and sampling system bias checks. If a diluter is used, it must be included in the calibration of the analyzer(s).

5.1.5 Sample lines shall be constructed of Teflon or other material that does not absorb or otherwise alter the sample gas.

5.1.6 Additional Analyzers for Systems with Destructive Vapor Processors: If processor exhaust flowrate is to be determined by USEPA Method 2B 40 CFR, Part 60, App.A-1 (36 FR 24877, December 23, 1971), then the following additional analyzers are needed for Test Point 1.

5.1.6.1 Carbon Monoxide (CO) analyzer: As specified in ARB Method 100, title 17, CCR, section 94114, or alternative test procedures approved by the Executive Officer.

5.1.6.2 Carbon Dioxide (CO_2) analyzer: As specified in ARB Method 100 or other alternative test procedures approved by the Executive Officer.

5.2 Data Acquisition System/Data Recorder: Provide a permanent record of hydrocarbon analyzer data using a strip chart recorder. A datalogger or another electronic data acquisition is also recommended. Data shall be collected at intervals not to exceed one second. Any electronic data acquisition system must be capable of integration at a ten-second interval. The strip chart, as well as the data acquisition system, must have a resolution of 0.5 percent of the analyzer range.

5.3 Volumetric Flow Rate Meters. Recommended volume meter ranges for each test point are shown in Table 5-2.

Table 5-2
Volume Meter Specifications

Test Point	Typical Range Measured (cfm)	Recommended Meter Range (cfh)
1	System specific	Determined during evaluation
2	Vent sleeve sweep: 2 to 20 Vent : 0 to 5	0 to 800 0 to 800

The volume meters are positive displacement or turbine meters that meet the following requirements:

5.3.1 Backpressure limits (BPL):

(a) Meters with a manufacturer specified maximum flow rating of greater than 1000 CFH shall demonstrate BPL < 1.10 inches WC at a flow rate of 3,000 CFH or the maximum flow rating specified by the manufacturer, whichever is less, and BPL < 0.05 inches WC at a flow rate of 30 CFH.

(b) Meters with a manufacturer specified maximum flow rating of less than 1000 CFH shall demonstrate BPL < 0.70 inches water column at a flow rate of 800 CFH and BPL < 0.04 inches WC at a flowrate of 16 CFH.

5.3.2 The error of the meter shall be less than 2% of the true volume over the entire range of flow rates for which it will be used.

5.3.3 The meter shall be equipped with taps to accommodate the following as applicable for the specific Test Point:

(a) Test Point 1: differential pressure gauge with a full-scale range of less than or equal to four times the backpressure limit.

(b) Test Point 2: differential pressure gauge with a full-scale range of less than or equal to four times the backpressure limit.

5.3.4 Pressure Measurement Devices for Volume Meters

Transducers, liquid manometers, Magnahelic gauges, electronic manometers, or equivalent with a design range suitable for the pressure being measured. The error of the pressure measuring device shall not exceed 3% of the true pressure over the range of pressures to be quantified.

5.3.5 Temperature Measurement Device for Volume Meters

Thermocouple or thermometer with a design range suitable for the temperature being measured. The error in the temperature measurement shall not exceed 4 degrees Fahrenheit.

5.4 Vapor Processor (Test Point 1)

5.4.2 Processor outlet sample probe: Use equipment specified in TP-201.1A.

5.4 Ambient Temperature Measurement: Use a temperature measurement device capable of measuring ambient temperature with a resolution of 2 deg F.

5.5 Ambient Pressure Measurement: Use a pressure measurement device capable of measuring atmospheric pressure to within 2.5 mm Hg.

5.6 Gasoline Containers for RVP Samples: As specified in Section 2296 of title 13, CCR.

6. CALIBRATIONS

All measurement devices shall be calibrated as described below. A record of all calibrations shall be maintained.

6.1 Analyzers: Calibration curves shall be produced no longer than six months before testing using ARB's SOP 054, "Standard Operating Procedure for the Multilevel Calibrations of Pollutant Gas Analyzers" (September 1997). Field calibrations during testing shall be conducted as described in Section 8.1.1.

6.2 Calibration Gases:

6.2.1 Certification. The calibration gases shall be certified according to one of the following options:

6.2.1.1 The EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (EPA-600/R-97/121, September 1997), or

6.2.1.2 To an analytical accuracy of $\pm$ 2% percent, traceable to a reference material approved by the National Institute of Standards and Technology (NIST) and recertified annually.

6.2.2 Documentation. Information on calibration gas cylinders shall be entered into a log identifying each cylinder by serial number. Sufficient information shall be maintained to allow a determination of the certification status of each calibration gas and shall include: (1) the data put in service, (2) assay result, (3) the dates the assay was performed, (4) the organization and specific personnel who performed the assay, and (5) the date taken out of service.

6.3 Volume Meters: All volume meters shall be calibrated on an annual basis against a bell type spirometer at flow rates representing 1, 10, 30, 60, and 90% of the meter capacity. The bell type spirometer shall be calibrated against a NIST traceable standard or a transfer standard traceable to NIST. The accuracy of the meter shall be 2% of the true volume measured over the range of flow rates encountered in application of this test procedure. Alternatively, the field volume meter may be calibrated against a transfer standard traceable to NIST. The transfer standard shall be calibrated against the bell type spirometer or wet test meter and may not be used in the field as a working meter.

6.4 Pressure Measurement Devices: All pressure measurement devices shall be tested for accuracy using a reference gauge, incline manometer, NIST traceable standard, or static pressure calibrator, for five points (e.g. 10, 25, 50, 75, and 90% of full scale) to verify that the accuracy is within 5 percent. This test for accuracy shall be conducted prior and immediately following the test period. Alternatively, pressure measurement devices may be calibrated in accordance with manufacturer's specifications. The certification report shall provide documentation on the calibration of pressure measurement devices.

6.5 Temperature Measurement Devices: Temperature measurement devices shall be checked semi-annually using an ice bath, ambient air, and boiling water. This accuracy check shall be conducted by comparison to a NIST traceable measurement device.

7. PRE-TEST REQUIREMENTS

7.1 Pre-test Static Pressure Performance Test. TP-206.3 shall be conducted preceding test equipment installation. First, check UST pressure. If at a vacuum, add N_2 gas to bring AST pressure up to zero gauge pressure then proceed with TP-206.3. Document test results.

7.2 Test Point 2 – Vent Pipe: See Figure 1. Assemble the vent sleeve and sampling equipment. All test sites are required to manifold their vent pipes to one P/V valve. Determine the positive and negative cracking pressures, positive leak rate, and negative leak rate in accordance with TP-201.1E CERT to verify that the P/V valve complies with specifications listed in CP-206, or with specifications requested by the applicant and approved by the Executive Officer.

7.3 Test Point 1 - Vapor Processor: Install sampling equipment downstream (outlet) of the vapor processor.

7.3.1 Outlet of Vapor Processor: Sampling points at the processor ideally should be at least eight stack diameters downstream and two stack diameters upstream of any flow disturbance. If these criteria cannot be met without altering the stack, a sampling point which is at least two stack diameters downstream and one diameter upstream of any flow disturbance may be used. Sampling locations that do not meet these minimum criteria shall be approved in advance of testing by the ARB Executive Officer. Hydrocarbon concentrations are measured at this test point for all vapor processors. CO and CO_2 concentrations are also measured for destructive processors by using USEPA Method 2B, "Determination of Exhaust Gas Volume Flow Rate from Gasoline Vapor Incinerators", 40 CFR Part 60, App. A-1 (36 FR 24877, December 23, 1971).

7.4 The certification engineering evaluation may have identified additional parameters beyond those listed in TP-206.2 to be monitored during the test. Verify that all equipment needed to monitor any additional parameters is calibrated and installed. Prepare additional data forms if necessary.

7.5 Post-Installation Facility Leak Test: After all test equipment is installed, conduct a pressure decay test in accordance with TP-206.3. Corrective action shall be taken as necessary until facility meets TP-206.3 requirements.

7.6 System Equilibration. After completing 7.4, wait at least 16 hours before data collection. Take steps to ensure facility and system operations are minimally disturbed by the test equipment in the period between equipment installation and the start of the test.

8. DAILY PRE-TEST PROCEDURES

8.1 Field Calibration

8.1.1 Hydrocarbon Analyzers: Follow manufacturer's instructions concerning warm-up time and adjustments. On each test day, prior to data collection, zero the analyzer with a zero gas and span with known concentrations of calibration gases at levels which are 40 to 60% and 80 to 100% of the concentration ranges to be used for the test.

Conduct the analyzer calibration error check by sequentially introducing the three calibration gases (high-range, mid-range and zero gas) and recording the analyzer response to each calibration gas. Make no adjustments to the sampling/analysis system except those necessary to achieve the proper calibration gas flowrate. The analyzer calibration error for any calibration gas shall not exceed ±2 percent of the range. If needed, take corrective action until acceptable performance is achieved.

Perform a leak check on the vacuum side of the assembly at the maximum pump vacuum. Correct any leaks found and repeat the leak check and correction procedure until no leak is detected.

8.1.2 CO and CO_2 Analyzers: Repeat instructions in 8.1.1 for CO and CO_2 analyzers if applicable.

8.1.3 Pressure Measurement Device: Prior to and immediately following each day of testing, record the pressure measuring device(s) response to the pressure generated by a static pressure calibrator at 0, 40, and 80% of the specified range of operation. If pressure differs more than 5%, recalibrate the device. Document instrument response before and after adjustment.

8.1.4 Temperature Measurement Device. Check the accuracy of the temperature measurement device(s) against an NIST traceable mercury-glass thermometer at ambient temperature prior to and immediately following each day of testing. If necessary, adjust the temperature read-out in accordance with manufacturer's instructions. Provide a copy of these instructions and document the instrument response before and after adjustment in the test report.

8.2 Initiate Test Documentation:

8.2.1 Photographs shall be taken at each test point to document the equipment set-up. Any changes in configuration during the test shall also be documented by photographs, along with the date and time of the modification.

8.2.2 Testers shall maintain a test log which shall document activities at the test site, such as modifications to equipment and the reasons for testing decisions. The tester shall update the test log at least twice a day.

8.3 RVP Sample: If required by the ARB Executive Officer, collect gasoline samples of each grade as described in title 13, CCR, Section 2296.

8.4 Determine the ullage in gallons of gasoline in the test tank through the gauging port, measurement stick, or other means approved by the Executive Officer.

9. TEST PROCEDURE

Collect data during periods of no transfers (Phase I and Phase II). Hydrocarbon emissions and volume measurements at test points 1 (processor) and 2 (vent), if applicable, are to be monitored continuously for a minimum 24 hours during the testing episode.

9.1 Testing requirements:

9.1.1 Testing shall be conducted during the summer months (June 1 to September 30). The Executive Officer may allow testing outside the summer months if the criteria of section 9.1.2 are met.

9.1.2 Minimum one testing episode during the test period when the ambient temperature is between 90°F and 100°F.

9.1.3 The testing episode shall be a minimum 24 hours in duration. Record the start date and time.

9.1.4 No Phase I or Phase II transfers are permitted during the testing episode.

9.2 Data Recording: In addition to the data collection described above, the tester shall record the following parameters at the minimum frequency set forth below.

9.2.1 Ambient Temperature: Hourly

9.2.2 Ambient Barometric Pressure: Hourly

10. END OF TEST DAY PROCEDURES

These procedures are required at the end of each test day.

10.1 Zero and Calibration Drift: The test run shall be considered invalid if the difference of zero or calibration gas measured for the bias check in section 10.1 and the zero or calibration gas bias check measured in section 10.1 exceeds ±3% of the range as determined by equation 10-1 below.

Equation 10-1

$$\text{Drift} = \frac{(C_{ib} - C_{fb})}{R} x100$$

Where:

C_{fb} = analyzer response for the zero or upscale calibration gas for post run sampling system bias check

C_{ib} = analyzer response for the zero or upscale calibration for initial system bias check

R = analyzer range

10.2 Pressure Measurement Devices: Following each day of testing, record the pressure measuring device(s) response to the pressure generated by a static pressure calibrator at 0, 40, and 80% of the specified range of operation. If necessary, adjust the instrument response in accordance with the manufacturer's instructions. Provide a copy of these instructions and document the instrument response before and after adjustment in the Certification Test Report.

10.3 RVP Samples. If required by the Executive Officer, take samples of each gasoline grade in accordance with Section 2296 of title 13, CCR.

10.4 Log. Summarize the day's testing activities and document any problems encountered during testing in the testing log.

10.5 Record end date and time.

11. POST-TEST PROCEDURES

The test is completed when valid measurements have been recorded for each 24-hour test episode. After completing the daily post-test activities in Section 10, continue as follows:

11.1 Dismantle equipment. Remove testing apparatus and carefully reconnect system plumbing to original configuration.

11.2 Static Pressure Performance Test. Conduct a static pressure performance test using TP-206.3.

12. CALCULATING RESULTS

Data from each test point is used to determine an emission factor in lbs/1000 gallons ullage/day.

12.1 An emission factor in lbs hydrocarbon/1000 gallons ullage/day is calculated for each 24 hour testing episode.

12.1.1 The sample volumes shall be corrected to standard conditions for each testing episode as shown in Equation 12.1.1.

Equation 12.1.1

$$Q_i = \frac{V_m}{t} \times \left(\frac{528}{T}\right) \times \left[\frac{P_{bar}\left(\frac{P}{13.6}\right)}{29.92}\right]$$

where:

Q_i	=	volumetric flowrate corrected to standard conditions (ft^3/day).
V_m	=	measured volume (ft^3).
P_{bar}	=	barometric pressure (in. Hg).
P	=	meter pressure (inches water column).
T	=	meter temperature (^oR).
t	=	time period of testing in days (e.g. 32 hours = 1.33 days)

12.1.2 The mass emission factor for each testing episode shall be calculated as follows:

Equation 12.1.2

$$M_i = \frac{(Q_i)(C_i)(MW)(1{,}000)}{(385)(G_i)}$$

where:

M_i = emission factor for testing episode *i* (lb HC/1,000 gallons ullage/day)

Q_i = volumetric flowrate for testing episode *i* corrected to standard conditions (ft^3/day).

C_i = hydrocarbon concentration for testing episode *i* (volume fraction, i.e. $ppm_v / 10^6$ or Volume % / 10^2)

MW = molecular weight of HC analyzer calibration gas (lb/lb-mole). For example, if propane is used as a calibration gas, the molecular weight is 44 lb/lb-mole.

385 = standard volume (ft^3) of one lb-mole of ideal gas at standard temperature and pressure (528°R and 29.92 in. Hg)

G_i = ullage of test tank for testing episode *i* (gallons).

1,000 = Conversion factor to 1,000 gallons

12.2 Test Point 2 Vent Sleeve

The vent emissions shall be calculated over the testing episode. Knowledge of the total station gasoline throughput for the specified time period is necessary to calculate the emission factor.

12.1.1 Calculate the standard volumetric flowrate over the testing episode using Equation 12.1.1.

12.1.2 Calculate the M_2 emission factor in lbs/1000 gallons ullage/day over the testing episode using Equation 12.1.2.

12.3 Test Point 1 Processor

12.3.1 If a volume meter is used at Test Point 1, calculate the standard volumetric flowrate of the testing episode using Equation 12.1.1.

12.4 Standing Loss Control System Emission Factor: Calculate the Phase II system emission factor using Equation 12-4.

Equation 12-4

$$EF_{HC} = M_1 + M_2$$

Where:

EF_{HC} = Standing Loss Emission Factor in lbs/1000 gallons ullage/day
M_1 = Mass emission factor at Test Point 1 (processor), lbs/1000 gallons ullage/day
M_2 = Mass emission factor at Test Point 2 (P/V vent valve), lbs/1000 gallons ullage/day

13. REPORTING RESULTS

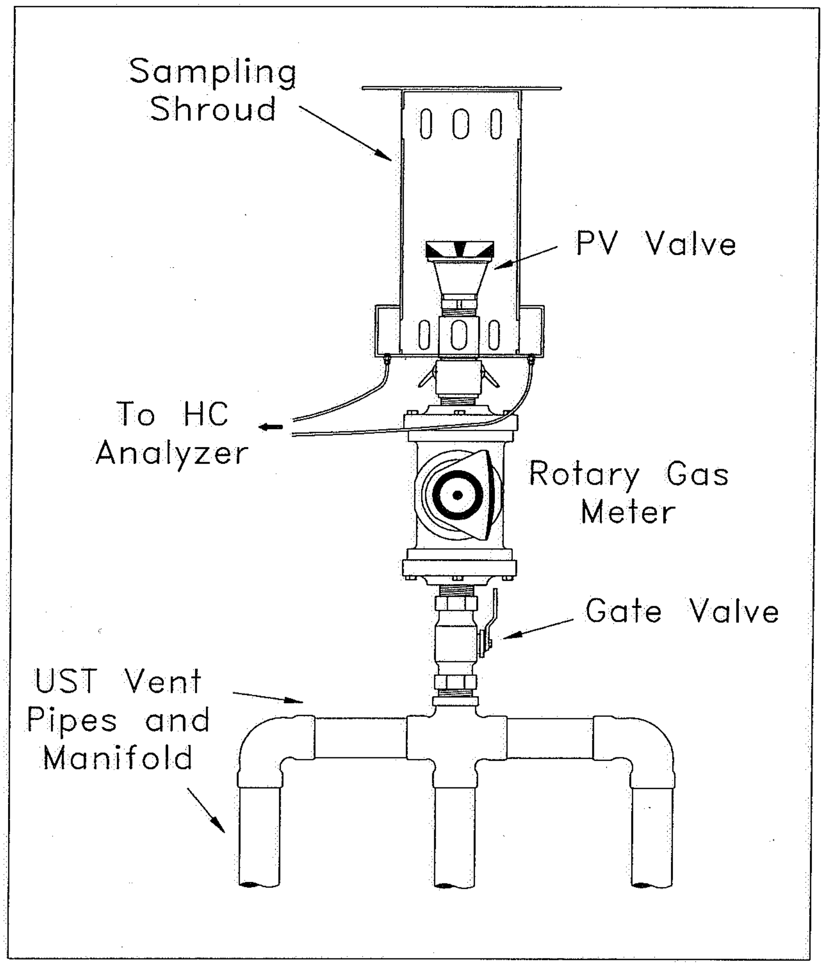
Data are collected by ARB. All data forms, equipment calibrations, completed forms, results, and other test documentation shall be included in a test report.

In cases of conflict between hard copy and electronic format, the hard copy shall be presumed correct, unless the ARB Executive Officer specifies otherwise in writing.

14. ALTERNATIVE PROCEDURES

14.1 This procedure shall be conducted as specified. Any modifications to this test procedure shall not be used for certification unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 15 of Certification Procedure CP-206.

Figure 1
Vent Pipe Sleeve



California Environmental Protection Agency

Air Resources Board

Proposed for Adoption

Vapor Recovery Test Procedure

TP - 206.3

Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks

Adopted: [insert adoption date]

[Note: All text is proposed for adoption. As permitted by Title 2, California Code of Regulations, section 8, for ease of review underline to indicate adoption has been omitted.]

California Environmental Protection Agency
Air Resources Board

Proposed Vapor Recovery Test Procedure

TP-206.3

Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks

Definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer or his or her authorized representative or designate.

1. PURPOSE AND APPLICABILITY

The purpose of this test procedure is used to quantify the vapor tightness of an aboveground storage tank installed at a gasoline dispensing facility (GDF).

This test procedure is used to determine the static pressure performance standard of a vapor recovery system during the certification process and subsequently to determine compliance with that performance standard for any installation of such a system.

The applicability of this test procedure for static pressure performance is for installations of systems with aboveground storage tanks certified by:

CP-206 Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities Using Aboveground Storage Tanks

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

The entire vapor recovery system is pressurized with nitrogen to two (2.0) inches water column. The system pressure is then allowed to decay for five (5) minutes. The acceptability of the final pressure is based upon the vapor system ullage.

3. BIASES AND INTERFERENCES

3.1 For tanks equipped with vapor recovery processor systems, the processor must be isolated or the processor outlet is capped. Leakage at the processor will indicate a system component leak.

3.2 Leaks in the test equipment will bias the results toward noncompliance. Prior to conducting the test, this bias is eliminated by conducting a leak check of the equipment.

3.3 There shall be no Phase I bulk product deliveries into the storage tank(s) within three (3) hours prior to this test. There shall be no product dispensing within thirty (30) minutes prior to this test. There shall be no Air to Liquid Volumetric Ratio Test (TP-201.5 or equivalent) conducted within the twenty-four (24) hour period immediately prior to this test.

3.4 Product levels less than four (4) inches above the highest opening at the bottom of the submerged drop tube may bias the test toward noncompliance.

3.5 For systems which utilize a destructive processor, power to the collection unit and the processor shall be turned off during testing.

3.6 For vacuum-assist systems with positive displacement vacuum pumps, which locate the vacuum producing device in-line between the Phase II vapor riser and the storage tank, the following requirements shall apply:

3.6.1 A valve shall be installed at the vacuum producing device. When closed, this valve shall isolate the vapor passage downstream of the vacuum producing device.

3.6.2 The upstream vapor passage (nozzle to vacuum producing device) shall also be tested. Methodology for this test shall be submitted to the Executive Officer for approval prior to submission of test results or shall be conducted in accordance with the procedures set forth in the applicable ARB Executive Order.

4. EQUIPMENT SPECIFICATIONS

4.5 Care must be exercised to prevent exposure of testing personnel to benzene, a carcinogen. Use of appropriate safety gear such as gloves and respirator is suggested.

4.5 Use commercial grade nitrogen in a high pressure cylinder, equipped with a two-stage pressure regulator and one psig pressure relief valve. The minimum and maximum nitrogen feed rates into the system shall be 1 and 5 cfm (cubic feet per minute) respectively.

4.5 The System Leak Test Assembly is shown in Figure 1. Use a modified vapor cap compatible with the Phase I vapor adaptor. The vapor cap shall be equipped with a nitrogen inlet port.

4.4 Use a Dwyer flowmeter, Model RMC-104, or equivalent, to determine the required pressure setting of the delivery pressure gauge on the nitrogen supply pressure regulator. This pressure shall be set such that the nitrogen flowrate is between 1.0 and 5.0 CFM.

4.5 If an electronic pressure measuring device or digital pressure indicator is used, the maximum full-scale range of the device shall be 10 inches water column. The minimum accuracy shall be 1.5 percent of full scale and the pressure measuring device shall be readable to the nearest 0.01 inches water column. A copy of the most current calibration of shall be kept with the equipment. Instrument shall be calibrated every six months.

4.6 Stopwatch. Use a stopwatch accurate to within 0.10 seconds to time the one-minute pressure stabilization period, and the five-minute decay test period.

4.7 Leak Detection Solution or a Combustible Gas Indicator. Any liquid solution designed to detect vapor leaks may be used to verify the pressure integrity of system components during this test; or a combustible gas detector that complies with the requirements of USEPA Method 21, "Determination of Volatile Organic Compounds Leaks", 40 CFR Ch. 1, Part 60, App. A-7 (36 FR 24877, December 23, 1971) and section 5 of this test procedure. Personnel shall assume that the combustible gas detector will be operated in an explosive atmosphere and comply with all pertinent regulations.

4.8 Traffic Cones. If needed for safety, use traffic cones to encircle the area while the test is being conducted.

5. CALIBRATION PROCEDURE

5.1 The electronic pressure measuring device or digital pressure indicator shall be calibrated using a National Institute of Standards and Technology (NIST) traceable standard or reference standard traceable to NIST within 180 days prior to conducting the testing and the calibration. In addition, calibration shall be conducted after any repairs or alterations to the pressure measuring or indicating device. Calibrations shall be conducted per manufacturer's instructions, ensuring it complies with the minimum accuracy requirement of 1.5 percent of full scale. A copy of the most current calibration of shall be kept with the equipment.

5.2 The flowmeter shall be calibrated every 180 days using a NIST traceable standard or a reference standard traceable to NIST as specified by the manufacturer's instructions.

5.3 Calibrate the combustible gas detector every 180 days with 2.1 mole percent ($\pm$ 0.3%) by volume (21,000 ppm) propane in nitrogen for 100 percent lower explosive limit response. Calibration gas shall be certified traceable to NIST-SRM.

5.3.1 The calibration gases must be certified according to one of the following options:

5.3.1.1 The EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (EPA-600/R-97/121 September 1997), or

5.3.1.2 To an analytical accuracy of $\pm$ 2 percent, traceable to a reference material approved by the National Institute of Standards and Technology (NIST) and recertified annually.

5.3.2 Documentation. Information on calibration gas cylinders shall be entered into a log identifying each cylinder by serial number. Sufficient information shall be maintained to allow a determination of the certification status of each calibration gas and shall include: (1) the data put in service, (2) assay result, (3) the dates the assay was performed, (4) the organization and specific personnel who performed the assay, and (5) the date taken out of service.

6. PRE-TEST PROCEDURES

6.1 Place the traffic cones around the perimeter of the testing area, allowing sufficient space to safely conduct the test.

6.2 Electronic manometers shall have a warm-up period of at least 15 minutes followed by a five-minute drift check. If the drift exceeds 0.01 inches water column, the instrument should not be used.

6.3 Record system information on Form 1.

6.4 The minimum ullage during the test shall be 25 percent of the tank capacity and the maximum ullage during the test shall be 75 percent of the tank capacity.

6.5 Determine the allowable system leak rate using Equation 9-1 in section 9.

6.6 Ensure the nozzle(s) are properly hung in the dispenser boot.

6.7 If a steel-braided nitrogen supply line is not used, a ground strap should be employed during the introduction of nitrogen into the system.

6.8 For two-point Phase I systems, this test shall be conducted with the dust caps removed from both the product and the vapor coupler.

6.9 If the Phase I containment box is equipped with a drain valve, this test shall be conducted with the drain valve installed.

6.10 Conduct visual inspection of vapor recovery components to ensure no cracks, tears, or other anomalies are present that may cause a failure of the leak test.

6.11 Install system leak test assembly per Figure 1.

7. TEST PROCEDURE

7.1 Observe the initial storage tank pressure. If the initial pressure is greater than one-half (0.50) inch H_2O gauge, proceed to Section 7.1.1. If the initial pressure is less than zero (0.00) inch H_2O gauge, proceed to Section 7.1.2. In the case where the storage tank pressure is between 0.00 and 0.50 inches H_2O, proceed to Section 7.2.

7.1.1 If the initial storage tank pressure is greater than one-half (0.50) inch H_2O gauge, carefully bleed off the excess pressure in accordance with all applicable safety procedures for a maximum of 30 seconds. Do not allow the tanks to remain open to atmosphere for more than 30 seconds or the ingestion of fresh air and additional vapor growth may result. Start the stopwatch and measure the storage tank pressure for three (3) minutes. If the 3-minute pressure exceeds 0.50 inches H_2O or continues to change at a rate exceeding ±0.02 inches H_2O in 3 minutes, repeat this Section. Several attempts may be required.

7.1.2 If the initial storage tank pressure is less than zero (0.00) inches H_2O gauge, slowly introduce nitrogen so that the storage tank pressure is between zero (0.00) and one-half (0.50) inches H_2O gauge. Start the stopwatch and measure the storage tank pressure for three (3) minutes. If the 3-minute pressure is not between 0.00 and 0.50 inches H_2O or continues to change at a rate exceeding ±0.02 inches H_2O in 3 minutes, repeat this Section.

7.2 Open the nitrogen gas supply valve, regulate the delivery pressure to at least 10 psig, and pressurize the vapor system (or subsystem for individual vapor return line systems) to or slightly above 2 inches water column. The minimum and maximum nitrogen feed rates in to the system shall be 1 and 5 cfm (cubic feet per minute) respectively. It is critical to maintain the flow until both flow and pressure stabilize, indicating temperature and pressure stabilization in the tanks. Close the nitrogen supply valve.

7.3 Check the system leak test assembly using leak detection solution to verify that the test equipment is leak tight. Quickly remove the vapor cap assembly. Leak check the vapor poppet, tank fittings, tank gauges, emergency vent, pipe fittings, hose fittings, test equipment and other vapor connections that have a no leak standard. Use liquid leak detection solution or a combustible gas detector to find leak(s). If leaks are noted, components shall be replaced prior to continuing with this test procedure.

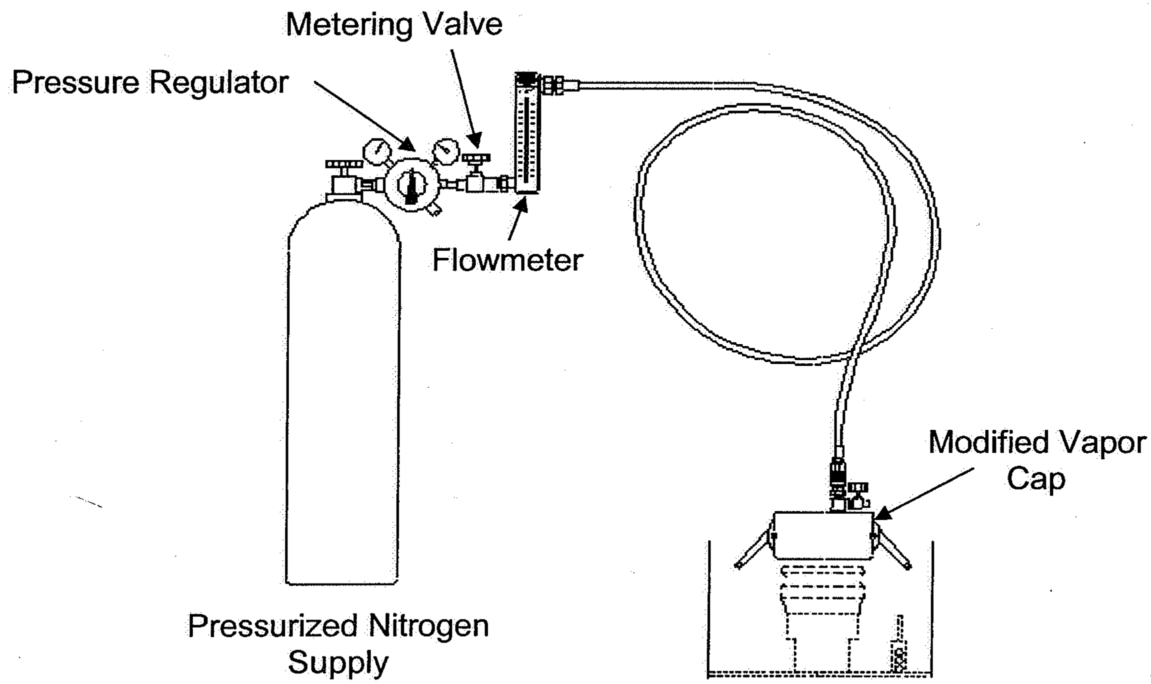
7.4 Re-open the nitrogen supply valve, and reset the tank pressure to reestablish a pressure slightly greater than 2 inches water column. Close the nitrogen supply valve and start the stopwatch when the pressure reaches an initial pressure of 2.0 inches of water column.

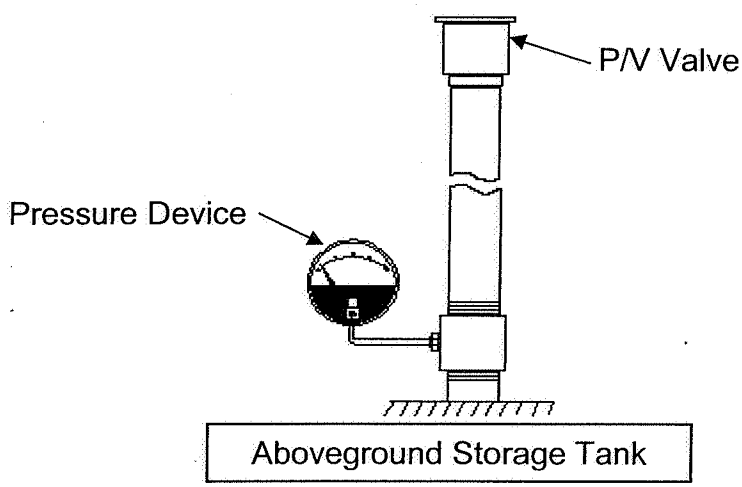
7.5 At one-minute intervals during the test, record the system pressure on Form 1. After five minutes, record the final system pressure on Form 1. Carefully remove the system leak test assembly.

7.6 Use Equation 8-1 in section 8 or Table 1 to determine the compliance status of the facility by comparing the final five-minute pressure with the minimum allowable pressure.

Figure 1

System Leak Test Assembly





8. CALCULATING RESULTS

Minimum Allowable Pressure

The minimum allowable pressure after five (5) minutes, with an initial pressure of 2.0 inches water column, shall be calculated as shown below, or obtained from Table 1:

Equation 8-1

$$P_f = 2e^{(-223.9/V)}$$

where:

P_f	=	The minimum pressure after 5 minutes, inches water column
V	=	The ullage of the system, gallons
e	=	Constant equal to 2.71828
2	=	The initial starting pressure, inches water column
-223.9	=	Decay constant for a 5 minute test

9. REPORTING RESULTS

Report the results as indicated on Form 1. District may

10. ALTERNATIVE TEST PROCEDURES

This procedure shall be conducted as specified. Any modifications to this test procedure shall not be used for certification unless prior written approval has been obtained from the ARB Executive Officer, pursuant to Section 15 of Certification Procedure CP-206.

Form 1
Summary of Source Test Data

Static Pressure Performance Test	
GDF Name and Address: GDF Representative and Title: GDF Phone #: GDF # ________________ Manifolded? Y or N	PHASE II SYSTEM TYPE (Check One) Balance ______ VacAssist ______ Other ______ Manufacturer: __________________ Permit Conditions:

TANK # :	1	2	3	4
1. Product Grade				
2. Actual Tank Capacity, gallons				
3. Gasoline Volume				
4. Ullage, gallons (ullage = capacity-volume)				
5. Initial Pressure (inches water column)				
6. Pressure After 1 Minute				
7. Pressure After 2 Minutes				
8. Pressure After 3 Minutes				
9. Pressure After 4 Minutes				
10. Final Pressure After 5 Minutes				
11. Allowable Final Pressure				

Test Conducted by: Date of Test:	Test Company:

TABLE 1
Leak Rate Criteria

ULLAGE (GALLONS)	MINIMUM PRESSURE AFTER 5 MINUTES, (INCHES OF WATER COLUMN)
100	**0.21**
150	0.45
200	**0.65**
250	0.82
300	**0.95**
350	1.05
400	**1.14**
450	1.22
500	**1.28**
550	1.33
600	**1.38**
650	1.42
700	**1.45**
750	1.48
800	**1.51**
850	1.54
900	**1.56**
950	1.58
1,000	**1.60**
1,200	1.66
1,400	**1.70**
1,600	1.74
1,800	**1.77**
2,000	1.79
2,200	**1.81**
2,400	1.82
2,600	**1.83**
2,800	1.85
3,000	**1.86**
3,500	1.88
4,000	**1.89**
4,500	1.90
5,000	**1.91**
6,000	1.93
7,000	**1.94**
8,000	1.94
9,000	**1.95**
10,000	1.96
15,000	**1.97**
20,000	1.98

California Environmental Protection Agency

Air Resources Board

Proposed for Adoption

Vapor Recovery Certification Procedure

CP - 206

Certification Procedure for
Vapor Recovery Systems at
Gasoline Dispensing Facilities Using
Aboveground Storage Tanks

Adopted: [insert adoption date]

[Note: All text is proposed for adoption. As permitted by title 2, California Code of Regulations, section 8, for ease of review underline to indicate adoption has been omitted]

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Air Resources Board

Vapor Recovery Certification Procedure

CP-206

Certification Procedure for Vapor Recovery Systems At Gasoline Dispensing Facilities Using Aboveground Storage Tanks

A set of definitions common to all certification and test procedures are in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "ARB" refers to the California Air Resources Board, and the term "Executive Officer" refers to the ARB Executive Officer, or his or her authorized representative or designate.

1. GENERAL INFORMATION AND APPLICABILITY

This document describes the procedure for evaluating and certifying Aboveground Storage Tanks (AST), Standing Loss Control, Phase I and Phase II vapor recovery systems, and components, used at Gasoline Dispensing Facilities (GDF). An ARB Executive Order certifying the system shall be issued only after all of the applicable certification requirements have been successfully completed.

This Certification Procedure, CP-206, is adopted pursuant to Section 41954 of the California Health and Safety Code (CH&SC) and is applicable to vapor recovery systems installed at GDFs using an AST for controlling gasoline vapors emitted during diurnal venting (Standing Loss Control), the re-fueling of aboveground storage tanks (Phase I), and the refueling of vehicle fuel tanks (Phase II). Vapor recovery systems are complete systems and components that shall include all associated ASTs, dispensers, piping, nozzles, couplers, processing units, and any other equipment or components necessary for Standing Loss Control or the control of gasoline vapors during Phase I or Phase II refueling operations at GDFs.

Below-grade vaulted tanks shall be certified under Certification Procedure, CP-201, as incorporated by reference in title 17, California Code of Regulations (CCR) section 94011.

1.1 Legislative and Regulatory Requirements of Other State Agencies

As required pursuant to sections 41955 and 41957 of the CH&SC, the Executive Officer shall coordinate this certification procedure with:

1.1.1 Department of Food and Agriculture, Division of Measurement Standards (DMS)

1.1.2 Department of Forestry and Fire Protection
Office of the State Fire Marshal (SFM)

1.1.3 Department of Industrial Relations, Division of Occupational Safety and Health (DOSH)

Prior to certification of the vapor recovery system by the Executive Officer, the applicant shall submit plans and specifications for the system to each of these agencies. Certification testing by these agencies may be conducted concurrently with ARB certification testing; however, the approval of the SFM, DMS, and DOSH shall be a precondition to certification by ARB. The applicant is responsible for providing documentation of these approvals to ARB.

1.2 Requirement to Comply with All Other Applicable Codes and Regulations

Certification of a system by the Executive Officer does not exempt the system from compliance with other applicable codes and regulations such as state fire codes, weights and measures regulations, safety codes and regulations, and water quality regulations.

1.3 System Certification Matrix

The certification procedure is designed to provide system and component certifications and Executive Orders with options for levels of controls as specified in CP-206 or as requested by the applicant. The varying levels of control can be achieved through combinations of Standing Loss Control, Phase I and Phase II vapor recovery systems, certified independently or together, according to the matrix in Table 1-1. An applicant shall specify the certification matrix to be tested in the application. Compatibility between Standing Loss Control, Phase I, and/or Phase II vapor recovery systems shall be evaluated per Table 1-1.

Table 1-1
Vapor Recovery System Certification Matrix

Vapor Recovery Systems			Compatibility
Standing Loss Control	**Phase I**	**Phase II**	**Section(s)**
X			n/a
X	X		4.9 and 12.3
X	X	X	4.9, 5.5, 5.6, and 12.3

2. PERFORMANCE STANDARDS AND SPECIFICATIONS

Table 2-1
Effective and Operative Dates for Standing Loss Control, Phase I, and Phase II Performance Standards

Performance Type	Requirement	Sec.	Effective Date	Operative Date
Standing Loss Control	As Specified in Table 3-1	3	January 1, 2009	January 1, 2009
All Phase I Standards and Specifications	As specified in Table 4-1	4	January 1, 2009	January 1, 2009
ORVR Compatibility(1)	As specified in Section 5.4	5.4	January 1, 2009	January 1, 2009
Nozzle Criteria	Post Refueling Drips: ≤ 3 drops/refueling	5.7	January 1, 2009	January 1, 2009
Liquid Retention Nozzle Spitting	≤ 100 ml/1,000 gals. ≤ 1.0 ml/nozzle/fueling	5.8	January 1, 2009	January 1, 2009
Spillage (including drips from spout)	≤ 0.24 pounds/1,000 gals dispensed	5.3	January 1, 2009	January 1, 2009
In-Station Diagnostics (ISD)	For GDF > 600,000gal/yr.(2)	10	January 1, 2009	January 1, 2009
All other Phase II Standards and Specifications	As Specified in Tables 5-1, 6-1, 7-1, 8-1, 9-1, and 9-2	5,6,7,8,9	January 1, 2009	January 1, 2009

(1) Effective January 1, 2001 state law requires the certification of only those systems that are ORVR compatible (Health and Safety Code Section 41954, as amended by Chapter 729, Statutes of 2000; Senate Bill 1300).
(2) GDF ≤ 600,000 gal/yr are exempted from ISD requirements.

2.1 Performance Standards

A performance standard defines the minimum performance requirements for certification of any system, including associated components. An applicant may request certification to a performance standard that is more stringent than the minimum performance standard specified in CP-206. Ongoing compliance with all applicable performance standards, including any more stringent standards requested by the applicant, shall be demonstrated throughout certification testing.

2.2 Performance Specifications

A performance specification is an engineering requirement that relates to the proper operation of a specific system or component thereof. In addition to the performance specifications mandated in CP-206, an applicant may specify additional performance specifications for a system or component. An applicant may request certification to a performance specification that is more stringent than the minimum performance specification in CP-206. Ongoing compliance with all applicable performance specifications, including any more stringent specifications requested by the applicant, shall be demonstrated throughout certification testing.

2.3 Innovative System

The innovative system concept provides flexibility in the design of vapor recovery systems. A vapor recovery system that fails to comply with an identified performance standard or specification may qualify for consideration as an innovative system, provided that the system meets the primary emission factor/efficiency, complies with all other applicable requirements of certification, and the Executive Officer determines that the emission benefits of the innovation are greater than the consequences of failing to meet the identified standard or specification.

2.4 Additional or Amended Performance Standards or Performance Specifications

Whenever these Certification Procedures are amended to include additional or amended performance standards, any system that is certified as of the effective date of additional or amended standards shall remain certified until the operative date. Systems installed before the operative date of additional or amended standards may remain in use for the remainder of their useful life or for up to four years after the effective date of the new standard, whichever is shorter, provided the requirements of Section 20 are met.

Whenever these Certification Procedures are amended to include additional or amended performance specifications, a system shall remain certified until the Executive Order expiration date. A system that was installed before the operative date of additional or amended performance specifications may remain in use subject to the requirements of Section 18.

2.4.1 The effective and operative dates of adoption for all performance standards and specifications contained herein are specified in Table 2-1.

2.4.2 The operative dates of performance standards shall be the effective date of adoption of amended or additional performance standards, except as otherwise specified in Table 2-1. Certifications shall terminate on the operative date of amended or additional performance standards unless the Executive Officer determines that the system meets the amended or additional performance standards or specifications. Upon the operative date of the amended or additional performance standards, only systems complying with the amended or additional performance standards may be installed.

2.4.3 The operative dates of performance specifications are listed in Table 2-1. As of the operative date of amended or additional performance specifications, only systems complying with the amended or additional performance specifications may be installed.

2.4.4 When the Executive Officer determines that no Standing Loss Control, Phase I, or Phase II system has been certified or will not be commercially available by the operative dates specified in Table 2-1 of CP-206, the Executive Officer shall extend the operative date and may extend the effective date of amended or additional performance standards or specifications. If there is only one certified system to meet amended or additional standards, that system is considered to be commercially available if that system can be shipped within eight weeks of the receipt of an order by the equipment manufacturer.

2.4.5 The Executive Officer may determine that a system certified prior to the operative date meets the amended or additional performance standards or specifications. In determining whether a previously certified system conforms to any additional or amended performance standards, specifications or other requirements adopted subsequent to certification of the system, the Executive Officer may consider any appropriate information, including data obtained in the previous certification testing of the system in lieu of new testing.

2.4.6 Gasoline Dispensing Facilities in districts that ARB determines are in attainment with the state standard for Ozone are exempted from the Enhanced Vapor Recovery performance standards and specifications set forth in Sections 3 through 10 inclusive, with the exception of the requirement for compatibility with vehicles that are equipped with Onboard Refueling Vapor Recovery (ORVR) systems as specified in subsections 5.4. New GDFs, and those undergoing major modifications, are not exempt. If exempt facilities become subject to additional standards due to a subsequent reclassification of their district such that the district is no longer in attainment, the facilities will have four years to comply.

2.5 Reference to CP-201

This procedure refers to applicable performance standards and specifications of CP-201, Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities as incorporated by reference into title 17, CCR section 94011. For the purpose of this procedure the term CP-201 shall mean the last adopted or amended version of CP-201 at the time that an Executive Order under CP-206 is issued.

3. STANDING LOSS CONTROL PERFORMANCE STANDARDS AND SPECIFICATIONS

Table 3-1 summarizes the Standing Loss Control Performance Standards and Specifications applicable to all ASTs that are not below-grade vaulted tanks.

Table 3-1
Standing Loss Control Performance Standards and Specifications

GDF Category	Emission Factor Requirement	Sec.	Std. or Spec.	Test Procedure
New Installations	≤ 0.57 lbs/1000 gallons ullage/day	3.1, 3.2 & 3.3	Std.	TP-206.1 and/or TP-206.2
Existing Installations (Retrofits)	≤ 2.26 lbs/1000 gallons ullage/day	3.1, 3.2 & 3.3	Std.	TP-206.1 and/or TP-206.2

3.1 Standing Loss Control Emission Factor

For new installations the Standing Loss Control Emission Factor shall be 0.57 pounds hydrocarbon per 1000 gallons ullage per day (lbs/1000 gal ullage/day) or less. For existing installations the Standing Loss Control Emission Factor shall be 2.26 lbs/1000 gal ullage/day or less. The applicable emission standard shall be determined for new and existing installations based on the operative and effective dates in Table 2-1. The Standing Loss Control Emission Factor shall be determined from temperature attenuation and/or hydrocarbon emissions as defined in Sections 3.2 and 3.3 of this procedure, respectively.

3.1.1 Standing Loss Control vapor recovery systems shall be certified based on one of the two following approaches:

(a) The performance approach tests all GDF components as a system. After successfully meeting the retrofit or new installation emission factor requirements, these components are certified together as a system.

(b) The design approach tests GDF components independently. After successfully meeting the component specific emission factor requirements from Table 3-2, these components shall be added to a consolidated Executive Order. Mixing and matching of design based components only applies to design based Standing Loss Control vapor recovery components.

(c) The applicant shall specify the certification approach, whether the performance approach or design approach, in the application.

3.1.2 All Standing Loss Control vapor recovery systems shall be tested for a minimum period as defined in Sections 3.3, 3.4, or 3.5 of this procedure. All vapor connections, fittings, emergency vents, and tank gauges required on the tank shall meet the performance standards of Section 4.6 (no leak).

Table 3-2
Standing Loss Control Vapor Recovery System Design Configurations*

Emission Factor (lbs/1000 gallon ullage/day)	Component(s)			
	Insulation	**Paint**	**Shade**	**P/V Valve**
0.57	X			X
2.26		X		X
2.26			X	X

*All components in Table 3-2 shall be certified with a pressure/vacuum (P/V) relief valve certified in accordance with Section 3.6 of this procedure.

3.2 Optional Standing Loss Control Emission Factor for Existing Installations

3.2.1 The applicant may request the certification to one of the following optional standing loss control emission factor for existing installations:

0.57 pounds/1000gallon tank volume/day or
1.34 pounds/1000 gallon tank volume/day

3.2.2 If certification is sought for one of the above optional emission factors, the applicant shall make the request in the application and transmittal letter.

3.3 Temperature Attenuation Loss Emission Factor

3.3.1 For control technologies that attenuate fuel surface temperature, the following equation shall be used to determine the standing loss emission factor.

$$EF = \quad EF_{Af}$$

Where:

EF means standing loss emission factor in pounds/1000 gallons ullage/day

$$EF_{Af} = 3.48\ (A_f) - 0.23$$

A_f is determined by TP-206.1, Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Temperature Attenuation at Gasoline Dispensing Facilities with Aboveground Storage Tanks

$EF_{Af} = 0$ when $A_f \leq 0.07$

3.3.2 The minimum certification testing duration shall be 30 consecutive days during the summer months (June 1 to September 30). At least seven of the 30 days shall have a daily peak temperature between 90 °F to 105 °F. The Executive Officer may allow testing outside the summer months if the criteria of this section are met.

3.4 Processor Emission Factor

3.4.1 The standing loss emission factor for a processor shall be determined by the following equation:

$$EF = \quad EF_{HC}$$

Where:

EF is the standing loss emission factor in pounds/1000 gallons ullage/day

EF_{HC} is determined by TP-206.2, Determination of Emission Factor for Standing Loss Control Vapor Recovery Systems Using Processors at Gasoline Dispensing Facilities with Aboveground Storage Tanks

3.4.2 The minimum operational test shall be 180 days. Abbreviated testing for certified processor may be allowed as provided by Section 19.

3.5 Temperature Attenuation and Processor Emission Factor

3.5.1 The standing loss emission factor shall be determined by the following equation for a system that employs temperature attenuation technology and processor.

$$EF = EF_{Af} + EF_{HC}$$

EF_{Af} and EF_{HC} are determined by Section 3.3 and TP-206.2, respectively.

3.5.2 The minimum operational test shall be 180 days. Abbreviated testing may be allowed as provided by Section 19.

3.6 Pressure/Vacuum Vent Valve

The Executive Officer shall certify only those vapor recovery systems equipped with a pressure/vacuum (P/V) relief valve(s) on the aboveground storage tank vent pipe(s). Verification of the P/V relief valve pressure settings and leak rate requirements set forth below shall be determined by TP-201.1E CERT (Leak Rate and Cracking Pressure of Pressure/Vacuum Vent Valve).

3.6.1 The pressure settings for the P/V valve shall be:

Positive pressure setting between 2.5 to 6.0 inches H_2O
Negative pressure setting between 6.0 to 10.0 inches H_2O

3.6.2 The total leak rates for P/V valves shall be less than or equal to:

0.17 CFH at +2.0 inches H_2O
0.63 CFH at -4.0 inches H_2O

3.6.3 The total leakrate of all P/V valves certified for use with any vapor recovery system shall not exceed 0.17 CFH at 2.0 inches H_2O or 0.63 CFH at -4.0 inches H_2O. Applicants may request to certify a system for use with multiple P/V valves by choosing P/V valves certified to more restrictive leak rate performance specifications. The applicant shall state in the certification application the leak rates to which P/V valves are to be certified. All individual valves shall be tested and certified to those stated leak rate specifications.

3.6.4 Certification test sites shall be configured with a minimum of three P/V valves for representativeness, each P/V valve to be configured with an associated ball valve.

3.6.5 The minimum operational test of the P/V valves shall be at least 180 days. Abbreviated testing may be allowed as provided by Section 19.

4. PHASE I PERFORMANCE STANDARDS AND SPECIFICATIONS

Table 4-1 summarizes the Phase I Performance Standards and Specifications applicable to all non-below grade vaulted AST Phase I vapor recovery systems.

Table 4-1
Phase I Performance Standards and Specifications
APPLICABLE TO AST PHASE I VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Phase I Transfer Efficiency	≥ 98% Efficiency	4.1	Std.	TP-201.1 TP-201.1A
Phase I Transfer Emission Factor	HC ≤ 0.15 pounds/1,000 gallons dispensed	4.1	Std.	TP-201.1A
Static Pressure Performance	In accordance with Section 4.2	4.2	Std.	TP-206.3
Pressure Integrity of Drop-Tube with Overfill Protection	Leakrate ≤ 0.17 CFH at 2.0 inches H_2O	4.3	Std.	TP-201.1D
Phase I Product and Vapor Adaptors	1. Fixed (non-Rotatable), or 2. Rotatable	4.4	Spec.	1. Testing and Eng. Eval. (fixed) 2. TP-201.1B (rotatable)
Phase I Product and Vapor Adaptor Cam and Groove	As Shown in Figure 4A and 4B	4.4	Spec.	Micrometer
Phase I Vapor Adaptor	Poppetted	4.4	Spec.	Testing and Eng. Eval.
Phase I Vapor Adaptor	No Indication of Vapor Leaks	4.4	Std.	LDS or Bagging, US EPA Method 21
Side or Bottom Fill Phase I Adaptor	Poppetted or Close-Coupled Shut-Off Valve	4.4	Spec.	Testing and Eng. Eval.
Side or Bottom Fill Phase I Adaptor	No Indication of Vapor Leaks	4.4	Std.	LDS or Bagging, US EPA Method 21

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Spill Container Drain Valve	Leakrate ≤ 0.17 CFH at +2.0 inches H_2O	4.5	Std.	TP-201.1C TP-201.1D
Vapor Connectors and Fittings	No Indication of Vapor Leaks	4.6	Std.	LDS or Bagging, US EPA Method 21
Emergency Vent	No Indication of Vapor Leaks	4.6	Std.	LDS or Bagging, US EPA Method 21
Compatibility with Fuel Blends	Materials shall be compatible with approved fuel blends	4.7	Spec.	Testing and Eng. Eval.
Dedicated Gauging Port with Drop Tube	No Indication of Vapor Leaks	4.8	Std.	Testing and Eng. Eval.
Compatibility of Phase I System with Standing Loss Control System	See Section 4.9	4.9	Spec.	Testing and Eng. Eval.

4.1 Phase I Efficiency / Emission Factor

4.1.1 The minimum volumetric efficiency of Phase I systems shall be 98.0%. This shall be determined in accordance with TP-201.1 (Volumetric Efficiency of Phase I Vapor Recovery Systems).

4.1.2 The hydrocarbon emission factor for systems with processors shall not exceed 0.15 pounds per 1,000 gallons dispensed. This shall be determined in accordance with TP-201.1A (Emission Factor for Phase I Systems at Dispensing Facilities).

4.2 Static Pressure Performance

The static pressure performance of Phase I vapor recovery systems shall be determined in accordance with TP-206.3 (Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities with Aboveground Storage Tanks).

4.2.1 All Phase I systems shall be capable of meeting the performance standard in accordance with Equation 4-1.

4.2.2 The minimum allowable final pressure after five-minutes, with an initial pressure of two (2.00) inches H_2O, shall be calculated as follows:

Equation 4-1

$$P_f = 2e^{\frac{-223.90}{V}}$$

Where:

P_f	=	The minimum allowable final pressure after five-minutes, inches H_2O
V	=	The ullage of the system, gallons
e	=	A dimensionless constant approximately equal to 2.718
2	=	The initial starting pressure, inches H_2O
-223.90	=	AST decay constant for a 5 minute test

4.3 Phase I Drop-Tubes with Over-Fill Prevention Devices (Top-Fill Application)

Phase I drop-tubes with over-fill prevention devices installed shall have a leak rate not to exceed 0.17 cubic feet per hour (0.17 CFH) at a pressure of two inches water column (2.0" H_2O). The leak rate shall be determined in accordance with TP-201.1D (Leak Rate of Drop Tube Overfill Prevention Devices and Spill Container Drain Valves). Drop-tubes that do not have an over-fill protection device shall not leak. Drop tubes and drop tube overfill prevention device certified per CP-201 shall be deemed to meet the requirement of this section.

4.4 Phase I Product and Vapor Adaptors

4.4.1 The vapor and product adaptors shall not leak. The vapor and product adaptors shall be either rotating or non-rotating. Vapor and product adaptors certified per CP-201 shall be deemed to satisfy the requirement of this section.

4.4.2 Phase I product and vapor recovery adaptors shall be manufactured in accordance with the cam and groove specifications shown in Figures 4A and 4B.

4.4.3 Phase I vapor recovery adaptors shall have a poppet. The poppet shall not leak when closed. The absence of vapor leaks may be verified by the use of a methane calibrated gas detector measured as greater than 10,000 parts per million at a minimum distance of one centimeter from the source in accordance with US EPA Method 21, Title 40 CFR, Part 60, Appendix A-7 (36 FR 24877, December 23, 1971), commercial liquid leak detection solution (LDS), or by bagging when the vapor containment space of the aboveground storage tank is subjected to a non-zero gauge pressure. (Note: leak detection solution (LDS) will detect leaks only when positive gauge pressure exists.)

4.4.4 The side or bottom fill Phase I adaptor shall have a poppet or close-coupled shut-off valve. The poppet or close coupled shut-off valve shall not leak when closed. The absence of vapor leaks may be verified by the use of a methane calibrated gas detector measured as less than 10,000 parts per million at a minimum distance of one centimeter from the source in accordance with EPA Reference Method 21, 40 CFR Ch.1, Part 60, commercial liquid leak detection solution, or by bagging when the vapor containment space of the aboveground storage tank is subjected to a non-zero gauge pressure. (Note: leak detection solution will detect leaks only when positive gauge pressure exists.).

4.5 Spill Container

4.5.1 Phase I spill container drain valves shall not exceed a leak rate of 0.17 CFH at 2.0 inches H_2O. Spill containers with cover-actuated drain valves shall be tested both with the lid installed and with the lid removed. The leak rate shall be determined in accordance with TP-201.2B (Pressure Integrity of Vapor Recovery Equipment). Phase I configurations installed so that liquid drained through the drain valve drains directly into the drop tube rather that the AST ullage shall be tested in accordance with TP-201.1C (Leak Rate of Drop Tube/Drain Valve Assembly) or TP-201.1D (Leak Rate of Drop Tube Overfill Prevention Device), whichever is applicable. Drain valves certified per CP-201 shall be deemed to satisfy the requirements of this section.

4.5.2 Drain valves shall not be allowed in containment boxes used exclusively for Phase I vapor connections unless required by other applicable regulations.

4.5.3 Spill containers shall be maintained in accordance with all applicable requirements.

4.6 Vapor Connections, Fittings, Emergency Vents, Tank Gauges

All vapor connections, fittings, emergency vent, tank gauges, components, and auxiliary fittings not specifically certified with an allowable leakrate shall not leak. The absence of vapor leaks may be verified by the use of a methane calibrated gas detector measured as greater than 10,000 parts per million at a minimum distance of one centimeter from the source in accordance with US EPA Method 21, Title 40 CFR, Part 60, Appendix A-7 (36 FR 24877, December 23, 1971), commercial liquid leak detection solution, or by bagging when the vapor containment space of the aboveground storage tank is subjected to a non-zero gauge pressure. (Note: leak detection solution will detect leaks only when positive gauge pressure exists.) The absence of liquid leaks may be verified by visual inspection for seepage or drips.

4.7 Materials Compatibility with Fuel Blends

Vapor recovery systems and components shall be compatible with any and all fuel blends in common use in California, including seasonal changes, and approved for use as specified in title 13, CCR, Section 2260 et seq. Applicants for certification may request limited certification for use with only specified fuel blends. Such fuel-specific certifications shall clearly specify the limits and restrictions of the certification.

4.8 Dedicated Gauging Port with Drop Tube

An AST shall include a dedicated port for manual tank gauging (measuring gasoline levels using a gauging stick). The gauging port shall have a drop tube which has the discharge opening submerged when the liquid level is 6 inches from the bottom of the tank. The gauging port shall be permanently identified on the tank. The gauging port shall not leak when no gauging is occurring.

4.9 Compatibility of Phase I System with Standing Loss Control System

4.9.1 During a Phase I system certification, any associated certified Standing Loss Control system shall be subject to all of the standards and specifications in Section 3, and tested pursuant to Section 14.

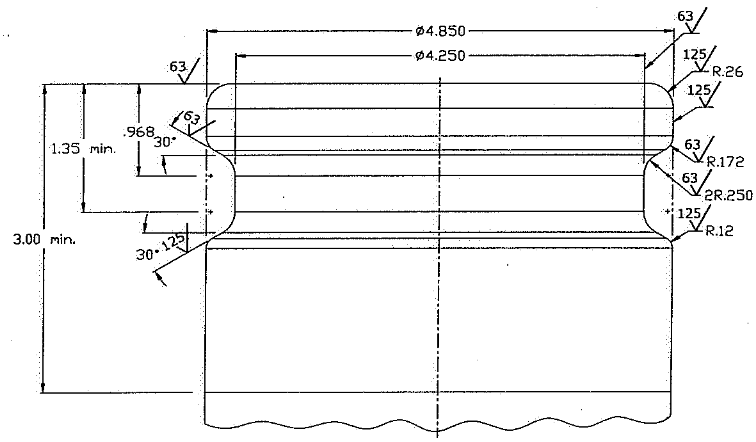
(a) Compatibility of the proposed Phase I system with the certified Standing Loss Control system installed at the certification test site shall be determined by use of all data collected as part of the monitoring described in Section 14. Failure of any Standing Loss Control system tests conducted during the Phase I system certification shall require an explanation from the applicant and a determination by the Executive Officer in regard to the possible cause of the failure. Standing Loss Control system test failures shall not trigger termination of the Phase I system certification test unless sufficient information demonstrates that the Phase I system caused the failure(s).

(b) Repeated component test failures may lead to a determination of incompatibility during the operational test.

(c) After successfully completing the certification testing, the Phase I system shall undergo engineering evaluation to determine compatibility with other certified Standing Loss Control systems. Unless otherwise specified by the applicant, compatibility with all other certified Standing Loss Control systems shall be evaluated by the Executive Officer.

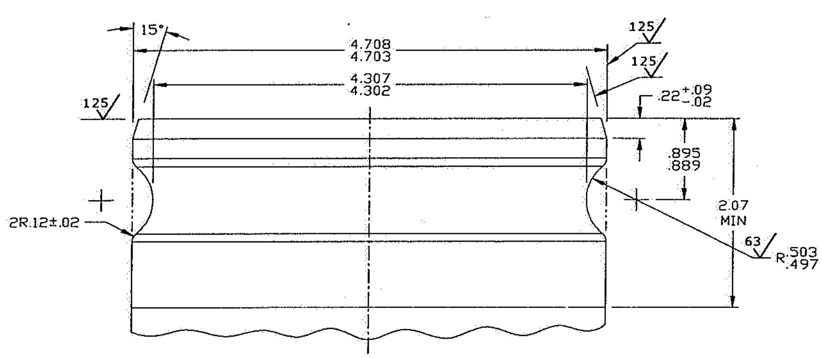
4.9.2 Applicants for certification may, as a performance specification, limit the type of equipment with which their system is compatible. Any such specification shall become a condition of certification.

Figure 4A
Phase I Adaptor Cam and Groove Standard



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS
.XXX ± .005
.XX ± .01
ANGLES ± 0.5°

Figure 4B
Phase I Vapor Recovery Adaptor Cam and Groove Standard



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS
.XXX ± .005
.XX ± .02
ANGLES ± 0.5°

BASED ON
COMMERCIAL ITEM DESCRIPTION
CID A-A-59326
COUPLING HALF, MALE

5. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO ALL PHASE II VAPOR RECOVERY SYSTEMS

Table 5-1 summarizes the Phase II Performance Standards and Specifications applicable to all non-below grade vaulted AST Phase II vapor recovery systems. Phase II vapor recovery systems shall be certified only in facilities equipped with a certified Phase I system.

Table 5-1
Phase II Performance Standards and Specifications
APPLICABLE TO AST PHASE II VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Phase II Emission Factor Includes: Refueling and Vent Emissions	Summer Fuel: 95% Efficiency and HC ≤ 0.38 pounds/1,000 gallons dispensed Winter Fuel: 95% Efficiency or HC ≤ 0.38 pounds/1,000 gallons dispensed	5.1	Std.	TP-201.2 TP-201.2A
Static Pressure Performance	In accordance with Section 5.2	5.2	Std.	TP-206.3
Spillage Including Drips from Spout	≤ 0.24 pounds/1,000 gallons	5.3	Std.	TP-201.2C
ORVR Compatibility	Refueling ORVR Vehicles Shall Not Cause the System to Exceed the Applicable Efficiency or Emission Std. Including ORVR Penetrations to 80%	5.4	Std.	Approved Procedure Developed by Applicant
Phase II Compatibility With Phase I Systems	See Section 5.5	5.5	Spec.	Testing and Eng. Eval.
Phase II Compatibility with Standing Loss Control Systems	See Section 5.6	5.6	Spec.	Testing and Eng. Eval.

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Nozzle Criteria	Post-Refueling Drips ≤ 3 Drops/Refueling Terminal End OD ≤ 0.840 inches for 2.5 inches Be capable of fueling any vehicle that can be fueled with a conventional nozzle	5.7	Spec.	TP-201.2D Engineering Evaluation
Liquid Retention Nozzle "Spitting"	≤ 100 ml/1,000 gallons ≤ 1.0 ml per nozzle per test	5.8	Std.	TP-201.2E
Nozzle/Dispenser Compatibility	Vapor Valve Closed When Hung Hold-open Latch Disengaged When Hung	5.9	Spec.	Testing and Eng. Eval.
Unihose MPD Configuration	One Hose/Nozzle per Dispenser Side	5.10	Spec.	Testing and Eng. Eval.
Coaxial Hose Routing Configurations	As Shown in Figure 5A, 5B, and 5C	5.11	Spec.	Testing and Eng. Eval.
Phase II Vapor Riser	Minimum 1" Nominal ID	5.12	Spec.	Testing and Eng. Eval.
Vapor Return Piping (Remote Dispensers)	No liquid or fixed blockage Minimum 3" Nominal ID after first manifold Recommended slope 1/4" per foot Minimum slope 1/8" per foot Rigid piping, or equivalent	5.12	Spec.	Testing and Eng. Eval.
Liquid Condensate Traps	Shall have Automatic Evacuation System	5.13	Spec.	Testing and Eng. Eval.
Connectors and Fittings	No Indication of Vapor Leaks	5.14	Std.	LDS or Bagging, US EPA Method 21

5.1 Phase II Emission Factor/Efficiency

5.1.1 The Hydrocarbon emission factor and/or efficiency for Phase II vapor recovery systems shall be determined as follows:

When testing conducted with gasoline meeting the requirements for summer fuel:

95% Efficiency and Hydrocarbon emission factor not to exceed 0.38 pounds/1,000 gallons dispensed.

When testing conducted with gasoline meeting the requirements for winter fuel:

95% Efficiency or Hydrocarbon emission factor not to exceed 0.38 pounds/1,000 gallons dispensed.

The emission factor shall demonstrate compliance with the standard when calculated for each of these test populations:

A population of 10 ORVR and 10 non-ORVR vehicles will be used
The vehicles defined as "ORVR vehicles" and
The vehicles defined as "non-ORVR vehicles."

The efficiency shall demonstrate compliance with the standard when calculated for the vehicles identified as "non-ORVR."

5.1.2 The emission factor and/or efficiency shall be determined in accordance with TP-201.2 (Efficiency and Emission Factor for Phase II Systems) and shall include all refueling emissions except for fugitive emissions.

5.2 Static Pressure Performance

The static pressure performance of Phase II systems shall be determined in accordance with TP-206.3 (Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities with Aboveground Storage Tanks.) All Phase II vapor recovery systems shall be capable of meeting the performance standard in accordance with Equation 4-2.

5.3 Spillage

The Executive Officer shall not certify vapor recovery systems that cause excessive spillage. Use of a nozzle certified per CP-201 shall be deemed to satisfy the following requirements.

5.3.1 Spillage shall be determined in accordance with TP-201.2C (Spillage from Phase II Systems). The emission factor for spillage shall not exceed 0.24 pounds/1000 gallons dispensed, for each of the following three categories:

(a) All refueling events;
(b) Refueling operations terminated before activation of the primary shutoff; and
(c) Refueling events terminated by activation of the primary shutoff.

5.3.2 The number of self-service refueling operations observed during certification testing of any AST system for spillage shall be not less than:

(a) 50 refueling operations [not including topoffs]; and
(b) 20 fill-ups [terminated by automatic shut-off, not including topoffs].

5.3.3 Increased spillage resulting from one top-off following the first activation of the automatic (primary) shutoff mechanism shall be subjected to challenge mode testing. Nozzles that result in excessive spillage following one top off shall not be certified.

5.4 Compatibility of Phase II Systems with Vehicles Equipped with ORVR Systems

5.4.1 When refueling vehicles equipped with onboard refueling vapor recovery (ORVR) systems, the Phase II system shall meet the criteria as specified in Section 5.1.

5.4.2 Compatibility shall be demonstrated for typical and worst case situations and shall demonstrate compatibility with 80% ORVR-equipped vehicle populations. Actual vehicles shall be used whenever feasible. Simulations may be proposed for specific demonstrations. Any ORVR simulation protocols shall be approved by the Executive Officer prior to conducting the test.

5.4.3 The system applicant shall be responsible for developing a procedure by which compatibility can be demonstrated. This procedure is subject to engineering evaluation by the Executive Officer; if it is deemed inadequate and/or unusable, the certification application shall be deemed unacceptable.

5.5 Compatibility of Phase II Systems with Phase I Systems

5.5.1 Phase II vapor recovery systems shall be certified only in facilities equipped with a certified Phase I system. During a Phase II system certification, the associated Phase I system shall be subject to all of the standards and specifications in Section 4, and tested pursuant to Section 14.

(a) Compatibility of the proposed Phase II system with the certified Phase I system installed at the certification test site shall be determined by use of all data collected as part of the monitoring described in Section 14. Failure of any Phase I system tests conducted during the Phase II system certification shall require an explanation from the applicant and a determination by the Executive Officer in regard to the possible cause of the failure. Phase I system test failures shall not trigger termination of the Phase II system certification unless sufficient information demonstrates that the Phase II system caused the failure(s).

(b) Repeated component test failures may lead to a determination of incompatibility during the operational test.

(c) After successfully completing the certification, the Phase II system shall be evaluated based on engineering evaluation of pressure profiles to determine compatibility with other certified Phase I systems. Unless otherwise specified by the applicant, compatibility with all other certified Phase I systems shall be evaluated by the Executive Officer.

5.5.2 Applicants for certification may, as a performance specification, limit the type of equipment with which their system is compatible. Any such specification shall become a condition of certification.

5.6 Compatibility of Phase II Systems with Standing Loss Control System

5.6.1 During a Phase II system certification, any associated certified Standing Loss Control system shall be subject to all of the standards and specifications in Section 3, and tested pursuant to Section 14.

(a) Compatibility of the proposed Phase II system with the certified Standing Loss Control system installed at the certification test site shall be determined by use of all data collected as part of the monitoring described in Section 14. Failure of any Standing Loss Control system tests conducted during the Phase II system certification shall require an explanation from the applicant and a determination by the Executive Officer in regard to the possible cause of the failure. Standing Loss Control system test failures shall not trigger termination of the Phase II system certification unless sufficient information demonstrates that the Phase II system caused the failure(s).

(b) Repeated component test failures may lead to a determination of incompatibility during the operational test.

(c) After successfully completing the certification, the Phase II system shall undergo engineering evaluation to determine compatibility with other certified Standing Loss Control systems. Unless otherwise specified by the applicant, compatibility with all other certified Standing Loss Control systems shall be evaluated by ARB.

5.6.2 Applicants for certification may, as a performance specification, limit the type of equipment with which their system is compatible. Any such specification shall become a condition of certification.

5.7 Nozzle Criteria

5.7.1 Each vapor recovery nozzle shall be capable of refueling any vehicle that complies with the fillpipe specifications (title 13, CCR, Section 2235) and can be fueled by a conventional nozzle.

5.7.2 Each vapor recovery nozzle shall be "dripless," meaning that no more than three drops shall occur following each refueling operation. This shall be determined in accordance with TP-201.2D (Post-Fueling Drips from Nozzles) with the exception that the minimum number of test nozzles be two.

5.7.3 Each vapor recovery nozzle shall comply with the following:

(a) The terminal end shall have a straight section of at least 2.5 inches (6.34 centimeters) in length;
(b) The outside diameter of the terminal end shall not exceed 0.840 inch (2.134 centimeters) for the length of the straight Section; and
(c) The retaining spring or collar shall terminate at least 3.0 inches (7.6 centimeters) from the terminal end.

5.7.4 Additional nozzle criteria are contained in Sections 6 and 7.

5.7.5 Use of a nozzle certified per CP-201 shall be deemed to satisfy the requirements of Section 5.7.

5.8 Liquid Retention

Use of a nozzle certified per CP-201 will satisfy the following criteria:

5.8.1 Liquid retention in the nozzle and vapor path on the atmospheric side of the vapor check valve shall not exceed 100 ml per 1,000 gallons. This shall be determined in accordance with TP-201.2E (Gasoline Liquid Retention in Nozzles and Hoses) with the exception that the minimum number of test nozzles shall be two.

5.8.2 Nozzle "spitting" shall not exceed 1.0 ml per nozzle per test and shall be determined in accordance with TP-201.2E (Gasoline Liquid Retention in Nozzles and Hoses).

5.8.3 The number of self-service refueling operations observed during certification testing of any system for liquid retention shall be not less than:

- 10 refueling operations (not including topoffs); and
- 4 fill-ups (terminated by automatic shut-off, not including topoffs).

5.9 Nozzle/Dispenser Compatibility

The nozzle and dispenser shall be compatible as follows:

5.9.1 The nozzle and dispenser shall be designed such that the vapor check valve is in the closed position when the nozzle is properly hung on the dispenser.

5.9.2 The nozzle and dispenser shall be designed such that the nozzle cannot be hung on the dispenser with the nozzle valves in the open position.

5.10 Unihose MPD Configuration

There shall be only one hose and nozzle for dispensing gasoline on each side of a multi-product dispenser (MPD). This shall not apply to facilities installed prior to January 1, 2009, unless the facility replaces more than 50 percent of the dispensers. Facility modifications that meet the definition of "major modification" for a Phase II system in D-200 trigger the unihose requirement as the facility is considered a "new installation." Exception: dispensers which must be replaced due to damage resulting from an accident or vandalism may be replaced with the previously installed type of dispenser.

5.11 Coaxial Hose Routing Configurations

The routing of coaxial hoses shall be consistent with the configurations outlined in Figure 5A (top-mount dispenser), Figure 5B (end-mount dispenser), and Figure 5C (ground-mounted dispenser with high-hang hose). A liquid removal system is not required if gasoline within the vapor passage of the coaxial hose can be cleared through natural drainage into the vehicle. In the case of top-mounted, side-mounted, and ground-mounted dispensers, natural drainage will be determined at a distance of 24 inches and a height of 30 inches from the outside plane of the dispenser.

5.12 Vapor Return Piping

The requirements of Sections 5.12.1 through 5.13.2 for the vapor return piping and, if applicable, condensate traps, from the dispenser riser to the aboveground storage tank, shall apply to any facility installed after January 1, 2009.

5.12.1 The vapor return piping from any fueling point to the aboveground storage tank shall be free of liquid or fixed blockage.

5.12.2 The Phase II riser shall have a minimum nominal internal diameter of one inch (1" ID). The connection between the Phase II riser and the dispenser shall be made with materials listed for use with gasoline, and shall have a minimum nominal 1" ID.

5.12.3 For remote dispensers, vapor return piping shall have a minimum nominal internal diameter of three inches (3" ID) from the point of the first manifold to the storage tank. Existing facilities operating prior to January 1, 2009, shall be required to meet the minimum three inch diameter standard only upon facility modifications requiring exposing at least 50 percent of the underground vapor return piping.

5.12.4 Wherever feasible, the recommended minimum downward slope of the vapor return piping, from the remote dispensers to the tank, shall be at least one-fourth (1/4) inch per foot of run. The minimum downward slope, in all cases, shall be at least one-eighth (1/8) inch per foot of run.

5.12.5 The vapor return piping shall be constructed of rigid piping (any piping material with a bend radius that exceeds six feet; the maximum allowable deflection distance is 9 5/8 inches, as determined by TP-201.2G, Bend Radius Determination for Underground Storage Tank Vapor Return Piping), or shall be contained within rigid piping, or shall have an equivalent method, approved by the Executive Officer, to ensure that proper slope is achieved and maintained. (Note: this does not apply to flexible connectors at potential stress points, such as storage tanks, dispensers, and tank vents.) Rigidity shall be determined in accordance with TP-201.2G.

5.12.6 The applicant shall specify the maximum allowable length of vapor return piping of the system and the Executive Officer shall validate by testing and/or engineering evaluation.

5.13 Liquid Condensate Traps

Liquid condensate traps (also known as knockout pots and thief ports) are used to keep the vapor return piping from the remote dispenser to the aboveground storage tank clear of any liquid blockage.

5.13.1 Liquid condensate traps shall be used only when the minimum slope requirements of 1/8 inches per foot of run cannot be met due to the topography.

5.13.2 When condensate traps are installed, they shall be:

(a) certified by ARB;
(b) maintained vapor tight;
(c) accessible for inspection upon request;
(d) capable of automatic evacuation of liquid; and
(e) equipped with an alarm system in case of failure of the evacuation system.

5.14 Connections and Fittings

All connections, fittings, emergency vents, tank gauges, components, and auxiliary fittings not specifically certified with an allowable leakrate shall not leak. The absence of vapor leaks may be verified by the use of a methane calibrated gas detector measuring as greater than 10,000 parts per million at a minimum distance of one centimeter from the source in accordance with US EPA Method 21, title 40 CFR, Part 60, Appendix A-7 (36 FR 24877, December 23, 1971), commercial liquid leak detection solution, or by bagging when the vapor containment space of the aboveground storage tank is subjected to a non-zero gauge pressure. (Note: leak detection solution will detect leaks only when positive gauge pressure exists.) The absence of liquid leaks may be verified by visual inspection for seepage and drips.

Figure 5A
Top Mount Dispenser for Aboveground Tank with Phase II Vapor Recovery System

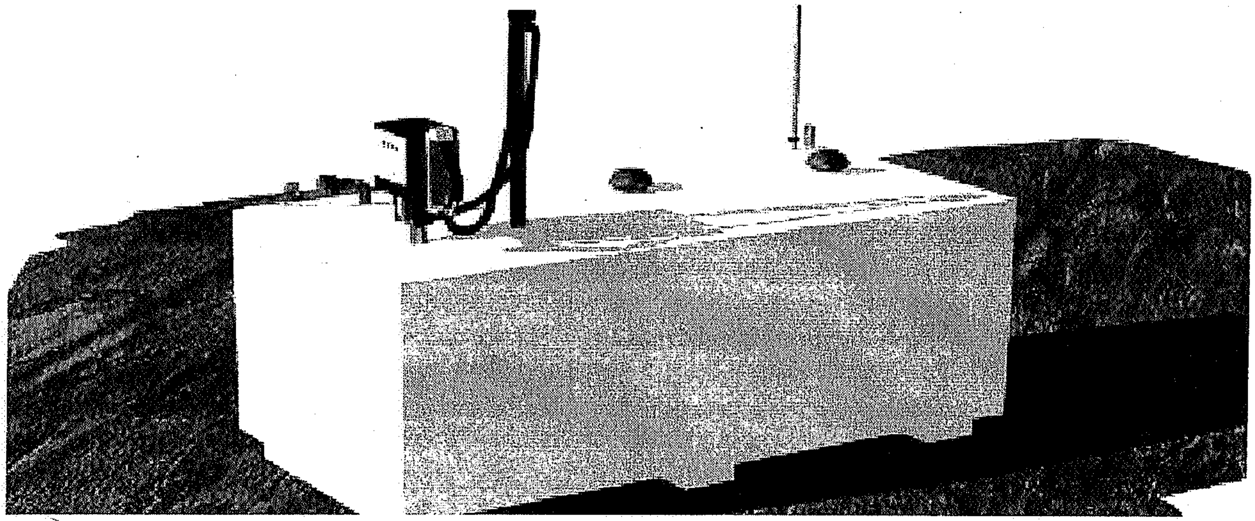


Figure 5B
End-Mount Dispenser for Aboveground Tank with Phase II Vapor Recovery System

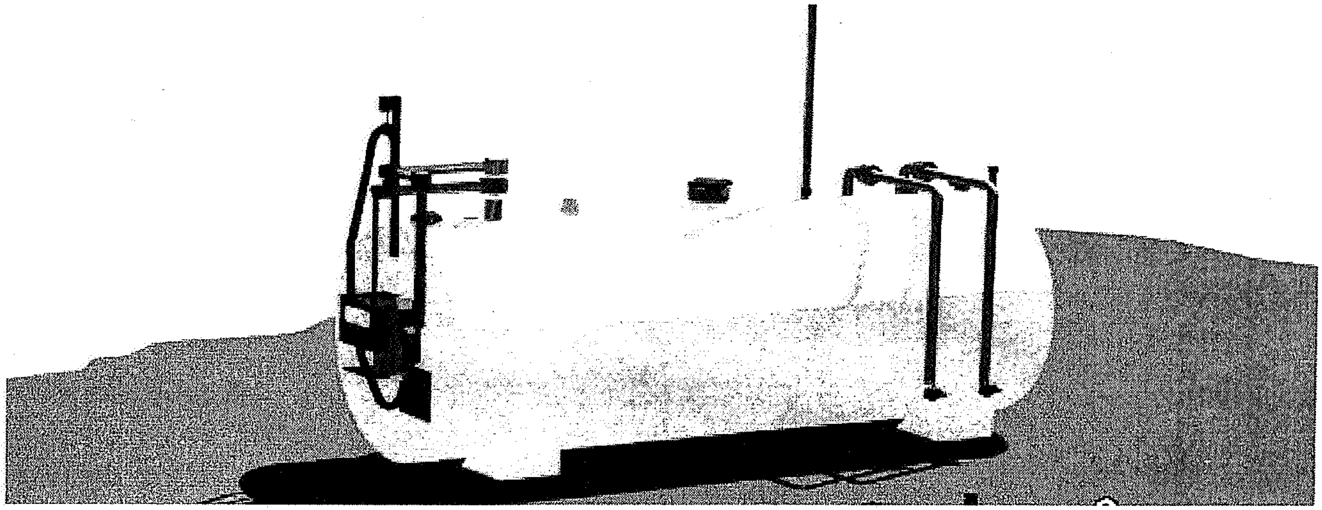
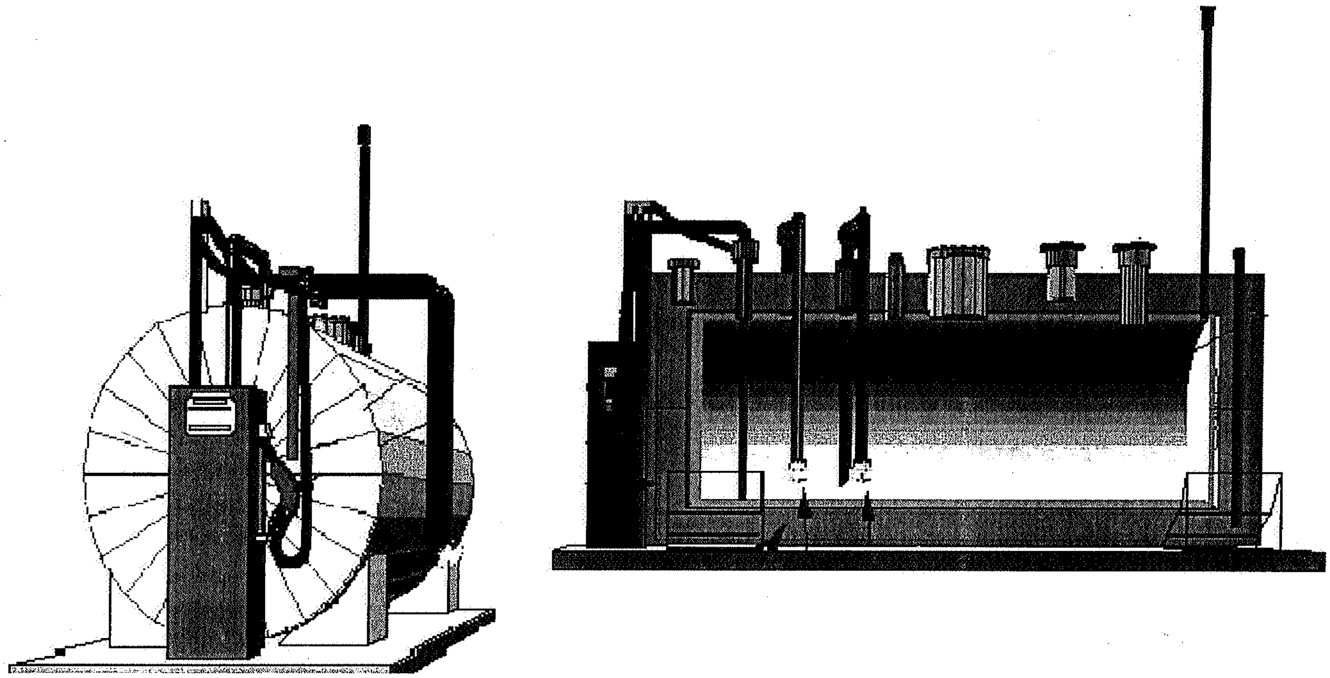


Figure 5C
Tank with Ground-Mount Dispenser and High-Hang Hose for Aboveground Storage Tank with Phase II Vapor Recovery System



6. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO BALANCE VAPOR RECOVERY SYSTEMS

Table 6-1 summarizes the performance standards and specifications specifically applicable to Phase II Balance vapor recovery systems. These systems are also subject to all of the standards and specifications in Sections 3 through 5, and the applicable requirements in Section 9. Nozzles and associated components shall be certified per CP-201 as specified in Section 6.

Table 6-1
Phase II Performance Standards and Specifications
APPLICABLE TO PHASE II BALANCE VAPOR RECOVERY SYSTEMS

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Nozzle Criteria Each Balance Nozzle Shall:	Have an Insertion Interlock Be Equipped with a Vapor Valve	6.1	Spec.	Testing and Eng. Eval.
Insertion Interlock	Verification of No Liquid Flow Prior to Bellows Compression	6.1	Spec.	Testing and Eng. Eval.
Vapor Check Valve Leakrate	$\leq$ 0.07 CFH at 2.0 inches H_2O	6.1	Spec.	TP-201.2B
Bellows Insertion Force	Pounds (force) to Retaining Device Specified by Applicant and Verified During Certification Testing	6.1	Spec.	Testing and Eng. Eval.
Nozzle Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.08 inches H_2O	6.2	Std.	TP-201.2J
Hose Pressure Drop [Including Whip Hose]	Use Hose Certified per CP-201: ΔP at 60 CFH of $N_2 \leq$ 0.09 inches H_2O	6.2	Std.	TP-201.2J
Breakaway Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.04 inches H_2O	6.2	Std.	TP-201.2J
Dispenser Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.08 inches H_2O	6.2	Std.	TP-201.2J
Swivel Pressure Drop	ΔP at 60 CFH of $N_2 \leq$ 0.01 inches H_2O	6.2	Std.	TP-201.2J
Pressure Drop Phase II Riser to Tank	ΔP at 60 CFH of $N_2 \leq$ 0.05 inches H_2O	6.2	Std.	TP-201.4
Pressure Drop from Nozzle to AST	ΔP at 60 CFH of $N_2 \leq$ 0.35 inches H_2O ΔP at 80 CFH of $N_2 \leq$ 0.62 inches H_2O	6.2	Std.	TP-201.4

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Liquid Removal System	Capable of Removing 5 ml/ gal. (average)	6.3	Std.	TP-201.6

6.1 Balance Nozzle Criteria

Nozzles for use with balance systems shall comply with all of the following criteria below.

6.1.1 Each balance nozzle shall have an insertion interlock designed to prevent the dispensing of fuel unless there is an indication that the nozzle is engaged in the fillpipe (i.e., the nozzle bellows is compressed). The performance specifications for the insertion interlock mechanism shall be established during the certification process.

6.1.2 Each balance nozzle shall be equipped with a vapor valve. The leakrate for the vapor valve shall not exceed 0.07 CFH at a pressure of 2.0 inches H_2O as determined by TP-201.2B.

6.1.3 The force necessary to compress the nozzle bellows to the retaining device, or a specified distance, shall be specified by the applicant for certification and verified during certification testing. The applicant shall include a protocol to test the nozzle bellow compression force in the certification application. This procedure is subject to engineering evaluation and approval by the Executive Officer.

6.1.4 Use of a balance nozzle certified per CP-201 shall be deemed to satisfy the requirements of Section 6.1.

6.2 Dynamic Pressure Drop Criteria for Balance Systems

6.2.1 The dynamic pressure drop for balance systems shall be established in accordance with TP-201.4 (Dynamic Pressure). The dynamic pressure drop standards from the tip of the nozzle spout to the aboveground storage tank, with the Phase I vapor poppet open, shall not exceed the following:

0.35 inches H_2O at a flowrate of 60 CFH of Nitrogen; and
0.62 inches H_2O at a flowrate of 80 CFH of Nitrogen.

6.2.2 The dynamic pressure drop for balance system components, measured in accordance with TP-201.2J (Pressure Drop Bench Testing of Vapor Recovery Components) shall not exceed the following.

Nozzle:	0.08 inches H_2O
Hose (Including Whip Hose):	0.09 inches H_2O
Breakaway:	0.04 inches H_2O
Dispenser:	0.08 inches H_2O
Swivel:	0.01 inches H_2O

(a) The dynamic pressure drop for the balance system vapor return line shall not exceed the following as determined by TP-201.4:

Phase II Riser to AST: 0.05 inches H_2O @60 CFH

(b) The addition of other components is acceptable as long as the total is not exceeded. The applicant may request to be certified to a dynamic pressure lower than those specified above. This shall be specified in the application and verified during certification testing.

(c) Use of balance system components certified per CP-201 shall be deemed to satisfy the requirements of Section 6.2.

6.3 Liquid Removal Systems

For those systems requiring liquid removal, the liquid removal rate shall be determined in accordance with TP-201.6 (Determination of Liquid Removal of Phase II Vapor Recovery Systems of Dispensing Facilities). The minimum removal rate, averaged over a minimum of 4 gallons, shall equal or exceed 5 ml per gallon. The minimum dispensing rate for this requirement shall be specified during the certification process. Use of nozzle certified per CP-201 shall be deemed to satisfy the requirements of Section 6.3.

7. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO ALL ASSIST VAPOR RECOVERY SYSTEMS

Table 7-1 summarizes the performance standards and specifications specifically applicable to Phase II Assist vapor recovery systems. These systems are also subject to all of the standards and specifications in Sections 3 through 5, and the applicable provisions of Sections 8 or 9.

Table 7-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II VACUUM ASSIST SYSTEMS

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Nozzle Criteria Each Assist Nozzle Shall:	Possess a Mini-Boot Have an Integral Vapor Valve	7.1	Spec.	Testing and Eng. Eval.
Nozzle Vapor Valve Leakrate	≤ 0.038 CFH at +2.0 inches H_2O ≤ 0.10 CFH at −100 inches H_2O	7.1	Spec.	TP-201.2B
Nozzle Pressure Drop Specifications ΔP at Specified Vacuum Level	Specified by Applicant and Verified During the Certification Process	7.1	Spec.	TP-201.2J
Maximum Air to Liquid Ratio	1.00 (without processor) 1.30 (with processor)	7.2	Std.	TP-201.5
Air to Liquid Ratio Range	Specified by Applicant and Verified During the Certification Process	7.2	Spec.	TP-201.5

7.1 Nozzle Criteria

Nozzles for use with assist systems shall comply with all of the following criteria below.

7.1.1 Each assist nozzle shall be equipped with a mini-boot that both allows for a lower A/L ratio and minimizes the quantity of liquid gasoline exiting the fillpipe during a spitback event.

7.1.2 Each assist nozzle shall be equipped with a vapor valve. The leakrate for the vapor valve shall not exceed the following, as determined by TP-201.2B:

0.038 CFH at a pressure of +2.0 inches H_2O; and
0.10 CFH at a vacuum of −100 inches H_2O.

7.1.3 The nozzle pressure drop shall be specified by the applicant and verified during the certification process using TP-201.2J.

7.1.4 Use of a nozzle certified per CP-201 shall be deemed to satisfy the criteria of Section 7.1.

7.2 Air to Liquid Ratio

The air to liquid (A/L) ratio shall be specified by the applicant and verified during the certification process in accordance with TP-201.5 (Air to Liquid Volume Ratio). The maximum A/L shall not exceed the following:

1.00 (without processor);
1.30 (with processor).

Use of a nozzle certified per CP-201 shall be deemed to satisfy the criteria of Section 7.2.

8. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO ASSIST SYSTEMS UTILIZING A CENTRAL VACUUM UNIT

Table 8-1 summarizes the performance standards and specifications specifically applicable to Phase II Assist vapor recovery systems utilizing a Central Vacuum Unit. These systems are also subject to all of the standards and specifications in Sections 3, 4, 5, 7 and, if applicable, Section 9.

Table 8-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II ASSIST SYSTEMS UTILIZING A CENTRAL VACUUM UNIT

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Specification of Minimum and Maximum Vacuum Levels	Specified by Applicant and Verified During the Certification Process	8.1	Spec.	Testing and Eng. Eval.
Number of Refueling Points Per Vacuum Device	Specified by Applicant and Verified During the Certification Process; and Challenge Mode Testing	8.2	Spec.	TP-201.5

8.1 Vacuum Levels Generated by the Collection Device

The normal operating range of the system shall be specified by the applicant and verified during the certification process, and the maximum and minimum vacuum levels shall be specified in the certification Executive Order. The applicant may propose challenge mode testing to extend the limits of the operating range.

8.2 Maximum Number of Refueling Points per Vacuum Device

The maximum number of refueling points that can be adequately associated with the vacuum device, including meeting the A/L limits, shall be specified by the applicant and verified during certification testing. The test shall be conducted with all of the refueling points except one using the same fuel grade, and the refueling point on which the effectiveness is being tested using a different fuel grade. An engineering evaluation followed by certification testing shall demonstrate the system's ability to meet the required A/L ratio and/or emission factor with a self-adjusting submersible turbine pump (STP).

9. PHASE II PERFORMANCE STANDARDS AND SPECIFICATIONS APPLICABLE TO SYSTEMS UTILIZING A DESTRUCTIVE OR NON-DESTRUCTIVE PROCESSOR

Tables 9-1 and 9-2 summarize the performance standards and specifications specifically applicable to all Phase II vapor recovery systems utilizing a processor. These systems are also subject to all of the standards and specifications in Sections 3 through 5 and, the applicable provisions of Sections 6, 7, and 8.

Table 9-1
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II SYSTEMS
UTILIZING A DESTRUCTIVE PROCESSOR

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Hazardous Air Pollutants (HAPS) from the processor	HAPS from the Processor Shall Not Exceed these Limits: 1,3-Butadiene: 1.2 lbs/year Formaldehyde: 36 lbs/year Acetaldehyde: 84 lbs/year	9.2	Std.	TP-201.2H
Maximum HC Rate from Processor	≤ 5.7 lbs/1,000 gallons (in breakdown mode)	9.3	Spec.	Testing and Eng. Eval.
Typical Load on Processor	Specified by Applicant and Verified during the Certification Process	9.4	Spec.	Testing and Eng. Eval.
Processor Operation Time	Specified by Applicant and Verified during the Certification Process	9.5	Spec.	Testing and Eng. Eval.

Table 9-2
Phase II Performance Standards and Specifications
APPLICABLE TO ALL PHASE II SYSTEMS
UTILIZING A NON-DESTRUCTIVE PROCESSOR

Performance Type	Requirement	Sec.	Std. or Spec.	Test Procedure
Maximum HC Rate from Processor	≤ 5.7 lbs/1,000 gallons (in breakdown mode)	9.3	Spec.	Testing and Eng. Eval.
Typical Load on Processor	Specified by Applicant and Verified during the Certification Process	9.4	Spec.	Testing and Eng. Eval.
Processor Operation Time	Specified by Applicant and Verified during the Certification Process	9.5	Spec.	Testing and Eng. Eval.

9.1 Processor Emission Factors

The processor emission factors shall be established in accordance with TP-201.2 (Efficiency and Emission Factor for Phase II Systems).

9.2 Hazardous Air Pollutants from Destructive Processors

Hazardous Air Pollutants (HAPS) from facilities using processors shall not exceed the following limits:

1,3-Butadiene: 1.2 pounds per year
Formaldehyde: 36 pounds per year
Acetaldehyde: 84 pounds per year

The emission factor shall be established in accordance with TP-201.2H (Determination of Hazardous Air Pollutants from Vapor Recovery Processors).

9.3 Maximum Hydrocarbon Emissions from the Processor

The maximum Hydrocarbon emissions from the processor, in breakdown mode, shall not exceed 5.7 pounds per 1,000 gallons as determined by TP-201.2.

9.4 Typical Load on the Processor

The typical load on the processor shall be identified by the applicant and verified during the certification process, and shall be included in the specifications in the certification Executive Order.

9.5 Processor Operation Time

The typical processor operation time shall be identified by the applicant and verified during the certification process, and shall be included in the specifications in the certification Executive Orders.

10. IN-STATION DIAGNOSTIC SYSTEMS

10.1 Vapor recovery systems at gasoline dispensing facilities that dispense greater than 600,000 gallons per year shall be equipped with an ISD system that meets the requirements of CP-201, Section 9.

11. CERTIFICATION OF VAPOR RECOVERY SYSTEMS

The Executive Officer shall certify only those vapor recovery systems that, based on testing and engineering evaluation of that system's design, component qualities, and performance, are demonstrated to meet all applicable requirements of this certification procedure. Except as provided in Sections 3, 18, and 19, this certification procedure should not be used to certify individual system components. Steps and conditions of the certification process, along with the Sections of this document that describe them, are outlined below.

(a)	Application Process	Section 12
(b)	Evaluation of the Applications	Section 13
(c)	Vapor Recovery System Certification Testing	Section 14
(d)	Alternate Test and Inspection Procedures	Section 15
(e)	Documentation of Certification	Section 16
(f)	Duration and Conditions of Certification	Section 17
(g)	Certification Renewal	Section 18
(h)	Amendments to Executive Orders	Section 19

11.1 Certification Fees

Each applicant submitting a system and/or component for certification shall be charged fees not to exceed the actual cost of evaluating and testing the system to determine whether it qualifies for certification. The applicant is required to demonstrate ability to pay the cost of testing prior to certification and performance testing. Applicants may request a payment plan for testing and certification costs. Requests for a payment plan should be submitted in writing to the Executive Officer and should include the payment frequency (monthly, quarterly, etc.) and amount of each payment to meet the obligation. Failure to fulfill the conditions of payment may result in revocation of the Executive Order.

12. APPLICATION PROCESS

All of the information specified in the following subsections shall be submitted to the Executive Officer for an application to be evaluated. An application for certification of a Standing Loss Control, Phase I, and/or Phase II vapor recovery system or a Standing Loss Control component may be made to the Executive Officer by any applicant.

The applicant for certification shall identify, in the preliminary application, the standard(s) or specification(s) with which the system or component complies, and demonstrate that the proposed system or component meets the primary performance standard(s) or specification(s) required by Sections 3 through 10 of this Procedure. For the preliminary application, the applicant shall have performed tests for all applicable performance specifications and standards. Engineering reports of successful test results for all these tests must be included in the preliminary application. In order to expedite the application process, the Executive Officer may determine that the application is acceptable based on the results of abbreviated operational and/or efficiency/emission factor testing and spillage. Test results shall be submitted for an operational test of at least 30 days, for a test of at least 20 vehicles demonstrating adequate collection, and for at least 50 observations of spillage (including at least 40 percent fills-ups), or equivalent verification that the system is capable of meeting the performance standards and specifications.

The system or component, as characterized by these reports, shall be subjected to an engineering evaluation. If the preliminary application is deemed acceptable, the applicant shall be notified and shall expeditiously install the system or component for certification testing. If the preliminary application is deemed unacceptable, the applicant shall be notified of any deficiencies within 60 days. The final application shall not be deemed complete until it contains the results of all necessary testing, the approvals of other agencies, the finalized operating and maintenance manuals, and all other requirements of certification.

The applicant shall demonstrate, to the satisfaction of the Executive Officer, that the system or component complies with the performance standards under actual field and challenge mode conditions. Such demonstrations shall include the submission of test results with the certification application.

Estimated timelines for evaluation of certification is provided in Table 12-1.

Table 12-1
Estimated Timeline for the Certification Application Process

Action	Time	Determination	ARB Response
Preliminary Application Filed	60 days	Acceptable	Preliminary Application Accepted Test Site Approval Granted
Preliminary Application Filed	60 days	Unacceptable	Preliminary Application Returned with Notification of Deficiencies
Application Resubmitted	30 days	Acceptable	Preliminary Re-Application Accepted Test site Approved
Application Resubmitted	30 days	Unacceptable	Initial Re-Application Returned with Notation of Deficiencies
Final Application Complete	120 days	Acceptable	Executive Officer Issues Certification Executive Order
Final Application Complete	120 days	Unacceptable	Executive Officer Denies . Certification

The application shall be written and signed by an authorized representative of the applicant, and shall include all of the items listed below.

(a) Description of Vapor Recovery System or Component (Section 12.1)
(b) Description of In-Station Diagnostics System (Section 12.2)
(c) Materials Compatibility with Fuels (Section 12.3)
(d) Evidence of Compatibility of the System or Component (Section 12.3)
(e) Evidence of Reliability of the System (Section 12.4)
(f) Installation, Operation, and Maintenance Requirements of the System or Component (Section 12.5)
(g) Evidence of Financial Responsibility of the Applicant (Section 12.6)
(h) A copy of the warranty (Section 12.7)
(i) Request for and information about proposed test station (Section 12.8)
(j) Notification of System Certification Holder, if applicable (Section 12.9)
(k) Vapor Recovery Equipment Defects (title 17) and Test Protocols (Section 12.10)
(l) Challenge Modes and Test Procedures (Section 12.11)
(m) If applicable; Bellows Insertion Force Specification and Test Procedure (Section 12.12)
(n) Other Information such as the Executive Officer may reasonably require. (Section 12.12)

12.1 Description of Vapor Recovery System or Component

The application shall include a complete description of the system or component concept, design and operation, including, but not limited to, the following items.

12.1.1 Identification of critical system or component operating parameters. An engineering evaluation of the system or component will be performed by the Executive Officer to evaluate any proposed specifications and to establish additional performance specifications if required.

12.1.2 Engineering drawings of system, components, and aboveground and underground piping and tank configurations for which certification is requested.

12.1.3 Engineering parameters for dispenser vapor system control boards and/or all vapor piping, pumps, nozzles, hanging hardware, vapor processor, etc.

12.1.4 Listing of components and evidence that the manufacturers of any components intended for use with the system and not manufactured by the applicant have been notified of the applicant's intent to obtain certification.

12.1.5 Applicable performance standards and specifications of components, specifically identifying those which exceed the minimum acceptable specifications and for which certification of superior performance is requested, and test results demonstrating compliance with these specifications.

12.1.6 Results of tests demonstrating that the system and components meet all the applicable performance standards. These tests shall be conducted by, or at the expense of, the applicant.

12.1.7 Any additional specifications of the system including, but not limited to, tank size, underground pipe sizes, lengths, fittings, volumes, material(s), etc.

12.1.8 Estimated retail price of the system.

12.1.9 For previously tested systems, identification of any and all new components and physical and operational characteristics, together with new test results obtained by the applicant.

12.2 Description of In-Station Diagnostics (ISD)

The applicant shall include the following documentation with the certification application.

12.2.1 A written description of the functional operation of the GDF vapor recovery ISD system.

12.2.2 A table providing the following information shall be included for each monitored component or system, as applicable:

(a) Corresponding fault code;
(b) Monitoring method or procedure for malfunction detection;
(c) Primary malfunction detection parameter and its type of output signal;
(d) Fault criteria limits used to evaluate output signal of primary parameter;
(e) Other monitored secondary parameters and conditions (in engineering units) necessary for malfunction detection;
(f) Monitoring time length and frequency of checks;
(g) Criteria for storing fault code;
(h) Criteria for notifying station operator; and
(i) Criteria used for determining out of range values and input component rationality checks.

12.2.3 A logic flowchart describing the general method of detecting malfunctions for each monitored emission-related component or system.

12.2.4 A written detailed description of the recommended inspection and maintenance procedures, including inspection intervals that will be provided to the gasoline dispensing facility operator.

12.2.5 A written detailed description of the training plan to train and certify system testers, repairers, installers, and rebuilders.

12.2.6 A written description of the manufacturer's recommended quality control checks.

12.2.7 A written description of calibration and diagnostic checks.

12.2.8 A list of system components that are monitored by the ISD system and test procedures for challenge mode testing. The Executive Officer may modify the list or test procedures based on an engineering evaluation. Additional procedures may be developed as necessary to verify that the system's self-check and self-test features perform accurately.

12.3 Compatibility

The applicant shall submit evidence of system compatibility, including the following:

12.3.1 Evidence of demonstrating compatibility between the Phase I vapor recovery system with any type of Standing Loss Control system with which the applicant wishes the Phase I system to be certified, as specified in Section 4.9

12.3.2 Evidence demonstrating compatibility between the Phase II vapor recovery system and ORVR-equipped vehicles shall be submitted, along with any test results demonstrating compatibility. ORVR compatibility testing shall comply with the provisions in Section 5.4.

12.3.3 Evidence demonstrating the compatibility of the Phase I and Standing Loss Control or Phase II system with any type of Phase I and Standing Loss Control system with which the applicant wishes the Phase II system to be certified, as specified in Sections 4.9 or 5.5 and 5.6. Continuous readings of pressure recordings in the aboveground storage tank, as well as challenge mode tests, may be used for this demonstration.

12.3.4 Evidence that the system can fuel any vehicle meeting state and federal fillpipe specifications and is capable of being fueled by a non-vapor-recovery nozzle.

12.3.5 The applicant shall provide information regarding the materials specifications of all components, including evidence of compatibility with all fuels in common use in California and approved as specified in Section 4.7. If the applicant is requesting a certification for use only with specified fuel formulations, the applicant shall clearly identify, in the application, the included and excluded fuel formulations for which certification is requested.

12.4 Reliability of the System

In order to ensure ongoing compliance, adequately protect public health, and protect the end-user, the reliability of the system shall be addressed in the application, including the following:

12.4.1 The expected life of system and components.

12.4.2 Description of tests conducted to ascertain compliance with performance standards and specifications for the expected life of the system or component, any procedures or mechanisms designed to correct problems, and test results.

12.4.3 Identification of and emission impact of possible failures of system, including component failures

12.4.4Procedure and criteria for factory testing (integrity, pressure drop, etc.)

12.5 Installation, Operation, and Maintenance of the System

The installation, operation, and maintenance plan shall be submitted, and shall include at least the following items which the Executive Officer shall review and approve prior to implementation:

12.5.1 Installation, operation, and maintenance manuals of the system or component, including the ISD.

12.5.2 A plan for training installers, including a training contact person or contact telephone number, to train for the proper installation of the system.

12.5.3 A replacement parts program.

12.5.4 The estimated installation costs and yearly maintenance costs.

12.6 Evidence of Financial Responsibility

The applicant shall submit evidence of financial responsibility to ensure adequate protection to the end-user of the product as specified in Section 17.4.

12.7 Warranty

The applicant shall submit a copy of the warranty for the system, warranties for each component, and samples of component tags or equivalent method of meeting warranty requirements as specified in Section 17.5.

12.8 Test Station

12.8.1 The vapor recovery system shall be installed and tested in an operating gasoline dispensing facility for the purpose of certification testing.

12.8.2 The applicant shall make arrangements for the vapor recovery system to be installed in an operating gasoline dispensing facility meeting the requirements of Section 14.1.

12.8.3 The request for designation as a test site shall include the following information:

(a) Location of the facility;
(b) Verification of throughput for at least six months; and
(c) Hours of operation.

12.8.4 The applicant shall submit final construction diagrams of the proposed test station. These drawings shall clearly identify the type of vapor recovery piping and connections, pipe slope, and type of storage tanks (i.e., single or double wall, steel, concrete, insulation, fiberglass, etc.). The Executive Officer may require Professional Engineer or Architect Approved As-Built drawings of the test site. If such drawings are not obtainable, the applicant may request the Executive Officer to accept alternatives sources of this information, such as detailed schematics of the vapor piping configuration and/or photographs.

12.9 Notification of System Certification Holder

If the applicant is not the manufacturer of all system components, the applicant shall include evidence that the applicant has notified the component manufacturer(s) of the applicant's intended use of the component manufacturers' equipment in the vapor recovery system for which the application is being made.

12.9.1 When the applicant is requesting inclusion of one or more components on a certified system, the applicant shall notify the manufacturer, if any, named as the applicant or holder of the executive order for the certified system.

12.9.2 When the applicant is requesting certification of one or more components as part of a new system, the applicant shall notify all manufacturers.

12.10 Equipment Defect Identification and Test Protocols

The application shall identify where failure of system components may result in a vapor recovery equipment defect (VRED) as defined in Section 92006, title 17, CCR. Test protocols shall be developed by the applicant, and submitted with the certification application, along with test results, observations, or other analyses conducted by the applicant, to determine if the component or system failure meets the criteria of a VRED.

12.11 Challenge Modes and Test Protocols

The application shall identify potential challenge modes, as described in Section 13.7. Test protocols shall be developed and submitted by the applicant, and submitted with the certification application, along with test results, observations, or other analyses conducted by the applicant, to determine if the system meets the applicable standards and specifications when tested in challenge mode.

12.12 Other Information

12.12.1 The applicant shall provide any other information that the Executive Officer reasonably deems necessary

12.12.2 For a balance type system, the applicant shall provide a specification for bellows insertion force as specified in Section 6.1. The applicant will include a protocol to test the nozzle bellows compression force in the certification application. This procedure is subject to engineering evaluation and approval by the Executive Officer.

12.12.3 For an assist system, the applicant shall provide specifications for the nozzle pressure drop as specified in Section 7.1 and for the air to liquid ratio as specified in Section 7.2.

12.12.4 For a central vacuum assist system, the applicant shall provide specifications for the minimum and maximum vacuum levels and for the number of refueling points per vacuum device as specified in Sections 8.1 and 8.2, respectively.

12.12.5 For a system with a processor, the applicant shall provide the typical load on the processor and the processor operation time as specified in Sections 9.4 and 9.5, respectively.

13. EVALUATION OF THE APPLICATION

The application for certification of all systems and components shall be subjected to an engineering evaluation by the Executive Officer. The evaluation of the application shall include, but is not limited to, subsections 13.1 through 13.7.

13.1 Performance Standards and Specifications

The system and component performance standards and specifications identified by the applicant shall be reviewed to ensure that they include and conform to the applicable standards and specifications in Sections 3 through 10 of this Procedure.

13.2 Bench and Operational Testing Results

The procedures for, and results of, bench testing and operational testing contained in the application shall be reviewed. The review shall determine if the procedures adhere to required methodology and ensure that the results meet or exceed the standards and specifications in Sections 3 through 10 of this Procedure. The evaluation shall include a determination of necessary verification testing.

13.3 Evaluation of System Concept

The system concept shall be evaluated to ensure that it is consistent with the generally accepted principles of physics, chemistry, and engineering.

13.4 Materials Specifications and Compatibility with Fuel Formulations

The component materials specifications shall be reviewed to ensure chemical compatibility with gasoline and/or any oxygenates that may be present in gasoline on an ongoing or on a seasonal basis, as specified in Section 4.7. This review shall include consideration of the variations in gasoline formulations for octane differences and summer fuel and winter fuel.

13.5 Installation, Operation, and Maintenance Manuals

The installation, operation, and maintenance manuals for the system and components shall be reviewed for completeness (see Section 17.6). Routine maintenance procedures shall be reviewed to ensure adequacy and determine that the procedures are not unreasonable (see Section 17.6).

13.6 Vapor Recovery Equipment Defect Identification

13.6.1 The applicant's VRED test results, test procedure, and test protocol shall be reviewed and subject to an engineering evaluation by the Executive Officer. The engineering evaluation shall identify where the failure of system components shall result in a VRED as defined by Section 94006, title 17, CCR. Test protocols may be developed by the applicant to determine if the component or system failure meets the criteria of a VRED. These test protocols, upon approval of the Executive Officer, are applied during certification testing as provided in section 14.4.1. The Executive Officer may, for good cause, require modification of, and/or testing in addition to, VRED testing proposed by the applicant.

13.6.2 All VRED mode test procedures, and the results of tests conducted by the applicant, shall be reviewed. Additionally, all VRED mode testing conducted during the certification process to verify the test results or further evaluate the systems shall be similarly reviewed.

13.7 Challenge Mode Determination

The applicant's Challenge Mode test results, test procedure, and test protocol shall be reviewed and subject to an engineering evaluation by the Executive Officer. The engineering evaluation shall determine if the component or system meets the applicable performance standards and specification under challenge mode testing. These test protocols, after engineering evaluation and upon approval of the Executive Officer, are applied during the certification testing as provided in Section 14.4.2. The ARB Executive Officer may, for good cause, require modification of, and/or testing in addition to, challenge mode testing proposed by the applicant.

14. VAPOR RECOVERY SYSTEM CERTIFICATION TESTING

The Executive Officer shall conduct, or shall contract for and observe, testing of vapor recovery systems for the purpose of certification. Except as otherwise specified in Section 15 of this procedure, vapor recovery systems shall be subjected to evaluation and testing pursuant to the applicable performance standards, performance specifications, and test procedures specified in Sections 3 through 10 of this procedure.

Certification testing of vapor recovery systems shall be conducted only after the preliminary application for certification has been found to be acceptable. Some tests may be conducted more than once, to characterize the performance of complete systems and/or system components over time. Except as otherwise provided in Sections 3, 18, and 19 of this procedure, only complete systems shall be certified.

Failure of any component during testing of a SLC, Phase I, or Phase II system shall be cause for termination of the certification test, except as noted below. Any SLC, Phase I, or Phase II system and/or component test failures must be investigated by the applicant and an explanation provided to the Executive Officer within one week of the test failure discovery. The Executive Officer may extend this one week period for good cause. The Executive Officer may consider information and circumstances presented by the applicant, including previous certification testing, to demonstrate that the failure was attributable to something other than the design of the component and/or system, and may allow further testing without modification.

Any applicant or representative of an applicant found to have performed unauthorized maintenance or to have attempted to conceal of falsify information, including test results and/or equipment failures may be subject to civil and criminal penalties and testing of the system of component shall be terminated.

Phase I

As specified in Section 4.9, Phase I vapor recovery systems shall be certified only in facilities equipped with a certified SLC system. During Phase I system certifications, the associated SLC system shall be subject to all of the standards and specifications in Section 3. Monitoring of SLC system performances shall be conducted for the purpose of demonstrating compatibility, as required by Section 4.9, as well as to insure that SLC systems are functioning properly during the Phase I certification test. Any SLC components identified as not performing correctly shall be replaced and the Phase I system certification continued. However, Phase I system test data collected during any period associated with a SLC system test failure shall be evaluated for validity.

During Phase I system certifications, failure of any SLC components that are determined to be unrelated to the performance of the Phase I system shall not be cause for termination of the Phase I system certification. During Phase I certification test, if any SLC component is identified as having performance deficiencies, then a more thorough investigation of the SLC component/system performance will be initiated by the Executive Officer.

During Phase I system certification, any SLC system and/or component performance deficiencies that are determined to be related to the performance of the Phase I system shall be cause for the termination of the Phase I system certification, as provided by Section 4.9.

Phase II

As specified in Sections 5.5 and 5.6, Phase II vapor recovery systems shall be certified only in facilities equipped with a certified Phase I and SLC systems. During Phase II system certifications, the associated Phase I and SLC systems shall be subject to all of the standards and specifications in Section 3 and 4. Monitoring of Phase I and SLC system performances shall be conducted for the purpose of demonstrating compatibility, as required by Sections 5.5 and 5.6, as well as to insure that the Phase I and SLC systems are functioning properly during the Phase II certification test. Any Phase I or SLC components identified as not performing correctly shall be replaced and the Phase II system certification continued. However, Phase II system test data collected during any period associated with a Phase I or SLC system test failure shall be evaluated for validity.

During Phase II system certifications, failure of any Phase I or SLC components that are determined to be unrelated to the performance of the Phase II system shall not be cause for termination of the Phase II system certification. During Phase II certification tests, if any Phase I or SLC component is identified as having performance deficiencies, then a more thorough investigation of the Phase I or SLC component/system performance will be initiated by the Executive Officer.

During Phase II system certification, any Phase I or SLC system and/or component performance deficiencies that are determined to be related to the performance of the Phase II system shall be cause for termination of the Phase II system certification, as provided by Sections 5.5 and 5.6.

14.1 Test Site for Field Testing of Vapor Recovery Systems

The applicant shall make arrangements for the vapor recovery system to be installed in one or more operating GDFs for certification testing, and the applicant shall request, in writing, approval of the GDF as a test site from the Executive Officer. Upon determining that the GDF meets all of the following criteria, the Executive Officer shall, in writing, designate the selected location as a test site, and exempt it from any state or local district prohibition against the installation of uncertified vapor recovery equipment. This shall not exempt it from the prohibition against the offer for sale, or sale, of uncertified equipment. The vapor recovery system shall be installed throughout the entire facility (note this requirement applies to the primary certification test site). The Executive Officer may require that the system be installed in more than one facility for the purpose of testing.

14.1.1 The test stations shall have a minimum monthly gasoline throughput of 1,500 gallons/month, as demonstrated over a consecutive six month period. The throughput data submitted in the application shall be the most current data available. The test site throughput shall also be shown to comply with these criteria for the six months prior to the start of the operational tests.

If the facility is equipped with one hose and nozzle for each gasoline grade, rather than a uni-hose configuration, the minimum throughput requirement shall apply to the gasoline grade with the highest throughput.

14.1.2 The station shall be located within 100 miles of the ARB Sacramento offices. When a suitable location for testing cannot be located within 100 miles of the ARB offices, the Executive Officer may, for good cause, grant approval of a test station elsewhere, provided that all the necessary testing can be conducted at that location. The applicant shall be responsible for any additional costs, such as travel, associated with that location.

14.1.3 Continuous access to the test site by ARB staff, without prior notification, shall be provided. Every effort will be made to minimize inconvenience to the owner/operator of the facility. If testing deemed necessary cannot reasonably be conducted, the facility shall be deemed unacceptable and the test shall be terminated.

14.1.4 If test status is terminated for any reason, uncertified equipment shall be removed within sixty (60) days, unless the Executive Officer extends the time in writing. The local district with jurisdiction over the facility may impose a shorter time.

14.1.5 All test data collected by the applicant at the test site shall be made available to the Executive Officer within fifteen (15) working days. Continuous data, such as temperature monitoring data, shall be submitted in bimonthly increments within fifteen (15) days of the last day of the increment. Failure to provide this information may result in extension or termination of the test. The Executive Officer may specify the format in which the data is to be submitted.

14.1.6 Test site designation may be requested by the applicant, or by another person, for facilities other than the certification test site(s), for the purpose of research and development, or independent evaluation of a system prior to its certification. Approval of such a test site shall be at the discretion of the Executive Officer. The test site shall be subject to all of the above conditions with the exception of 14.1.1 and 14.1.2.

14.1.7 For testing conducted pursuant to Sections 19 and 20, SLC or Phase I certification test sites configured with fewer than three P/V valves may be approved by the Executive Officer

14.1.8 Phase II certification test sites will be configured with one to three P/V vent valves, each with an associated ball valve.

14.2 Bench Testing of Components

Components identified by the engineering evaluation as requiring bench testing to verify performance standards and specification shall be submitted to the Executive Officer prior to commencement of operational testing. This testing may be repeated during and/or after the operational testing.

14.3 Operational Test Duration

14.3.1 All vapor recovery systems shall be subjected to an operational test. The duration of the Phase I and Phase II system operational testing shall be at least 180 days, except as otherwise provided in Section 19. The duration of the SLC system operational test is specified in section 3.2.

14.3.2 No maintenance shall be performed other than that which is specified in the installation, operation, and maintenance manual. Such maintenance as is routine and necessary shall be performed only after approval by the Executive Officer. Occurrences beyond the reasonable control of the applicant, such as vandalism or accidental damage by customers (e.g., drive-offs), shall not be considered cause for failure of the systems.

14.3.3 Except where it would cause a safety problem, maintenance shall not be performed until approval by the Executive Officer has been obtained. In those situations that require immediate action to avoid potential safety problems, maintenance may be performed immediately and the Executive Officer notified as soon as practicable.

14.3.4 For the purpose of SLC system certification, the temperature in the AST and ambient temperature shall be monitored and recorded continuously throughout the operational test in accordance with TP-206.1.

14.3.5 Tests of the performance of the system and/or components shall be conducted periodically throughout the operational test period. If the results of such tests, when extrapolated through the end of the warranty period, show a change that results in the degradation of a performance standard or specification, the Executive Officer may extend or terminate the operational test.

14.4 Equipment Defect and Challenge Mode Testing

14.4.1 Equipment Defect Testing

Testing to determine vapor recovery equipment defects as defined by Section 94006 of title 17, CCR, shall be conducted as part of certification testing. Vapor recovery equipment defect testing may be allowed during the operational test only when the Executive Officer has determined that the testing does not affect the normal operation of the system.

14.4.2 Challenge Mode Testing

Testing to verify that the system meets the applicable standards under various GDF operating conditions may be conducted as part of certification testing. Challenge mode tests may be allowed during the operational test only when the Executive Officer has determined that the testing does not affect the normal operation of the system.

14.5 Efficiency and/or Emission Factor Test

Testing to determine the efficiency and/or emission factor of the vapor recovery system shall be conducted in accordance with the applicable test procedures specified in Section 3, 4, or 5 of this procedure. Additional testing may be required if the Executive Officer deems it necessary. The additional testing may include, but is not limited to the determination of the Reid Vapor Pressure of the fuel, the volume and/or mass in the vapor return path, fuel and/or tank temperature, and the uncontrolled emission factor.

14.5.1 Standing Loss Systems. A test of the static pressure integrity of the Phase I system shall be conducted, in accordance with TP-206.3, no less than 24 hours or more than seven days prior to conducting TP-206.1 or TP-206.2. The static pressure integrity test shall be conducted not more than 48 hours after the completion of these tests as well. Failure of the static pressure integrity test shall invalidate the TP-206.1 or TP-206.2 test results unless the Executive Officer determines that the integrity failure did not result in any significant unmeasured emissions.

14.5.2 Phase I Systems. A test of the static pressure integrity of the Phase I system shall be conducted, in accordance with TP-206.3, no less than 24 hours or more than seven days prior to conducting TP-201.1 or

TP-201.1A. Testing, in accordance with TP-201.1 and/or TP-201.1A, shall be conducted at delivery rates typical and representative of the facilities for which certification is requested. More than one test may be required to accomplish this determination. Certification may be limited to specified maximum loading rates. The static pressure integrity of the vapor recovery system shall be verified as soon as possible, but not more than 48 hours, after the completion of this test. Failure of the static pressure integrity test shall invalidate the TP-201.1 or TP-201.1A test results unless the Executive Officer determines that the integrity failure did not result in any significant unmeasured emissions.

14.5.3 Phase II Systems. A test of the static pressure integrity of the Phase II system shall be conducted, in accordance with TP-206.3, no more than seven days and no less than three days prior to conducting TP-201.2. The static pressure integrity of the vapor recovery system, including all test equipment installed for the purpose of conducting TP-201.2, shall be verified as soon as possible, but not more than 48 hours, after the completion of this test. Failure of the static pressure integrity test shall invalidate the TP-201.2 test unless the Executive Officer determines that the integrity failure did not result in any significant unmeasured emissions.

14.6 Vehicle Matrix

A representative matrix of 20 vehicles shall be used when testing to determine the Phase II efficiency for the performance standard. The composition of the representative vehicle matrix shall be determined for each calendar year by the Executive Officer in accordance with TP-201.2A (Determination of Vehicle Matrix for Phase II Systems).

14.6.1 Vehicles will be tested as they enter the dispensing facility ("first in" basis) until a specific matrix block of the distribution is filled.

14.6.2 The vehicle matrix shall include a population of ORVR-equipped vehicles consistent with the distribution of ORVR-equipped vehicles in the State of California.

14.6.3 The Executive Officer may exclude any vehicle that fails to comply with the vehicle fillpipe specifications ("Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks" incorporated by reference in title 13, CCR, Section 2235).

14.6.4 The Executive Officer may exclude a vehicle prior to its dispensing episode only if such exclusion and its reason is documented; e.g. unusual facility conditions beyond the applicant's control or unusual modifications to the vehicle. All data required by the test procedure shall be taken for such vehicles for subsequent review and possible reversal of the exclusion decision made during the test. The only other reasons for excluding a vehicle from the test fleet are incomplete data or the factors in TP-201.2.

14.6.5 Additional vehicles may be chosen for testing at the test site by the Executive Officer. The vehicles shall be chosen, according to the Executive Officer's judgment, so that any of the first 20 vehicles, which may later be found to have invalid data associated with them, shall have replacements from among the additional vehicles on a "first in" basis.

14.6.6 A matrix of fewer than 20 (10 ORVR and 10 non-ORVR) vehicles may be made by deleting up to a maximum of two vehicles (one ORVR and one non-ORVR) by reducing the representation in any cell or combination of cells of the vehicle matrix, subject to the following requirements for each candidate reduced cell.

(a) No cell shall be reduced by more than one vehicle
(b) At least one dispensing episode has already been tested in each cell.
(c) None of the other dispensing episodes in the cell have yielded field data which, in the Executive Officer's judgment, would cause a failure to meet the standards specified in Section 5.1.
(d) All tested dispensing episodes in all cells have yielded field data that, in the Executive Officer's judgment, would yield valid test results after subsequent review and evaluation.

15. ALTERNATE TEST PROCEDURES AND INSPECTION PROCEDURES

Test procedures other than those specified in this certification procedure shall be used only if prior written approval is obtained from the Executive Officer. A test procedure is a methodology used to determine, with a high degree of accuracy, precision, and reproducibility, the value of a specified parameter. Once the test procedure is conducted, the results are compared to the applicable performance standard to determine the compliance status of the facility. Test procedures are subject to the provisions of Section 41954(h) of the H&SC.

15.1 Alternate Test Procedures for Certification Testing

The Executive Officer shall approve, as required, those procedures necessary to verify the proper performance of the system.

15.2 Request for Approval of Alternate Test Procedure

Any person may request approval of an alternative test procedure. The request shall include the proposed test procedure, including equipment specifications and, if appropriate, all necessary equipment for conducting the test. If training is required to properly conduct the test, the proposed training program shall be included.

15.3 Response to Request

The Executive Officer shall respond within fifteen (15) days of receipt of a request for approval and indicating that a formal response will be sent within sixty (60) days. If the Executive Officer determines that an adequate evaluation cannot be completed within the allotted time, the Executive Officer shall explain the reason for the delay, and will include the increments of progress such as test protocol review and comment, testing, data review, and final determination. If the request is determined to be incomplete or unacceptable, Executive Officer shall respond with identification of any deficiencies. The Executive Officer shall issue a determination regarding the alternate procedure within sixty (60) days of receipt of an acceptable request.

15.4 Testing of Alternate Test Procedures

All testing to determine the acceptability of the procedure shall be conducted by ARB staff, or by a third party responsible to and under the direction of ARB. Testing shall be conducted in accordance with the written procedures and instructions provided. The testing shall, at a minimum, consist of nine sets of data pairs, pursuant to USEPA Reference Method 301, "Field Validation of Pollutant Measurement Methods from Various Waste Media", 40 CFR Part 63, Appendix A, 57 Federal Register page 61992. Criteria established in USEPA Reference Method 301 shall be used to determine whether equivalency between the two test methods exists. For situations where method 301 is not directly applicable, the Executive Officer shall establish equivalence based on the concepts of comparison with the established method and statistical analysis of bias and variance. Method Approval of the procedure shall be granted, on a case-by-case basis, only after all necessary testing has been conducted. Because of the evolving nature of technology and procedures for vapor recovery systems, such approval may or may not be granted in subsequent cases without a new request for approval and additional testing to determine equivalency. If, after approval is granted, subsequent information demonstrates that equivalency between the two methods no longer meets the USEPA Method 301 requirements, the Executive Officer shall revoke the alternate status of the procedure.

15.5 Documentation of Alternate Test Procedures

Any such approvals for alternate test procedures and the evaluation testing results shall be maintained in the Executive Officer's files and shall be made available upon request. Any time an alternate procedure and the reference procedure are both conducted and yield different results, the results determined by the reference procedure shall be considered the true and correct results.

15.6 Inspection Procedures

Inspection procedures are methodologies that are developed to determine compliance based on applicable performance standards or specifications. Inspection procedures are typically, but not necessarily, parametric in nature and possess a built-in factor of safety, usually at least twice the applicable standard or specification. Inspection procedures are not subject to Section 41954(h) of the H&SC.

Upon submittal of an inspection procedure to CARB, the Executive Officer shall respond within thirty (30) days, providing the applicant with a determination of the applicability of Section 41960.2(d) or Section 41960.2(e) of the H&SC.

16. DOCUMENTATION OF CERTIFICATION

Documentation of certification shall be in the form of an Executive Order listing the criteria requirements of installation and operation of a certified system.

16.1 Executive Order

The certification Executive Order shall include the following items:

16.1.1 A list of components certified for use with the system.
16.1.2 Applicable Performance Standards, Performance Specifications and Test Procedures.
16.1.3 Applicable Operating Parameters and Limitations.
16.1.4 Warranty period(s).
16.1.5 Factory testing requirements, if applicable.

16.2 Summary of Certification Process

A summary of the certification process for each certified system shall be prepared. It shall contain documentation of the successful completion of all applicable portions of the requirements contained in this Certification Procedure. In addition, all problems encountered throughout the certification process, any changes made to address the identified problems, the location of the test station(s), the types of testing performed, the frequency and/or duration of any testing or monitoring, as appropriate, and any other pertinent information about the evaluation process shall be contained in this summary.

17. DURATION AND CONDITIONS OF CERTIFICATION

Vapor recovery system certifications shall specify the duration and conditions of certification.

17.1 Duration of System Certification

Vapor recovery systems shall be certified for a period of four years. The certification Executive Order shall specify the date on which the certification shall expire if it is not renewed as specified in Section 18.

17.2 One Vapor Recovery System per AST System

No more than one certified Phase II vapor recovery system may be installed on each aboveground storage tank (AST) system unless the Phase II system has been specifically certified to be used in combination. For facilities with dedicated vapor piping, each aboveground storage tank and associated dispensing points shall be considered an AST system, and different AST systems may have different vapor recovery systems. For facilities with manifolded vapor piping connecting storage tanks, all the manifolded tanks and associated dispensing points are considered one AST system, and only one certified Phase II vapor recovery system may be installed in conjunction with that AST system.

17.3 Certification Not Transferable

Upon successful completion of all the requirements, certification shall be issued to the company or individual requesting certification, as the Executive Officer deems appropriate. If the ownership, control or significant assets of the certification holder are changed as the result of a merger, acquisition or any other type of transfer, the expiration date of the certification shall remain unchanged. However, no person shall offer for sale, sell, or install any system or component covered by the certification unless the system or component is recertified under the new ownership, or, in the case of a component, is otherwise certified. Systems installed prior to the transfer shall be subject to the specifications contained in Section 20 of this procedure.

17.4 Financial Responsibility

The adequacy of the (1) methods of distribution, (2) replacement parts program, (3) financial responsibility of applicant and/or manufacturer, and (4) other factors affecting the economic interests of the system purchaser shall be evaluated by the Executive Officer and determined to be satisfactory to protect the purchaser. A determination of financial responsibility by the Executive Officer shall not be deemed to be a guarantee or endorsement of the manufacturer or applicant.

If no system has yet been certified that meets additional or amended performance standards and specifications, as provided in Section 2.4, the applicant is also requested to provide evidence of the commitment of financial investors for the commercial manufacture of the system, a projected market demand of the system as milestones for implementation of the plan, an inventory of equipment ready for shipment and a list of suppliers and subcontractors which are part of the manufacturing plan.

17.5 Warranty

The requirements of this shall apply with equal stringency both to the original applicant and to re-builders applying for certification. For systems that include components not manufactured by the applicant, the applicant shall provide information that shows that all components meet the following requirements:

17.5.1 The applicant and/or manufacturer of the vapor recovery system equipment shall provide a warranty for the vapor recovery system and components, including all hanging hardware, to the initial purchaser and any subsequent purchaser within the warranty period. This warranty shall include the ongoing compliance with all applicable performance standards and specifications. The applicant and/or the manufacturer may specify that the warranty is contingent upon the use of trained installers.

17.5.2 The minimum warranty shall be for one year from the date of installation for all systems and components. The applicant may request certification for a warranty period exceeding the minimum one-year requirement.

17.5.3 The manufacturer of any vapor recovery system or component shall include a warranty tag with the certified equipment. The tag shall contain at least the following information:

(a) Notice of warranty period;
(b) Date of manufacture, or where date is located on component
(c) Shelf life of equipment or sell-by date, if applicable;
(d) A statement that the component was factory tested and met all applicable performance standards and specifications; and
(e) A listing of the performance standards and/or specifications to which it was certified.

17.5.4 The Executive Officer shall certify only those systems which, on the basis of an engineering evaluation of such system's component qualities, design, and test performance, can be expected to comply with such system's certification conditions over the one-year warranty period specified above.

17.6 Installation, Operation, and Maintenance of the System

Systems requiring unreasonable maintenance or inspection/maintenance frequencies, as determined by the Executive Officer, shall not be certified. The manufacturer of any vapor recovery system or component shall submit manual(s) for all installation, operation, and maintenance procedures with the application as provided by Section 12.5. This manual(s) shall be reviewed during the certification process and the certification shall not be issued until the Executive Officer has approved the manual(s).

17.6.1 The manual(s) shall include all requirements for the proper installation of the system and/or component. The manual(s) shall include recommended maintenance and inspection procedures and equipment performance procedures, including simple tests the operator can use to verify that the system or component is operating in compliance with all applicable requirements. The Executive Officer may require the inclusion of additional procedures.

17.6.2 No changes shall be made to ARB Approved Manuals without the Executive Officer's prior written approval.

17.7 Identification of System Components

17.7.1 All components for vapor recovery systems shall be permanently identified with the manufacturer's name, part number, and, if applicable, a unique serial number. This requirement does not apply to replacement subparts of the primary component. Specific components may be exempted from this requirement if the Executive Officer determines, in writing, that this is not feasible or appropriate.

17.7.2 Nozzle serial numbers shall be permanently affixed to, or stamped on, the nozzle body and easily accessible for inspection. The location of the serial number shall be evaluated and approved by the Executive Officer prior to certification.

17.8 Revocation of Certifications

The certification of any system determined not to be achieving the applicable performance standards and specification listed in CP-206 may be revoked. The Executive Officer may conduct testing for the purpose of investigation of or verification of potential system deficiencies

Revoked systems may remain in use for the remainder of their useful life or for up to four years after the revocation, whichever is shorter, provided they comply with all of the requirements of Section 20. Systems with revoked certifications shall not be installed on new installations or major modifications of existing installations.

18. CERTIFICATION RENEWAL

At least eighteen (18) months prior to expiration of the certification period, the applicant may request to renew the certification. System certifications shall be renewed without additional testing if no data demonstrating system deficiencies is found or developed prior to the expiration date. During the four-year certification period, system deficiencies shall be identified through periodic equipment audits, complaint investigations, certification or compliance tests, surveys, or other sources of information. If deficiencies are documented, they shall be resolved to the satisfaction of the ARB Executive Officer or the certification shall expire. The ARB Executive Officer may extend certification if resolution of system deficiencies appears likely or if additional time is required to gather and evaluate information.

The renewal process, along with the sections of this document that describe them, are outlined below.

(a) Request for Renewal	Section 18.1
(b) Review of the Request	Section 18.2
(c) Evaluation of System Deficiencies	Section 18.3
(d) Letter of Intent	Section 18.4
(e) Renewal of Executive Order	Section 18.5
(f) Denial of Executive Officer Approval	Section 18.6

If no request for renewal is received by the ARB within eighteen (18) months of the certification expiration date, the Executive Officer shall send a "Notice of Pending Expiration" to the holder of the Executive Order. Table18-1 provides an estimated timeline for the renewal process. The timeline is intended to serve as a guide to provide approximate target schedules for completion of steps in the renewal process.

Each applicant submitting a certification renewal request shall be charged fees not to exceed the actual cost of evaluating and/or testing the system to determine whether it qualifies for renewal. Refer to Section 11.1 for more information on Fee Payment.

18.1 Request for Renewal

The request for renewal shall be written and signed by an authorized representative, and shall include the items listed below:

18.1.1 The Executive Order Number to be renewed;

18.1.2 Identification of any system or component deficiencies through warranty claims or other information such as:
(a) User feedback
(b) Contractor/Tester
(c) Distributers

18.1.3 Amendments to the Executive Order such as:
(a) Warranty information
(b) Installation, Operation, and Maintenance Manual
(c) System or component drawings
(d) Component modification

18.1.4 Updates to the training program;

18.1.5 Factory Testing Requirements;

18.1.6 Agency approvals or determinations, if any system modifications have been made since the original approval/determinations (to be submitted prior to approval of EO amendment, see Section 1.1), and

18.1.7 Other information such as the Executive Officer may reasonably require.

18.2 Review Request

The Executive Officer shall review the request and determine if any information provided warrants further evaluation/testing or if amendments to the Executive Order are needed. The applicant will be notified within 60 days of the receipt of the request and whether the submission of additional information is required.

18.3 Evaluation of System Deficiencies

In addition to the information provided in Section 18.1, the Executive Officer shall solicit information on system or component deficiencies through equipment audits, complaint investigations, certification or compliance tests, surveys, VRED data (if applicable), and any deficiencies identified by District staff, or other sources of information. The Executive Officer may conduct testing to investigate and/or verify system or component deficiencies. Testing to evaluate component modifications, VRED lists (if applicable), to demonstrate compatibility, or for challenge mode determinations, will be subject to the applicable sections of CP-206. If potential deficiencies are noted, an evaluation will be conducted to determine if:

18.3.1 The deficiency has been or is in the process of being resolved;

18.3.2 System/component modification(s) are necessary;

18.3.3 Executive Order modifications are necessary;

18.3.4 Additional testing is required.

18.4 Letter of Intent

After the review has been completed, a letter of intent will be issued to either (1) renew the Executive Order or (2) allow the Executive Order to expire. Conditions for expired certifications are discussed in Section 19 of this certification procedure. The letter of intent should be issued prior to the Executive Order expiration date but will not be issued prior to completion of the evaluation process described in Sections 18.1, 18.2, and 18.3. If the evaluation process is not complete and the letter of intent is not issued prior to the expiration date then the Executive Officer may determine that installation of the system at new facilities or major modifications will not be allowed during the extension period.

The Executive Officer may allow a certification extension if:

18.4.1 Resolution is likely but renewal time is insufficient; or

18.4.2 Additional time is necessary to gather and evaluate information.

18.5 Renewal of Executive Order

Executive Orders approved for renewal shall be valid for a period of four (4) years.

18.6 Denial of Executive Order Renewal

System certifications shall not be renewed if the Executive Officer determines that the performance standards and/or specifications in the Executive Order and CP-206 fail to be met. Non-renewed systems may remain in use for the remainder of their useful life or for up to four (4) years after the expiration date, whichever is shorter, provided the requirements of Section 20 are met.

Table 18-1
Estimated Timeline for the Renewal Process

Action	By	Time before Expiration
Submittal of renewal request	Applicant	18 months
Notice of pending expiration (if no renewal request received)	ARB	18 months
Solicitation of system information	ARB	18 months (or at time of receipt of request)
Application review and initial response	ARB	
Renewal request documentation completed	ARB/Applicant	15 months
Submittal of system information for other agency approval/determinations	Applicant	12 months
Draft Testing protocol and site identification	ARB/Applicant	14 months
Seal site/start test	ARB	12 months
End testing	ARB	11 to 6 months
Letter of Intent and draft Executive Order	ARB	3 months
Final Executive Order	ARB	0 months

19. AMENDMENTS TO EXECUTIVE ORDERS

Amendments to Executive Orders may be requested to add alternate or replacement components to a certified system. Alternate or replacement components may be modifications to originally certified components, components originally certified on another system, or new components.

Sections of this document that describe the process to amend an EO are outlined below.

19.1 Request for Amendment

The request for amendment shall be written and signed by an authorized representative of the applicant, and shall include the items listed below:

19.1.1 Executive Order to be amended;

19.1.2 Description of change;

19.1.3 Changes to the Executive Order such as:
- (a) System or component drawings
- (b) Installation, Operations, and Maintenance Manual
- (c) Fuel and System Compatibility

19.1.4 Agency approvals or determinations (to be submitted prior to approval of EO amendment, see Section 1.1);

19.1.5 Updates to the training program;

19.1.6 Applicable information specified in Section 11 ; and

19.1.7 Other information such as the Executive Officer may reasonably require.

19.2 Review of the Request

Requests for alternate or replacement components, equipment reconfigurations, or software changes will be subjected to an engineering evaluation to determine the level of testing required. The Executive Officer may require full operational testing of at least 180 days (30 days for Standing Loss Controls that attenuate temperature), allow abbreviated and/or limited operational testing, or determine that a component modification does not affect the performance of the vapor recovery system and therefore no testing is required.

General criteria to be considered when determining the level of testing are as follows:

(a) extent of physical changes to the component;
(b) extent of material changes to the component;
(c) changes that may affect the durability of the component;
(d) whether performance specifications are the same;
(e) similarity of system designs (i.e. for component transfers); and
(f) information from previous certification testing.

19.2.1 Modified Components

Modified components (i.e., any changes made to vapor recovery components certified as part of a system) may be certified if testing demonstrates that performance standards and specifications will continue to be achieved. The level and duration of operational and/or other testing will be determined by the Executive Officer based on an engineering evaluation.

19.2.2 Transfer of Components from Another Certified System

Components certified with a system may subsequently be considered for use with another certified system design provided that the performance standards and specifications of the components, as specified in the application for the system, are equivalent. Performance standards and specifications, and compatibility, are to be verified by testing and/or engineering evaluation.

Abbreviated/limited operational testing may be considered since the component has previously undergone 180-day/full certification testing as part of another system.

19.2.3 New Component(s) that have not been Previously Certified on a System.

Components that have not previously been certified with a system, whether for use as an alternate or replacement component, shall be required to undergo operational testing of at least 180 days. Limited operational testing may be considered for such components, if determined to be appropriate by the Executive Officer.

19.2.4 Components that do not affect the performance of the vapor recovery system.

Certification shall not be required for components, either new or modified, determined by the Executive Officer not to affect the performance of the vapor recovery system. An engineering evaluation shall be conducted to document that the change will not affect the performance of the vapor recovery system. The Executive Officer shall notify the applicant in writing of the determination. However, in some cases, such as when a part number changes, an amendment to the Executive Order may be required.

19.2.5 Other Amendments to Executive Orders

(a) System Configurations

Alternative configurations of components of a certified system may be considered for certification based on limited and abbreviated testing. Examples of alternative system configurations include dual fill or remote fill for Phase I and processor placement or vapor piping options for Phase II.

(b) Software Updates

Software revisions of previously certified software components may be considered for certification with limited and/or abbreviated testing. The software change may be approved with no testing if the Executive Officer finds that the software modifications do not affect the vapor recovery system or in-station diagnostic system performance.

19.3 Testing

System or component modifications shall be subjected to sufficient operational, challenge mode, and/or VRED testing to verify the performance and durability of the modified system relative to the certified system that was originally tested.

The level of operational testing to be required is determined as outlined in Section 19.2. Normally, full operational testing of at least 180 days (30 days for Standing Loss Controls that attenuate temperature) is required. Abbreviated and/or limited operational tests may be allowed in some cases, at the discretion of the Executive Officer. If operational tests are abbreviated, the minimum duration (and gasoline throughput requirement) will be specified by the Executive Officer. The test procedure and test frequency requirements for limited operational tests will be specified by the Executive Officer.

If operational testing is required, then the applicant will choose an appropriate test site meeting the requirements of Section 14.1. The applicant shall submit sufficient information to demonstrate that the requirements of Section 12.8 are met.

19.4 Letter of Intent

A letter shall be sent to the applicant stating the Executive Officer's intent to either issue the amended Executive Order or deny the request.

19.5 Issuance of Executive Order

The original expiration date shall be maintained for all Executive Order amendments unless a renewal, as described in Section 18, is specifically requested and approved.

Previous versions of the Executive Order are superseded, as discussed in Section 20.

20. REPLACEMENT OF COMPONENTS OR PARTS OF A SYSTEM WITH A TERMINATED, REVOKED, SUPERCEDED, OR EXPIRED CERTIFICATION

This section applies to systems for which the certification was terminated, revoked, superseded, or has expired. Systems that were installed as of the operative date of a new standard, or that are otherwise subject to Health and Safety Code Section 41956.1, may remain in use for the remainder of their useful life or for up to four (4) years after the effective date of the new standard or the date of revocation, whichever is shorter, provided they comply with all of the specifications of this section. Installed systems that have superseded or expired Executive Orders, unless renewed in accordance with Section 18, may remain in use for up to four (4) years after the expiration date of the Executive Order, provided they comply with all the specifications of Section 20.

20.1 Components and replacement parts meeting the currently and prospectively operative performance standards or specifications may be approved for use as a replacement part with the no-longer-certified system for the remainder of the allowable in-use period of the system.

When an approved, compatible component or replacement part that meets the operative standards or specification is determined to be commercially available, only that component or replacement part shall be installed. Approval shall not require the replacement of already-installed equipment prior to the end of the useful life of that part or component. The approved replacement component shall be considered to be commercially available if that component can be shipped within three weeks of the receipt of an order by the manufacturer of the component.

20.2 A component or replacement part not meeting the currently operative performance standards or specifications, but which was certified for use with the system, shall be used as a replacement only if no compatible component or part that meets the new standards or specifications has been approved as a replacement part.

20.3 A component or part that was not certified for use with the system, and that does not meet all of the currently operative standards or specifications, may be approved as a replacement part or component for use on the system provided that there are no other commercially available certified parts meeting the most current performance standards or specifications.

20.4 Approval of replacement parts shall be requested, evaluated, and granted as follows:

20.4.1 A request shall be submitted to the Executive Officer.

20.4.2 The request shall include the information outlined in Section 18.1 and information demonstrating that the component is compatible with the system.

20.4.3 Requests for replacement parts will be subjected to an engineering evaluation to determine the level of testing required. The Executive Officer may require full operational testing of at least 180 days and other certification tests (e.g. VRED or challenge), allow abbreviated and/or limited operational testing, or determine that additional testing is not necessary.

General criteria to be considered when determining the level of testing are as follows:

(a) similarity of system designs;

(b) information from previous certification testing; and

(c) compatibility of the replacement part.

20.4.4 The Executive Officer shall issue an approval letter to authorize the use of the approved replacement part and to detail any modification to the Executive Order for which the part is approved. Requests not granted shall be documented with a disapproval letter.

CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC MEETING TO CONSIDER APPROVAL OF THE PROPOSED STATE STRATEGY FOR CALIFORNIA'S STATE IMPLEMENTATION PLAN (SIP) FOR THE FEDERAL 8-HOUR OZONE AND PM2.5 STANDARDS

The Air Resources Board (Board or ARB) will conduct a public hearing at the time and place noted below to consider the approval of ARB staff's "Proposed State Strategy for California's State Implementation Plan" (SIP) to attain the national ambient air quality standards for 8-hour ozone and fine particulate matter (PM2.5). At the public hearing, the Board will also consider a modification to the current SIP commitment for pesticide emission reductions in the Ventura County nonattainment area. If adopted, ARB will submit these items to the U.S. Environmental Protection Agency (U.S. EPA) for approval as revisions to the California SIP.

DATE:	June 21 and June 22, 2007
TIME:	9:00 a.m.
PLACE:	Los Angeles Airport Marriott 5855 West Century Blvd. Los Angeles, CA 90045

These items will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., Thursday, June 21, 2007, and may continue at 8:30 a.m., Friday, June 22, 2007. This item may not be considered until June 22, 2007. Please consult the agenda for the meeting, which will be available at least 10 days before June 21, 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 Air Resources Board and local air districts are responsible for developing clean air plans to demonstrate how and when California will attain the new federal 8-hour ozone and PM2.5 standards established under the federal Clean Air Act. For the areas within California that have not attained federal air quality standards, the ARB works with local air districts to develop and implement State and local attainment plans.

This notice focuses only on the proposed State Strategy which consists of emission reduction commitments (predominantly for mobile sources) that are within the State's authority to control. After air districts adopt plans for emission reduction commitments

for sources within their jurisdiction (primarily stationary and area sources), ARB staff will bring these plans to the Board for approval.

The State Strategy proposes commitments for emission reductions that are statewide in nature. The strategies, however, are driven by the considerable amount of emission reductions needed in the South Coast and San Joaquin Valley. These areas experience the worst air quality problems in the State and are also the only two areas in California that exceed the federal PM2.5 standard.

PROPOSED ACTION

The proposed State Strategy would apply throughout California and is intended to help all nonattainment areas attain or maintain the federal 8-hour ozone and PM2.5 standards. Staff is proposing a commitment which consists of three components: a commitment to achieve emission reductions by specific dates, a commitment to propose defined new SIP measures, and a long-term strategy commitment. Defined new SIP measures for Board consideration affect passenger vehicles, heavy-duty trucks, goods movement sources, off-road equipment, fuels and fueling operations, and consumer products. Staff also proposes that the Board approve a commitment to implement further improvements to the Smog Check program and a SIP commitment by the Department of Pesticide Regulation (DPR) to reduce pesticide emissions. Staff is also proposing a modification to DPR's existing SIP commitment to achieve pesticide emission reductions in the Ventura County nonattainment area.

ARB staff has prepared a document entitled *Proposed State Strategy for California's 2007 State Implementation Plan* (State Strategy) which sets forth staff's proposed SIP commitments along with supporting documentation. The document also recommends strategies for reducing emissions from mobile sources and fuels under federal jurisdiction, including ships, locomotives, and trucks registered outside of California.

In compliance with the California Environmental Quality Act (CEQA), an environmental impact analysis has been prepared and is available as an appendix to the proposed State Strategy. Additionally, an economic impact analysis is also included in the appendices.

AVAILABILITY OF DOCUMENTS

Copies of the proposed State Strategy may be obtained from the Board's Public Information Office, 1001 "I" Street, 1st Floor, Environmental Services Center, Sacramento, CA 95814, 916-322-2990. The proposed State Strategy will be available to the public on May 7, 2007, and will be posted on the ARB website at http://www.arb.ca.gov/planning/sip/sip.htm.

PUBLIC PROCESS

During the hearing, ARB staff will make an oral presentation and present recommendations to the Board. 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, June 20, 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 SIP revisions. Further inquiries regarding these items should be directed to Jeff Weir, Staff Air Pollution Specialist, at 916-445-0098 or Ravi Ramalingam, Manager, Transportation Strategies Section at 916-322-2085.

CALIFORNIA AIR RESOURCES BOARD

Catherine Witherspoon
Executive Officer

Date: May 7, 2007

Revised Draft

Air Resources Board's
Proposed State Strategy for California's
2007 State Implementation Plan

Release Date: April 26, 2007

California Environmental Protection Agency

Air Resources Board

This document has been prepared by the staff of the California Air Resources Board. Publication does not signify that the contents reflect the views and policies of the Air Resources Board. The Air Resources Board will consider this document as a revision to the California State Implementation Plan at a noticed public meeting tentatively scheduled for June 21-22, 2007.

Electronic copies of this document can be found on ARB's website at http://www.arb.ca.gov/planning/sip/sip.htm. Alternatively, paper copies 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.

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.

Please send written comments to:

Mr. Kurt Karperos, P.E., Chief
Air Quality and Transportation Planning Branch
California Air Resources Board
P.O. Box 2815
Sacramento, California 95812
Phone: (916) 322-0285
Fax: (916) 322-3646

For general questions, contact:

Mr. Ravi Ramalingam, P.E., Manager
Transportation Strategies Section
Phone: (916) 322-2085
Email: rramalin@arb.ca.gov

Air Resources Board's Proposed State Strategy for California's 2007 State Implementation Plans

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Executive Summary

Introduction

The Air Resources Board's proposed State Strategy for California's 2007 State Implementation Plan (SIP) is a comprehensive strategy designed to attain federal air quality standards through a combination of technologically feasible, cost-effective, and far reaching measures. It describes the scope of the State's ozone and fine particulate matter (PM2.5) nonattainment problems and presents ARB staff's recommendations on how California can comply with federal standards. The proposed strategy will be considered for adoption by ARB's Governing Board on June 21-22, 2007.

Under State law, ARB has the responsibility to develop SIP strategies for mobile sources and consumer products, to coordinate SIP strategies with the Bureau of Automotive Repair (BAR) and Department of Pesticide Regulation (DPR), and to oversee local district programs for stationary sources.

The 2007 SIP is the first plan designed to show how California will meet the federal 8-hour ozone standard – it represents a transition from the less stringent 1-hour standard that was the benchmark for previous SIPs. Since the new standard is more stringent, the U.S. Environmental Protection Agency (U.S. EPA) set presumptive deadlines that allow more time for attainment. Nonetheless, the measures California has adopted to meet the 1-hour standard remain in place and will deliver substantial new reductions over the next few years. These measures have enabled San Diego, Ventura, Santa Barbara, and the San Francisco Bay Area to meet the 1-hour ozone standard.

The benefits of California's mobile source control program are evident and serve as the foundation for this new State Strategy. For example, the mobile source regulations already in place will reduce today's emissions from passenger vehicles and heavy-duty trucks another 50 percent by 2015. The ARB staff's proposed State Strategy would further accelerate the reductions. Staff's proposed State Strategy addresses three key mobile source issues: the need to clean up the legacy diesel fleets, the national and international nature of many diesel fleets, and limitations on SIP credit for unsecured funding.

The proposed State Strategy, in combination with local actions, would provide emission reductions necessary to the meet 8-hour ozone standard in the two most challenging regions -- the South Coast Air Basin and the San Joaquin Valley. The State Strategy is also necessary, in whole or part, for the Sacramento region, Ventura, and several locations downwind of urban areas. Ozone SIPs are due to U.S. EPA in June 2007.

The State Strategy provides reductions needed for PM2.5 attainment in the South Coast and expected to be necessary for the San Joaquin Valley. PM2.5 SIPs for these two regions are due in 2008.

Adoption of the State Strategy by the Board would create an enforceable commitment for new emission reductions by the attainment deadline for each region. These commitments reflect the proposed attainment deadlines of 2024 for ozone for the South Coast and San Joaquin Valley and a deadline of 2015 for PM2.5. As in past SIPs, staff has estimated the expected emission reductions from various measures and a schedule for Board consideration. The Board retains the ability to modify staff proposals and achieve the necessary reductions through other measures or mechanisms.

This proposal includes aggregate emission reduction commitments for 2014 for South Coast and San Joaquin Valley PM2.5, and for 2020 and 2023 for South Coast and San Joaquin Valley ozone. The commitments precede the attainment deadline by one year in order to comply with federal SIP requirements. Staff may propose additional commitments for Board consideration in the future to the extent necessary. A PM2.5 SIP is under development by the San Joaquin Valley District and on track for adoption in 2008. The South Coast has proposed early adoption of a PM2.5 SIP in parallel with the ozone SIP due this year.

The 2023 commitment for ozone includes the long-term emission reductions needed for ozone attainment in the South Coast and San Joaquin Valley under the "new technology" provisions of the Clean Air Act (section 182(e)(5)). Staff proposes that ARB take on the full legal commitment for these reductions with the understanding that advances in technology for sources under local air districts' jurisdiction should contribute to future reductions. Until new mobile and stationary technologies become available, we propose to defer the issue of how to apportion long-term emission reduction obligations among responsible agencies. This issue will be revisited in future SIP updates. In the meantime, ARB would be responsible for all the long-term reductions upon SIP approval.

<u>Proposed Mobile Source Strategy</u>

The mobile source strategy has two distinct components – more stringent standards for new engines and cleanup of existing fleets. For passenger vehicles, ARB's Low Emission Vehicle Program ensures that new vehicles entering the fleet are exceptionally clean. The challenge is maintaining low emission levels over time and getting the oldest, dirtiest remaining vehicles off the road as soon as possible. The State Strategy proposes improvements to Smog Check and expansion of vehicle scrap programs to achieve these goals.

The biggest mobile source challenge is cleaning up legacy fleets of diesel engines – including trucks, construction and farm equipment, ships and locomotives. Emissions of NOx (nitrogen oxides) from diesel engines contribute to both ozone and PM2.5 levels. Emissions of SOx (sulfur oxides) from ships are a significant contributor to PM2.5 levels. Directly emitted particulate matter from diesel engines contributes to PM2.5 levels. ARB has adopted a number of measures to reduce emissions from diesel fleets under ARB's 2000 Diesel Risk Reduction Plan and 2006 Goods Movement Emission Reduction Plan.

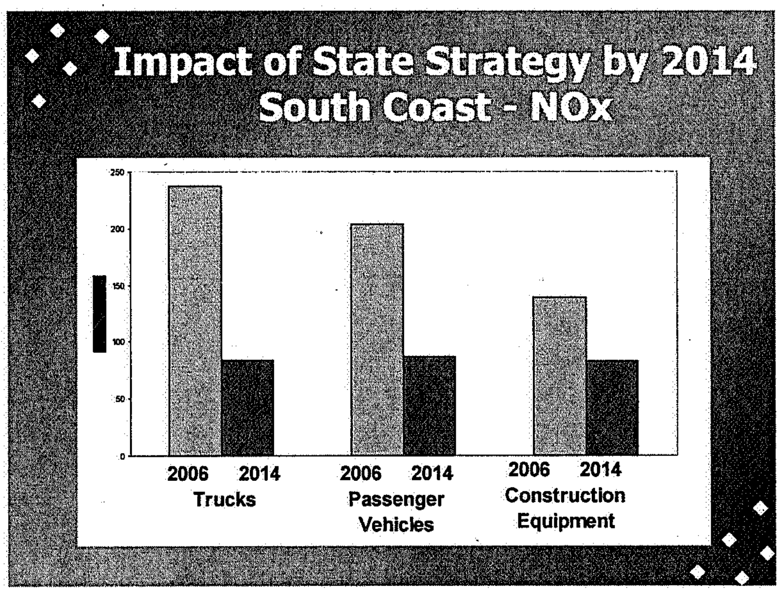
The proposed State Strategy would incorporate measures from these plans into the California SIP. This includes new measures for port trucks, statewide truck fleets, ships traveling and in port, locomotives, and harbor craft. These measures would accelerate introduction of newer, cleaner engines and, where available, require retrofit controls. The cost of these measures will be in the billions of dollars but these reductions are necessary to meet air quality standards and reduce the health and economic impacts of air pollution in California.

The mobile source reductions rely primarily on regulatory actions by ARB, BAR, and U.S. EPA. International actions to require cleaner new ship engines and retrofits are also part of the longer-term strategy. Actions by the ports and private sector and public funding would complement the regulatory strategies. However, the enforceable SIP obligation to achieve the specified emission reductions would rest with the Board.

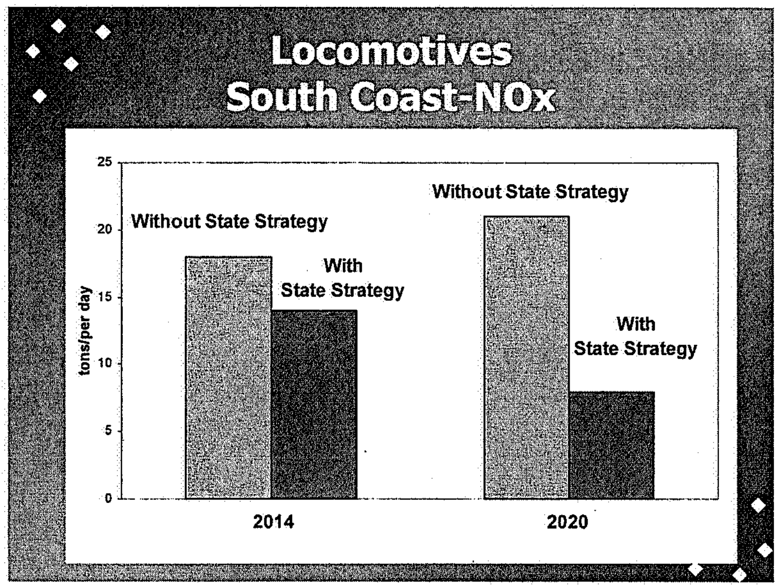
The Board's authority to regulate mobile sources varies by category and circumstance. Under California law, the Board can set new engine standards for mobile sources, but federal preemptions and practical limitations apply to many diesel engines categories. For example, under the federal Clean Air Act, only U.S. EPA can set new engine standards for locomotives and construction and farm equipment equipped with off-road engines less than 175 horsepower. In the case of new heavy-duty diesel trucks and other new and in-use off-road engines, ARB may establish emission standards, but must obtain a waiver/authorization from U.S. EPA before it can enforce such regulations. The interstate nature of trucking makes national standards for new trucks a practical necessity. While not admitting preemption, we recognize that U.S. EPA has the responsibility to represent California's interests in the international standard setting process for ocean-going ships. In short, ARB must rely on the federal action to set the new technology standards that form much of the basis for ARB staff's proposed measures to accelerate cleanup of legacy diesel fleets.

The timing of federal standards is an important part of the picture. California can only accelerate the introduction of cleaner technology once cleaner engines are available. The cleanest NOx standards phase in for trucks in 2010 and between 2013-2017 for various types of construction and other off-road equipment. U.S. EPA has proposed more stringent NOx standards for new locomotives that would begin in 2017. ARB staff continues to make the case that these standards need to be implemented prior to 2014. While the interim standards now in place are contributing to current progress, the magnitude of the reductions needed in the South Coast and San Joaquin Valley will ultimately require the cleanest technology in every diesel engine application.

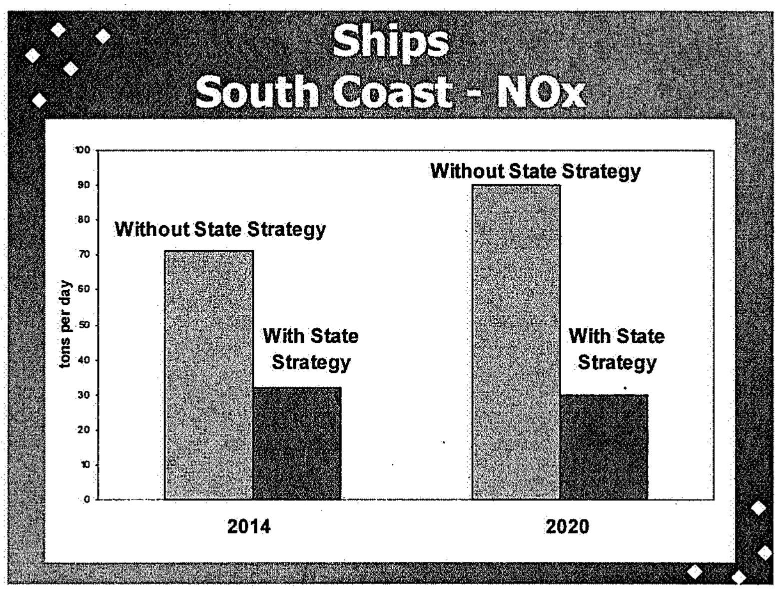
The proposed mobile source strategy and SIP commitments are described in Chapter 3. Individual measures are described in more detail in Chapter 5. The figure below shows the decrease in emissions for passenger vehicles, heavy-duty trucks, and construction equipment between now and 2014 with the proposed State Strategy. Due to increasingly more stringent mobile source controls, emissions from these categories are all on a downward trend, despite growth in population, travel, and the economy. The new measures in the proposed State Strategy would accelerate these emissions reductions. ARB staff is proposing an aggressive new emission reduction commitment of 122 tons per day of NOx reductions in the South Coast by 2014 in order to meet the region's PM2.5 attainment needs. This would bring the total mobile source NOx reductions achieved between 2006 and 2014 to about 450 tons per day.



In contrast to passenger vehicles, trucks, and construction equipment that show substantial emission decreases with natural fleet turnover, locomotive and ships show an increase in emissions without the proposed State Strategy. Locomotive emissions have been decreasing in the South Coast due to the accelerated introduction of the cleanest current technology (Tier 2). However, as shown below, growth overtakes this benefit by 2014. The proposed State Strategy includes a measure to accelerate introduction of the next generation of clean technology once U.S. EPA adopts its proposed new Tier 4 standards. The 2014 benefits assume Tier 4 engines becoming available in 2012. The 70 percent reduction projected for 2020 is based on the proposed measure to accelerate the introduction of Tier 4 locomotives to California.



Ocean-going ships show an even greater increase in emissions without the State Strategy. Ship engines are largely uncontrolled, and growth in goods movement through California ports will exacerbate this problem. The figure below shows the benefits of the proposed State Strategy in the South Coast.



<u>Proposed Consumer Products Strategy</u>

Consumer products are expected to become the largest source of reactive organic gas (ROG) emissions in the South Coast and the third largest source in the San Joaquin Valley by 2020. The magnitude of the emissions indicates that additional controls for this sector remain important, even though the average photochemical reactivity of the ROG emissions from consumer products is about one-third that of motor vehicle exhaust. The proposed State Strategy would continue ARB's commitment to reduce ROG emissions from consumer products.

Two new phases of control are proposed. One is under development for Board consideration by 2008 and the other between 2010 and 2012. As part of ARB's longer-term strategy, staff also proposes to explore additional market-based mechanisms to encourage the development, distribution, and purchase of cleaner, very low, or zero emitting products.

The table below shows the expected reductions from the proposed State Strategy in 2014 for South Coast and San Joaquin Valley. The benefits of the State Strategy will increase over time. The expected reductions in 2020 and 2023, along with the proposed timeframes for staff development, Board consideration, and implementation of the these measures is found in Chapter 3.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)
South Coast and San Joaquin Valley -- 2014

	South Coast		San Joaquin Valley	
Proposed New SIP Measures	**NOx**	**ROG**	**NOx**	**ROG**
Passenger Vehicles	**14.4**	**17.7**	**3.8**	**6.5**
Smog Check Improvements (BAR)	12.0	10.5	3.3	2.9
Expanded Vehicle Retirement	2.4	2.8	0.5	0.7
Modifications to Reformulated Gasoline Program	--	4.4	--	2.9
Heavy-Duty Trucks	**47.3**	**5.1**	**61.4**	**6.4**
Cleaner In-Use Heavy-Duty Trucks	47.3	5.1	61.4	6.4
Goods Movement Sources	**49.4**	**0.7**	**7.2**	**0.5**
Ship Auxiliary Engine Cold Ironing & Clean Technology	18.5	--	--	--
Cleaner Main Ship Engines and Fuel	20.0	--	--	--
Port Truck Modernization	2.0	--	--	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	4.3	0.7	7.2	0.5
Clean Up Existing Harbor Craft	4.6	--	--	NYQ
Off-Road Equipment	**10.5**	**2.7**	**3.7**	**0.9**
Cleaner In-Use Off-Road Equipment (e.g.,Construction)	10.5	2.7	3.7	0.9
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	NYQ
Other Off-Road Sources	**0.4**	**6.6**	**0.1**	**3.5**
New Emission Standards for Recreational Boats	0.4	4.2	0.1	1.3
Expanded Off-Road Rec. Vehicle Emission Standards	--	2.4	--	2.2
Additional Evaporative Emission Standards	--	NYQ	--	NYQ
Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	NYQ
Areawide Sources	**--**	**12.9**	**--**	**5.7**
Consumer Products Program	--	12.9	--	3.2
Pesticides: DPR 2008 Regulation	--	NYQ	--	2.5
Emission Reductions from Proposed New Measures	**122**	**46**	**76**	**23**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation

Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.
Note: Emission reductions reflect the combined impact of regulations and supportive incentive programs. Emission reduction estimates for each proposed measure are shown for informational purposes only. Actual emission reductions from any particular measure may be greater than or less than the amounts shown.

<u>Major Issues</u>

Bump Up to "Extreme" for Ozone

There is concern that the proposed State Strategy does not provide sufficient emission reductions to show attainment of the ozone standard earlier than the deadlines proposed in the South Coast and San Joaquin Valley SIPs. Both ozone SIPs propose an "extreme" classification for the 8-hour ozone standard which sets an attainment deadline of 2024. Under the federal Clean Air Act, the extreme classification carries with it an ability to rely on as yet undefined new technologies where necessary (section 182(e)(5)).

Both regions were previously classified as "extreme" for the 1-hour ozone standard based on the severity of their ozone problem. With the transition to the more stringent 8-hour standard, these districts were classified as severe-17, with an attainment deadline of 2021 (South Coast), and serious, with an attainment deadline of 2013 (San Joaquin Valley), based solely on their ambient concentrations of ozone. In reality, both districts need more time to accomplish the substantial emission reductions required for attainment.

Air districts have the ability to request a reclassification, and in the case of a request to reclassify to "extreme," U.S. EPA must grant the request. Since such a request frames a district's attainment demonstration, ARB must also accept the reclassification request unless the Board rejects a district SIP as inconsistent with federal requirements.

The proposed reclassifications raise the issue of how the 2024 attainment deadline will affect air quality progress and the health impacts of air pollution in these regions. This is a very real concern. Accordingly, in the SIP development process considerable effort was devoted to assessing whether these bump-ups could be avoided.

ARB staff considered whether existing technologies, if applied across the board to all mobile and stationary sources, could achieve the necessary emission reductions to attain sooner. Unlike rulemaking processes, this analysis was performed for SIP development purposes without considering cost as a constraint.

The analysis showed that all diesel fleets would need to turn over to the newest engine standards that phase in between 2010 and 2017, all passenger vehicles would need to be no older than 10 years, and substantial additional reductions would be needed from new technologies for both mobile and stationary sources. The only other potential option for fully achieving the remaining reductions would be to constrain growth, business operations, and personal travel. Absent policy decisions to impose such restrictions, ARB staff believes it is necessary to make use of the new technology provision of the Clean Air Act. For the San Joaquin

Valley, about 10 percent of the necessary reductions would fall in this category. For the South Coast, it would be about 25 percent of the necessary reductions.

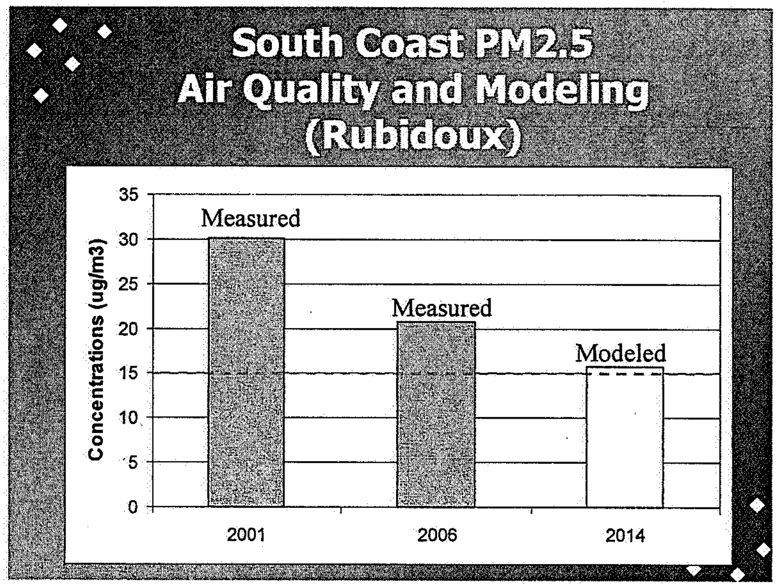
To address concerns about delays in attainment, ARB staff proposes to continue to identify and pursue additional actions that would.further accelerate air quality progress. While it is unlikely that the entire ozone attainment gap will be filled without new technology, staff believes additional progress could be made if, for example, more incentive funds became available. Also, as regions move closer to attainment, episodic "spare the air" type programs may be able to provide the final increment of reductions needed a few days per year. Public education and outreach to encourage voluntary actions have historically been key elements of these programs.

South Coast PM2.5 SIP

How the SIP should address the PM2.5 attainment challenge in the South Coast continues to be controversial. The proposed State Strategy along with district measures leaves an emission reduction gap in the South Coast's proposed attainment demonstration of about 70 tons per day of NOx in 2014. The South Coast air district staff has identified a set of measures -- mobile source NOx measures -- for ARB to adopt to close the gap. This would be above and beyond the 451 tons per day of NOx reductions in the proposed State Strategy. ARB staff believes the District's suggested mobile source measures are not feasible without billions of dollars of unidentified subsidies to expedite the introduction of the newer, cleaner diesel vehicles and equipment.

ARB technical staff has reviewed South Coast's proposed PM2.5 attainment demonstration and identified additional local measures to reduce directly emitted particulate matter. ARB staff believes these measures can bridge the gap and achieve the standard by 2014. These measures would reduce emissions from residential wood smoke, restaurant cooking, and dust-generating activities. The ARB staff's analysis and the peer review of the staff methodology are discussed in Chapter 4.

It is important to recognize that the projected gap in reductions is based on a modeling assessment that is more pessimistic than the measured air quality trend. Between 2001 and 2006, the measured PM2.5 annual average dropped from 30 to just over 20 ug/m^3 consistent with the downward emissions trend. If that trend continues, the emission reductions in the proposed State Strategy will be sufficient for attainment. The South Coast predicts that with ARB staff's proposed State Strategy, the highest remaining concentration in 2014 would 15.7 ug/m^3 -- less than one microgram above the 15 ug/m^3 standard. Even if that modeling is correct, ARB's alternative attainment strategy would close that gap.



In light of the measured PM2.5 progress over the past 15 years, and the magnitude of the new emission reductions that will occur, ARB staff believes that the South Coast will attain the PM2.5 standard by 2015 with the mobile source measures in the proposed State Strategy. Nonetheless, to be health protective and meet U.S. EPA SIP modeling requirements, staff believes that additional feasible measures should be pursued. Using the South Coast model, ARB staff found that the proposed local measures for residential wood smoke, restaurant cooking, and fugitive dust would close the apparent gap.

Proposed Action

Staff is recommending that the Board adopt the proposed State Strategy to meet both ozone and PM2.5 attainment needs in the South Coast Air Quality Management District and the San Joaquin Valley Air Pollution Control District at ARB's June 21-22, 2007 public meeting. The State Strategy, in combination with near-term local air district measures, must meet the emission reduction target in each region's attainment demonstration.

The sequence of public meetings to consider the various SIP elements is:

- April 30, 2007 – San Joaquin Valley Air Pollution Control District Governing Board consideration of the San Joaquin Valley Ozone Plan.
- June 1, 2007 (tentative) – South Coast Air Quality Management District Governing Board consideration of the South Coast Air Quality Management Plan.
- June 14, 2007 – ARB consideration of San Joaquin Valley Ozone Plan.
- June 21-22, 2007 – ARB consideration of the proposed State Strategy and South Coast District Air Quality Management Plan for ozone and PM2.5.
- April 2008 – Completion of San Joaquin Valley PM2.5 SIP.

Next Steps

Once local plans and the State Strategy are approved by the local and State governing boards, they are submitted to U.S. EPA for approval.

SIPs are generally updated on a triennial basis for regions with the most persistent air quality problems. When U.S. EPA revises national ambient air quality standards, new SIP planning processes are triggered. U.S. EPA recently tightened its 24-hour PM2.5 standard and is currently reviewing the 8-hour ozone standard. Final U.S. EPA action on the 8-hour ozone standard review is expected by March 2008.

Technical Supporting Documents

By May 7, 2007 – 45 days before the June 21-22, 2007 Board hearing — ARB staff will release these additional elements as an appendix to this document.

- Economic analysis;
- Environmental impacts analysis;
- Detailed emissions data;
- Reasonable Further Progress demonstrations;
- Contingency reductions for progress milestone years; and
- Legal authority and other federally required submittals.

1. BACKGROUND

General SIP Requirements

California's 2007 State Implementation Plans (SIPs) are a combination of State and local air quality planning documents that must show how California will meet federal the 8-hour ozone standard statewide. The San Joaquin Valley, South Coast Air Basin, Sacramento region, San Diego, Ventura, and a number of air districts downwind of urban areas are nonattainment for the ozone standard. Ozone SIPs must be submitted to U.S. EPA by June 15, 2007.

This document is the State's emission reduction strategy for sources of pollution under State and federal authority (State Strategy), and, for every local region not meeting federal standards, a demonstration of how attainment of the 8-hour ozone standard will be achieved.

In addition to ozone SIPs, the South Coast and San Joaquin Valley must prepare PM2.5 SIPs for submittal to U.S. EPA by April 5, 2008. For the South Coast Air Basin, the South Coast Air Quality Management District is developing a PM2.5 SIP in parallel with the ozone SIP. The San Joaquin Valley PM2.5 SIP in on track to be submitted in 2008.

The 2007/2008 ozone and PM2.5 SIPs are another step in the air quality planning process that over the years has helped define new actions to improve California's air quality. ARB has adopted a series of regulations over the past 10 years to implement measures in the 1994 ozone SIP, as well as additional new ARB measures identified in the 2003 SIP update. New mobile source regulations, reformulated gasoline, and multiple consumer products regulations envisioned in these SIPs have been adopted and are being implemented today. And, while California has serious air quality challenges ahead, it is important to recognize the progress made as a result of California's landmark air pollution control programs. With that experience and history of success, we need to continue to do more. ARB staff recognizes the importance of the new State measures and are proposing a full slate of new measures for development and consideration by the Board.

National Air Quality Standards

The U.S. EPA adopts standards for ambient (outdoor) air pollutants designed to protect public health. Extensive studies on the health effects of air pollution worldwide have confirmed the importance of continuing to reduce people's exposure to air pollution. U.S. EPA is required to review its air quality standards every five years.

In July 1997, the federal government announced new national ambient air quality standards (NAAQS) for the pollutants ozone and particulate matter (PM). The new standards provide more protection from the harmful health effects of these pollutants. The ozone standard was revised to protect against longer pollutant exposure periods by requiring that ozone concentrations not exceed specified levels over an 8-hour period instead of a 1-hour period. A new particulate matter standard was added to protect against the smaller inhalable particles, less than two and a half microns in diameter (PM2.5). Air quality standards have become more stringent over time as new studies have shown adverse health effects at lower levels. The standards below are the current benchmark for federal SIP requirements. U.S. EPA is currently reviewing the adequacy of the current 8-hour standard. And in December 2006, U.S. EPA adopted a more stringent 24-hour PM2.5 standard of 35 micrograms per cubic meter. This will likely mean that several new areas will be required to prepare a plan to attain the newer standard. Initial State recommendations for nonattainment areas are due in late 2007, with final nonattainment areas determined by U.S. EPA in early 2010. Plans for the revised 24-hour standard will be due in 2013, with attainment dates to be determined after U.S. EPA issues transition guidance.

Ozone Standard

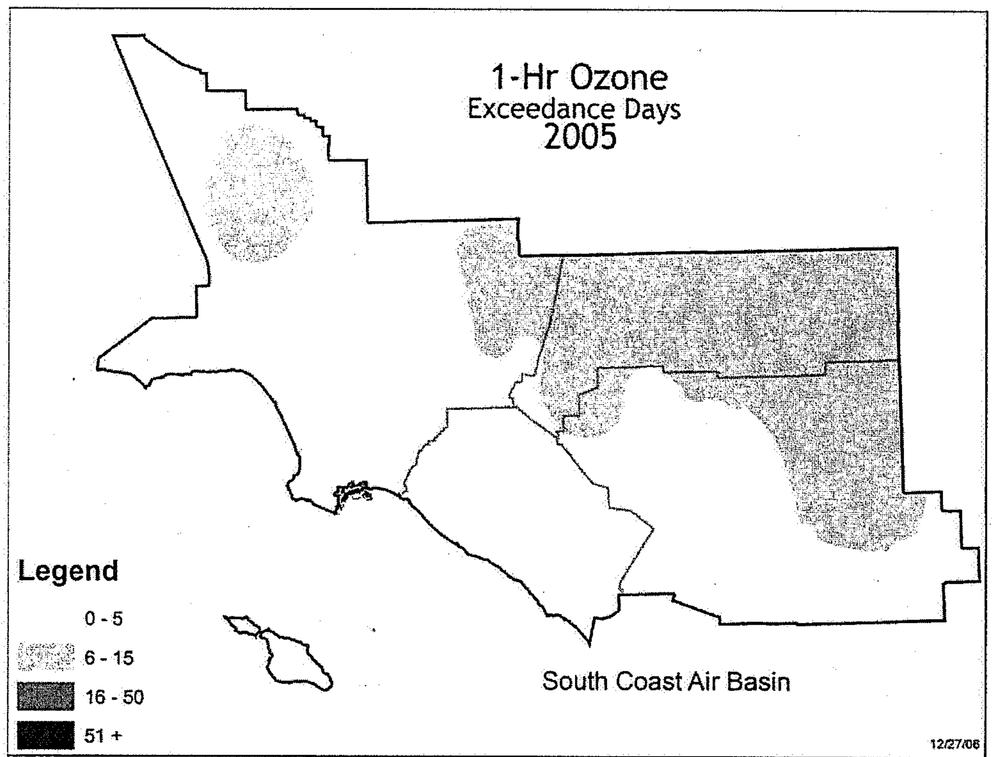
0.08 parts per million for 8 hours, not to be exceeded, based on the fourth highest concentration averaged over three years.

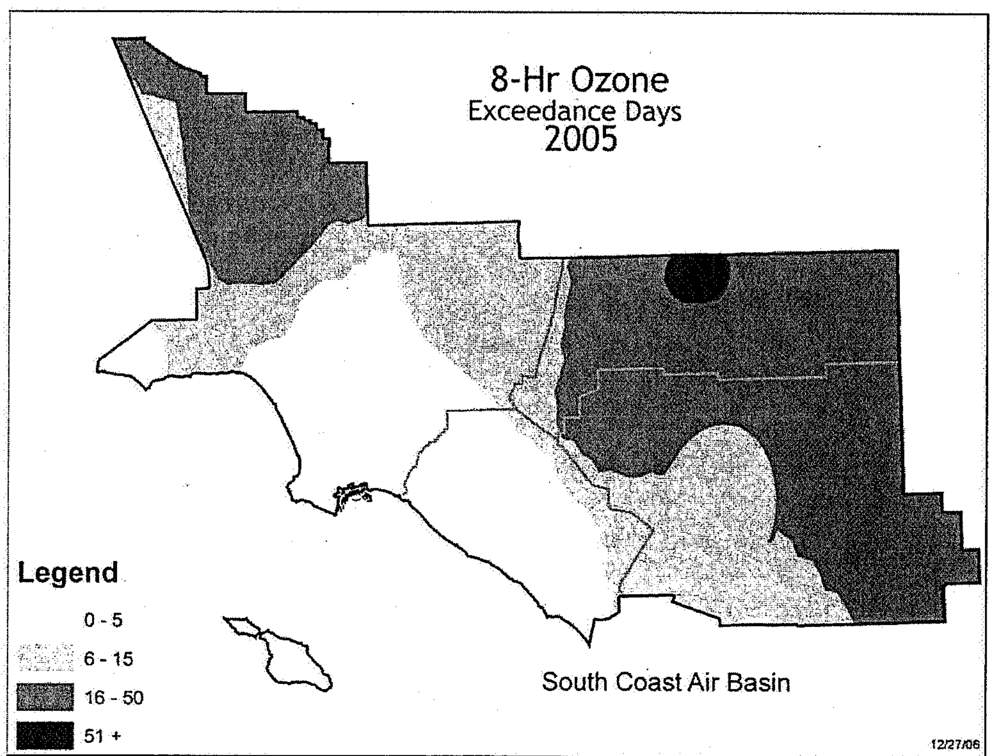
PM 2.5 Standards

65 micrograms per cubic meter for 24 hours, not to be exceeded, based on the 98th percentile concentration averaged over three years, *and* **15 micrograms per cubic meter annual average** (arithmetic mean) averaged over three years.

How much more stringent is the 8-hour ozone standard than the 1-hour ozone standard? The two maps on the following page illustrate a dramatic difference in exceedance days (number of days that violated the standard) for the 1-hour standard versus the 8-hour standard in the South Coast air basin in 2005. While many areas of California continue to be in violation of federal air quality standards, real air quality progress has been made, as we will illustrate later. The clean air bar simply continues to be raised as we learn more about the health effects of air pollution.

Comparison of 1-Hr Ozone Standard and More Stringent 8-Hr Ozone Standard in the South Coast Air Basin





Health Effects of Ozone and PM2.5

Ozone

The formation and health impacts of ozone are very well studied. Ozone is a highly reactive gas that forms in the atmosphere through complex reactions between chemicals directly emitted from motor vehicles, industrial plants, consumer products and many other sources. It forms in greater quantities on hot, sunny, calm days making the summer season the key exposure period.

Considerable research over the past 35 years has investigated how people respond to inhaling ozone. These studies have consistently shown that inhalation of ozone can lead to inflammation and irritation of the tissues lining the human airways. This causes the muscle cells in the airways to spasm and contract, thus reducing the amount of air that can be inhaled. Symptoms and responses to ozone exposure vary widely, even when the amount inhaled and length of exposure is the same. Typical symptoms include cough, chest tightness, and increased asthma symptoms. Ozone in sufficient doses can also increase the permeability ("leakiness") of lung cells, making them more susceptible to damage from environmental toxins and infection.

Medical studies of large populations have found that ozone exposure is associated with an increase in hospital admissions and emergency room visits, particularly for lung problems such as asthma and chronic obstructive pulmonary disease. Several studies have also associated ozone exposure with increased premature mortality in elderly people with chronic diseases of the lungs and circulatory system.

People who exercise or work outdoors are at greater risk of experiencing adverse health effects from ozone exposure because they inhale more ozone. Current evidence has linked the onset of asthma to exposure to elevated levels of ozone in exercising children. Children and adolescents are at increased risk because they are more likely to spend time outdoors engaged in vigorous activities than adults and because they inhale more ozone per pound of body weight.

PM2.5

Particulate matter (PM) air pollution is also well studied. Particulate matter pollution is a complex mixture that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. PM can be directly emitted into the air in forms such as dust and soot. It can also be formed in the atmosphere from the reaction of various gases. Particulate matter is less than 10 microns in diameter (a micron is one-millionth of a meter) and is called PM10. Even smaller particles, those 2.5 microns or less in diameter, are called "fine particles" or PM2.5, and are the target of this SIP. PM2.5 is a component of PM10.

Extensive research has shown that PM can be inhaled into the deep portions of the lungs. Some inhaled particles are exhaled again, but others deposit in the lungs, which can lead to inflammation in both the lungs and the circulatory system. PM2.5 poses an increased health risk because it can penetrate deeper into the lungs and may also enter the bloodstream.

Population-based studies in hundreds of cities around the world have demonstrated a strong link between elevated particulate matter levels and premature death in people with pre-existing heart or lung disease. The two most important of these studies were performed in many cities in the United States, and have been ongoing for over 15 years. Both of these studies found a strong relationship between long-term PM exposure and premature death.

Scientists have observed higher rates of hospitalization, emergency room visits and doctor's visits for respiratory illnesses or heart disease during times of high PM concentrations. During these periods of high PM levels, scientists also observed the worsening of both asthma symptoms and acute and chronic bronchitis, and reductions in various measures of lung function.

The elderly and people with heart and/or lung diseases are particularly at risk of experiencing adverse effects from PM exposure. Studies have also shown that children may be particularly vulnerable to PM effects. There is evidence from the 10-year Children's Health Study funded by the ARB that in communities with high levels of PM children's lungs develop more slowly and that at maturity they tend to have lower lung capacity than children who grow up in communities with lower levels of PM. Just as with ozone, children and infants may also be more at risk of experiencing adverse effects from PM because they inhale more air per pound of body weight than do adults, they breathe faster, and have smaller body sizes. In addition, there is some evidence that children's immature immune systems may cause them to be more susceptible to PM than adults.

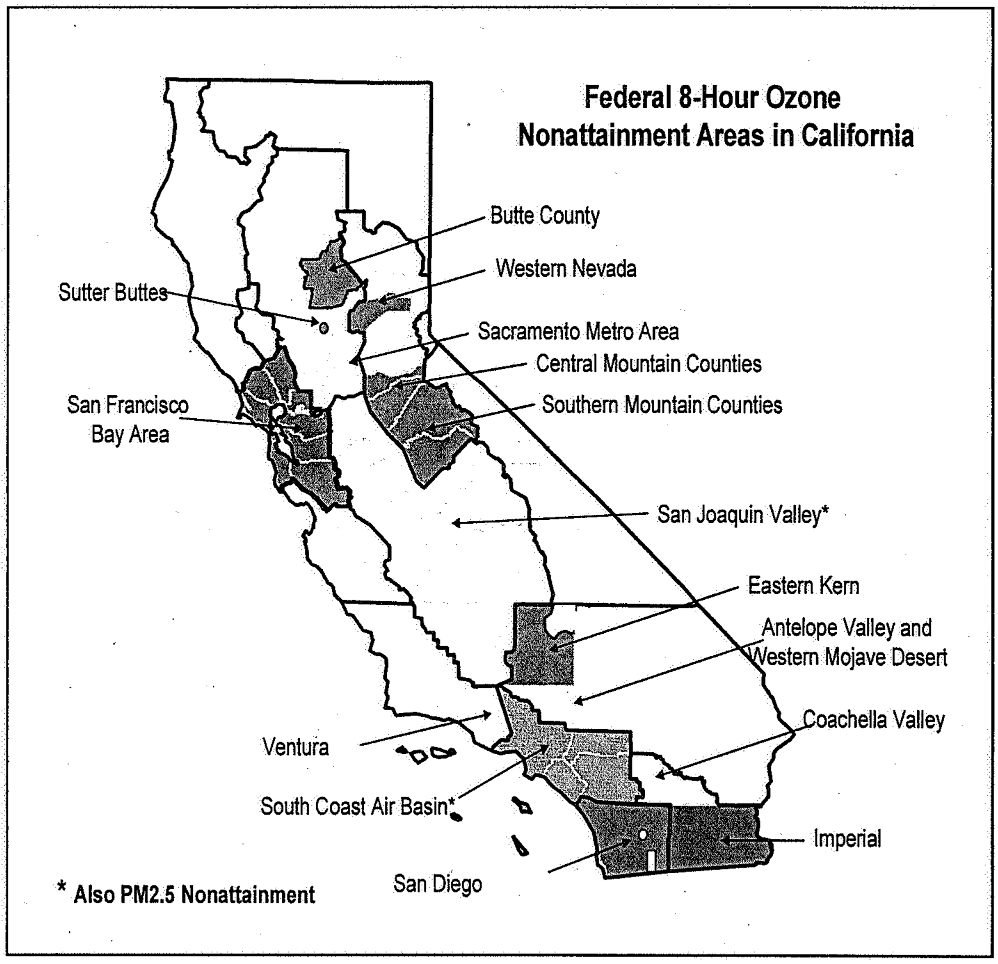
<u>Nonattainment Areas and Air Quality Trends</u>

Geographic areas that exceed a federal air quality standard are called nonattainment areas. A comprehensive network of monitoring stations throughout California measures air quality and provides the data necessary to determine whether an area meets or exceeds federal ozone and PM2.5 air quality standards.[1]

Compliance with the federal ozone and PM2.5 standards is based on pollutant concentrations, measured at a comprehensive network of monitoring stations throughout California, averaged over three years. These three-year averages are called *design values*. Air quality monitoring in the years 2001 through 2003

[1] More about California's air quality monitoring network can be found on ARB's website at: *http://www.arb.ca.gov/aaqm/aaqm.htm*

was used by U.S. EPA to designate 15 areas in California as nonattainment for the federal 8-hour ozone standard. The San Joaquin Valley and South Coast Air Basin are also nonattainment for PM2.5.



A specific year's design value is averaged over three years. For example, the design value for the year 2001 reflects the averages for the years 1999, 2000, and 2001. Ozone design values are an average of the fourth highest concentrations for each of the last three years. Design values for the PM2.5 annual average reflect annual average (arithmetic mean) concentrations averaged over the last three years. The PM2.5 24-hour design values reflect the 98th percentile concentrations averaged over the last three years.

For the ozone standard, areas are classified based on the severity of the problem. In descending order in terms of magnitude of the problem, the classifications are *extreme*, *severe*, *serious*, *moderate*, and *marginal*. The Clean Air Act provides more time to meet the standard based on the severity of the problem. Based on its classification an area is given an attainment deadline. A special designation, called *basic*, refers to nonattainment areas governed under a separate set of requirements in the Clean Air Act. For PM2.5, U.S. EPA simply designated the South Coast and San Joaquin Valley as nonattainment without application of the classification scheme used for PM10. This results in an attainment deadline of 2015.

Ozone Nonattainment Area	Nonattainment Designation (Current / Anticipated)	Attainment Year (Current / Anticipated)
South Coast Air Basin	Severe / Extreme	2021 / 2024
San Joaquin Valley	Serious / Extreme	2013 / 2024
Coachella Valley	Serious / Severe	2013 / 2019
Sacramento Region	Serious / Severe	2013 / 2019
Antelope Valley and Western Mojave Desert	Moderate / Severe	2010 / 2019 or 2021
Ventura County	Moderate / Serious	2010 / 2013 or 2019
Imperial County	Marginal	2007
San Francisco Bay Area	Marginal	2007

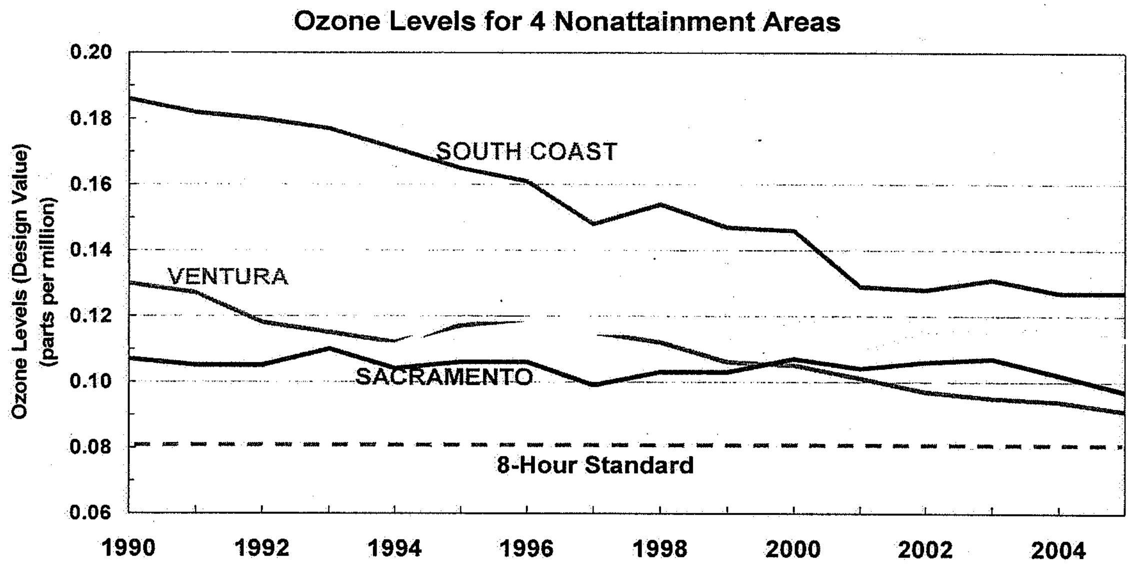
Basic Ozone Nonattainment Areas Attainment Year 2009-2014
Butte County
Central Mountain Counties
Eastern Kern County
San Diego County
Southern Mountain Counties
Sutter Buttes
Western Nevada County

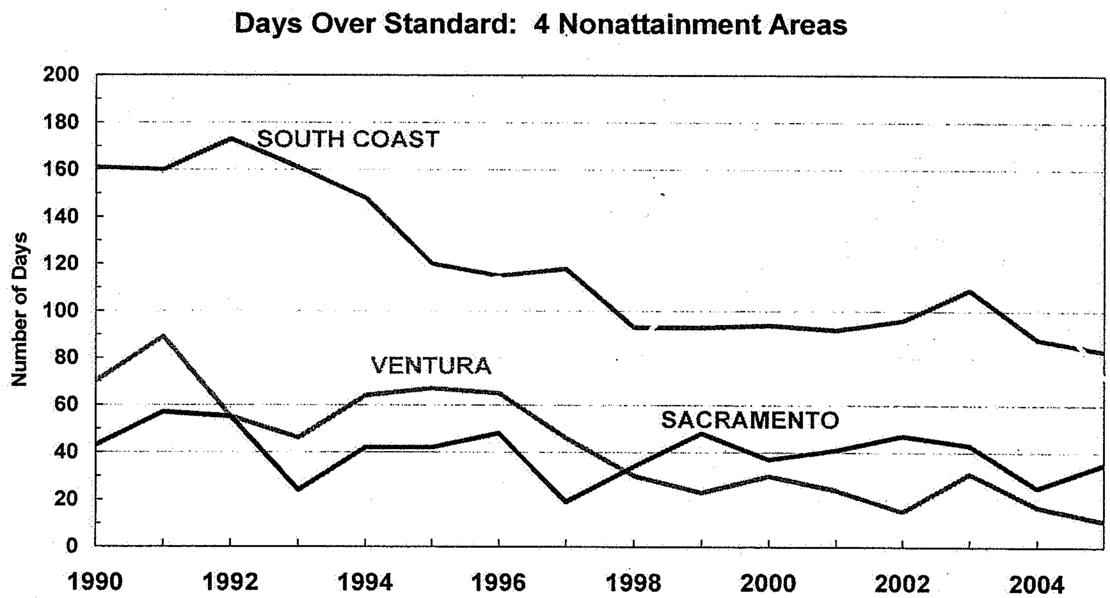
The above table lists the marginal through extreme nonattainment areas for the federal 8-hour ozone standard, while the table to the right lists the areas with the special basic ozone nonattainment designation. The Clean Air Act allows changing of nonattainment designations and the extension of the attainment deadline if the State believes a change is needed after analyzing the nature of the ozone problem and challenges to meet the standard. So the above table includes the current attainment designations, as well as designation changes that may be needed based on regional analyses.

For this set of SIPs, U.S. EPA has provided guidance on how to interpret the attainment deadline as it relates to attainment demonstrations. The question arises because the deadlines are mid-year. The ozone attainment deadline is June 15 and the PM2.5 deadline is April 5 of the attainment year. To address the issue, U.S. EPA guidance calls for the analysis of attainment to be done for the year prior to the actual attainment year. So in this document we will be showing emission reduction targets and emissions for the year prior to the attainment year. For example, if the attainment year is 2024, we will be showing emission reduction targets and emissions for the year 2023.

Ozone Trends

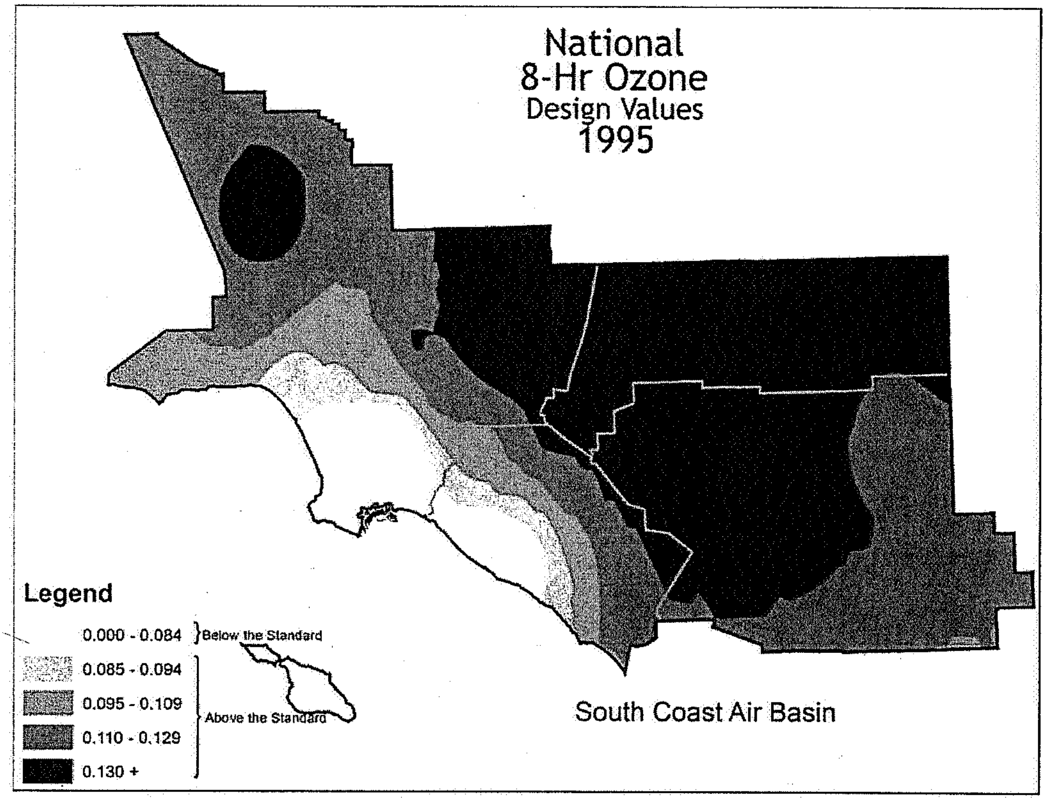
A snapshot of four ozone nonattainment areas on the next page shows ozone levels (design values) relative to the federal standard and number of days over the standard since 1990. The ozone levels chart gives a sense of recent progress toward meeting the standard as well as how far we still have to go. The San Joaquin Valley and the South Coast have the most days exceeding the standard and the South Coast has the highest design values. In general, ozone trends show the greatest improvement in coastal areas like San Diego and Ventura.

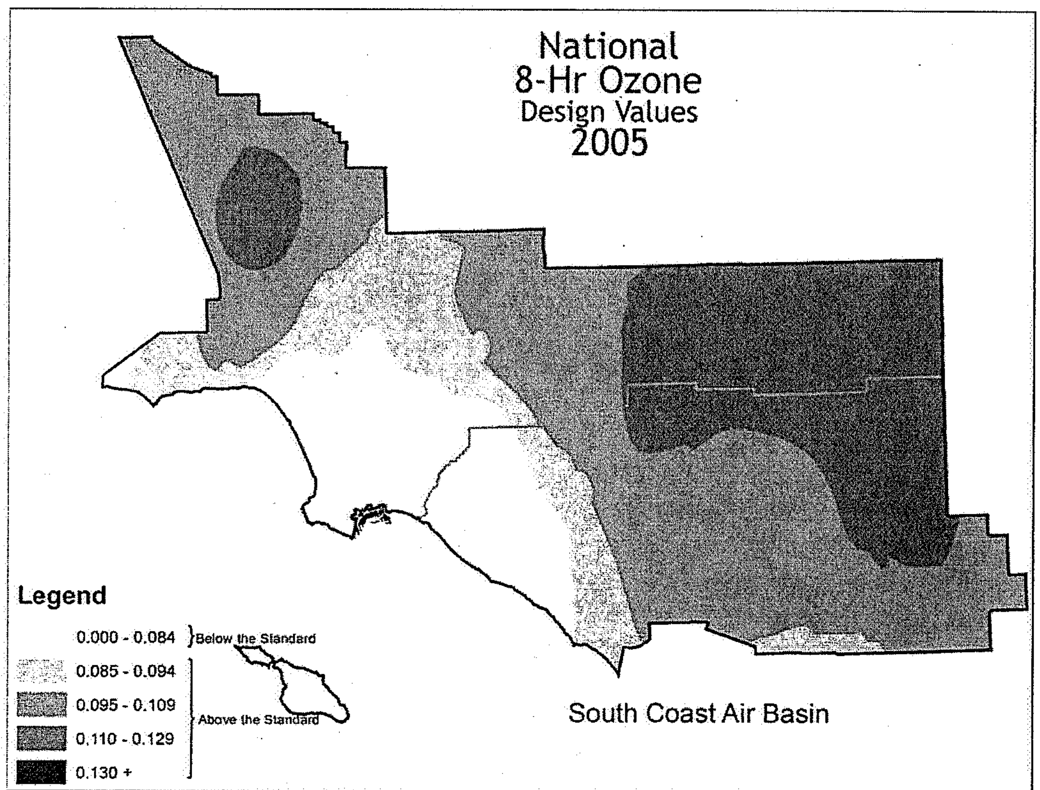




South Coast's ozone concentrations have been cut by about a third since 1990, but the region's design value is still 50 percent over the level of the standard and progress has slowed in recent years. Fifteen years ago, the highest values were widespread throughout the basin. Now, the number of communities within the basin experiencing the highest values is substantially smaller. The maps below show this progression of air quality progress.

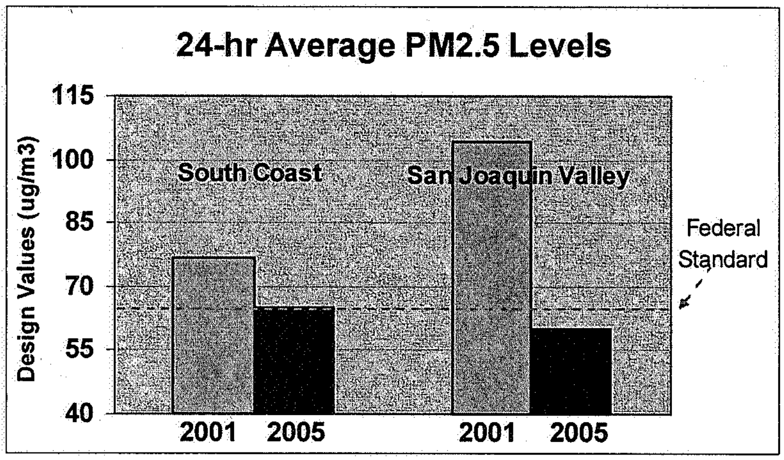
Ozone Air Quality Comparison – South Coast
1995 to 2005

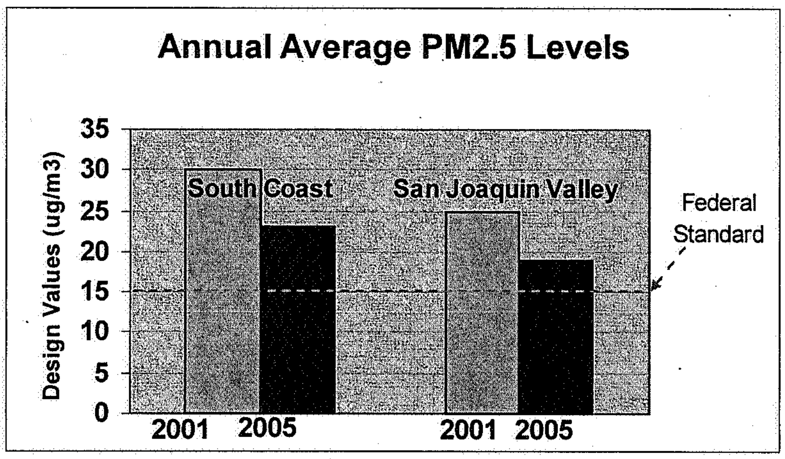




PM2.5 Trends

Both the South Coast and San Joaquin Valley are showing good progress toward PM2.5 attainment. As of 2005, both regions are meeting the 24-hour standard. In addition, annual average PM2.5 design values have declined by 25 percent since 2001. In terms of the remaining challenge, the South Coast levels are still about 50 percent above the standard, and the San Joaquin Valley levels are about 25 percent above the standard.





Development of State Strategy

In developing our proposed statewide emission reduction strategy, ARB staff worked closely with air districts on attainment demonstrations for ozone for each area and on a PM2.5 attainment demonstration for the South Coast. In that process, emissions inventories are developed and air quality models are used to establish a region's "carrying capacity" and to calculate the additional emission reductions needed for attainment.

The emission reduction targets serve three purposes. First, they provide an indication of how far the existing control program will take each region toward attainment and if additional reductions from new measures are needed. Second, they indicate how much time a region may need to reach the standards and if a classification change to a later attainment date is likely needed. And third, they provide a benchmark for designing new emission reduction measures.

The magnitude of the attainment challenges in the South Coast and San Joaquin Valley, as shown in the next chapter, are the drivers for ARB staff's proposed statewide strategy. The new SIP measures are also needed for the Sacramento region, the Coachella Valley, and the Antelope Valley and Western Mojave Desert nonattainment area. California's other ozone nonattainment areas, including San Diego and Ventura, are projected to attain by their assigned deadline based on the benefits of previously adopted SIP measures.

Given the severity of the ozone problems in the South Coast and San Joaquin Valley, both regions have indicated in their draft air quality plans that they will be requesting a reclassification to extreme with attainment deadlines of 2024. The 2015 PM2.5 deadline and the South Coast PM2.5 carrying capacity framed staff's analysis of new near-term measures. The other key driver for developing new SIP strategies is to reach ozone attainment in both regions as quickly as possible.

Chapter 2 will summarize the process of determining the emission reduction targets and show those targets for the South Coast and San Joaquin Valley. The process consists of developing an emissions inventory and performing data analyses and air quality modeling based on that inventory to establish the emissions limits that ensure air quality standards are met.

Air Pollution Transport

Air pollution transport, by definition is quite simple – air movements carry pollutants from one area to another. In reality, air pollution transport is a very complex phenomenon. It is three-dimensional and can occur at ground level or aloft in upper air levels. With modeling for the State being split into two modeling domains – one for Northern and Central California and one for Southern California – transport relationships between air districts within these large domains are implicitly captured within the models. This is the mechanism ARB uses in its oversight role to ensure transport impacts on downwind areas are addressed for purposes of both State and federal air quality standards. In terms of attainment demonstrations, inputs to the modeling for a downwind area include forecasted emission reductions in upwind areas. This way the attainment demonstration takes into account the shared responsibility for reducing emissions in regions where air pollution transport can at times be significant.

Other Programs

In addition to SIPs, ARB has multiple plans and programs to reduce air pollution throughout California. Emission reduction strategies from many of these programs are taken into account in the ozone and PM2.5 SIPs.

ARB Goods Movement Plan

The Emission Reduction Plan for Ports and Goods Movement in California, approved by ARB in April 2006, is one of the main contributors of new measures necessary to meet federal air quality standards. Most goods that move within and through California do so by truck. Ships are the largest source of SOx emissions in the State. Heavy-duty trucks are the largest statewide source of NOx emissions. These air pollution realities make it impossible to tackle the PM2.5 challenge without addressing goods movement emissions. Likewise, emission reduction targets for ozone will not be met without reducing emissions related to goods movement.

The strategies included in the goods movement emission reduction plan target ships and trucks, as well as the other three main sources of goods movement emissions: harbor craft, cargo handling equipment, and locomotives. By 2020, these strategies will cut statewide goods movement emissions of NOx by 63 percent, SOx emissions by 78 percent, and will also reduce the statewide health risk from goods movement-related diesel particulate matter 85 percent.

Work on many of the strategies in the goods movement emission reduction plan is underway and serves as the starting point for near-term actions to meet the emission reduction targets for the SIPs. These strategies will provide essential new emission reductions needed for regional attainment, while they reduce the air pollution-related health risk for those who live near our ports, railyards, distribution centers, and other goods movement facilities.

ARB Diesel Risk Reduction Plan

An important source of directly emitted PM2.5 is diesel exhaust. The particulate matter from diesel-fueled engines (diesel PM) has been singled out as a particularly harmful pollutant and identified as a toxic air contaminant by the Air Resources Board in 1998. Nearly 70 percent of the known cancer risk caused by air toxics is attributed to diesel PM. In 2000, ARB adopted a plan to reduce diesel PM emissions 85 percent by 2020, and has since adopted a number of regulatory measures to reduce diesel PM emissions statewide. Additional measures are under development. Diesel PM control measures in the plan are reducing both direct diesel PM and NOx emissions through a combination of engine retrofits and replacements. Upcoming mobile source fleet measures to reduce diesel PM and NOx emissions are a critical part of the new SIP strategy as well the Diesel Risk Reduction Plan.

Environmental Justice

The SIPs consist of strategies designed to bring a region's air quality into compliance with federal standards. SIPs must be designed to ensure air quality standards throughout the entire region, so achieving air quality standards provides public health benefits to every community. This makes SIP implementation important to meeting ARB's community health and environmental justice goals. As part of our environmental justice program, ARB has initiated air quality studies in several communities and continues to focus resources on mobile source enforcement in environmental justice communities. ARB's Air Quality and Land Use Handbook, approved by ARB in May 2005, provides guidance to help improve local land use decisions that can negatively impact public health at the community level.

ARB's SIP strategies have a significant nexus to community health due to the emphasis on cleaning up the legacy fleets of diesel engines. Much of the large equipment and vehicles that help construct our buildings and highways and move our goods are not well controlled and have very long lives. Adopting rules to clean up these fleets will have an immediate and significant effect on the communities where these sources are concentrated.

Regional Haze

The same particulate air pollutants that affect public health also extinguish and scatter light, thereby obscuring visibility. The federal Clean Air Act set the far-reaching goal of achieving natural visibility conditions by 2064 in the nation's most treasured parks and wilderness areas. Of the 156 designated areas, 29 are in California, managed by the National Park Service and the U.S. Forest Service. Therefore California is working in concert with fourteen other western states to reduce controllable emissions of particulates so that regional haze is reduced in the western region of the country. In 1999, the U.S. Environmental Protection Agency published rules to guide the preparation of Regional Haze State Implementation Plans to reduce regional haze.

ARB is currently preparing the first regional haze plan for the entire State, for transmittal to EPA by the December 17, 2007 deadline. General trends in California since the 1990s show that emission controls are improving visibility in our parks and wilderness areas. The regional haze plan will show how these controls constitute reasonable progress along the path to natural visibility. In 2012, ARB will conduct a mid-course review of measured visibility changes and analyze how emission reductions implemented to achieve the 8-hour ozone and the PM2.5 standards will move the State further along the path to natural visibility in the future.

Climate Change

ARB's implementation of the Global Warming Solutions Act of 2006 (AB 32) is a major new effort just underway. These activities, including future rulemaking, will occur on a parallel but separate track as we proceed with implementation of our SIP strategies. The statutory requirements and timelines are different, so it is not appropriate to include potential co-benefits of greenhouse gas strategies in SIP documents at this point. However, as greenhouse gas reduction measures are developed and adopted, ARB staff will do the necessary technical work to determine the impact on ozone and PM2.5 precursor pollutants.

2. TECHNICAL FOUNDATION

Emissions Inventory Overview

Developing attainment strategies requires an understanding of the sources of pollution, the quantities emitted, their geographical distribution, and how air pollution controls and growth will impact future emission levels. There are multiple types of emission inventories used in air quality programs including annual averages, seasonal, and day-specific modeling inventories. SIPs rely on region specific inventories that may differ from the statewide picture. In the regulatory development process emission inventories are typically refined since inventory data is a key input for cost-effectiveness evaluations. This is an important inventory improvement mechanism, and ARB staff incorporates these updates into the statewide inventory.

The emissions inventory serves three principal roles in the SIP process:

- It provides a primary input to the modeling necessary to determine the emission reductions needed for attainment;
- It supplies comprehensive emissions information for the development of emission reduction strategies;
- And after the SIP is approved, it is used to track progress of the emission reduction commitments outlined in the plan.

California is a diverse State with many sources of air pollution. ARB, in cooperation with local air districts, maintains a statewide emissions inventory. The inventory is constructed based on four major emission categories:

- Stationary Sources -- generally industrial facilities, which can be identified by a name and location.
- Areawide Sources -- either small individual sources, such as residential fireplaces, or widely distributed sources that cannot be tied to a single location, such as consumer products and dust from unpaved roads.
- On-Road Mobile Sources -- includes on-road cars, trucks, buses, etc.
- Off-Road Mobile Sources -- includes off-road vehicles such as boats, off-road recreational vehicles, aircraft, trains, ships, industrial and construction equipment, farm equipment, and other equipment.

The statewide emissions inventory developed by ARB and the local air districts includes all the main sources of emissions – all of the many on-road and off-road mobile sources and all the various stationary and areawide sources. Estimating the amount of emissions statewide and in each region is done by summing the emissions from each source. The statewide inventory for the 2007 SIP development uses ARB's November 2006 on-road motor vehicle model (EMFAC) and ARB's off-road mobile source model. Stationary source emissions are provided by local air districts. The regional SIP inventories are discussed in Chapter 5, Regional SIP Summaries.

Precursor Pollutants

Air pollutants that react to form ozone and PM2.5 in the air are called precursor pollutants. For ozone, the main precursor pollutants are nitrogen oxides (NOx) and reactive organic gases (ROG). There are four main precursors of PM2.5: NOx, ROG, sulfur oxides (SOx) and ammonia (NH3). PM2.5 can also be directly emitted into the atmosphere (direct PM2.5) in various forms that include smoke from fires, dust from paved and unpaved roads, and particle emissions from the burning of fossil fuels.

PM2.5 pollution is a complex mixture and air quality modeling is used to assess the relative effectiveness of reducing each precursor pollutant as well as directly emitted PM2.5. Current data analysis and air quality modeling indicates that two of the four precursors, NOx and SOx, are significant in reducing PM2.5 concentrations in the South Coast, and that the PM2.5 emission control strategy would be served best by focusing on reducing emissions of these two precursor pollutants. There is also a small PM2.5 benefit from ROG emission reductions, but benefits from ammonia emission reductions were found to be insignificant. Reducing direct PM2.5 is also an effective strategy according to recent modeling.

NOx. Nitrogen oxide emissions are produced by the combustion of fuels in engines, furnaces, or fires. Today mobile sources make up about 85 percent of the total statewide NOx emissions. This percentage decreases over time as motor vehicle fleets become cleaner. Emissions from less clean sources like locomotives, ships, and aircraft continue to grow. Stationary sources of NOx include combustion processes in industries such as manufacturing, food processing, electric utilities, and petroleum refining. Areawide sources of NOx, which include waste burning and residential fuel combustion, contribute a smaller portion of total NOx emissions. Air quality science indicates that reductions of NOx are more beneficial than reductions of other pollutants to help meet both ozone and PM2.5 standards, and therefore NOx is a major focus of the State Strategy.

ROG. Reactive organic gases result primarily from incomplete fuel combustion and the evaporation of chemical solvents and fuels. Stationary sources of ROG include processes that use solvents such as dry cleaning, degreasing, and coating operations. Today mobile sources are the largest ROG emissions category. However, other ROG categories become relatively more important over time. Areawide ROG sources which grow directly with population begin to dominate in the future so that by 2020 consumer products is the largest source category.

SOx. Sulfur oxide emissions are dominated by the mobile source category of ships and commercial boats. Evaporative losses from petroleum refining (a stationary source) are another significant source of SOx. The other sources that make up 5 percent or more of the SOx inventory are locomotives and mining and cement manufacturing.

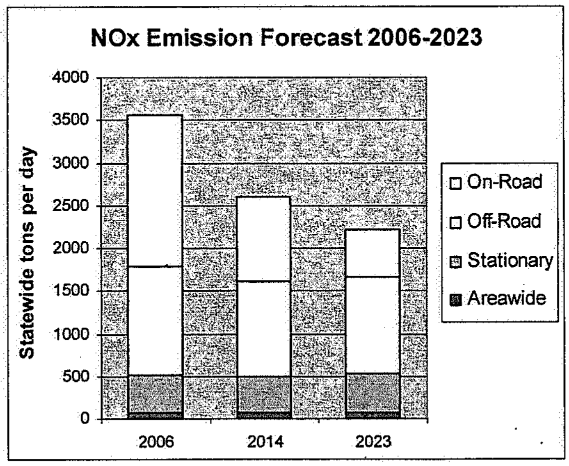
Direct PM2.5. Directly emitted PM2.5 comes mainly in the form of smoke, soot, and dust particles. Major sources include managed burning and agricultural burning; dust generated by vehicles traveling on paved and unpaved roads, residential fireplaces, cooking and fuel combustion; and particle emissions from diesel-fueled engines on trucks, ships, and construction equipment. While soot from diesel engines is not a major portion of the entire direct PM2.5 emissions inventory, it is a major health concern, as it is a toxic air contaminant that can cause premature death.

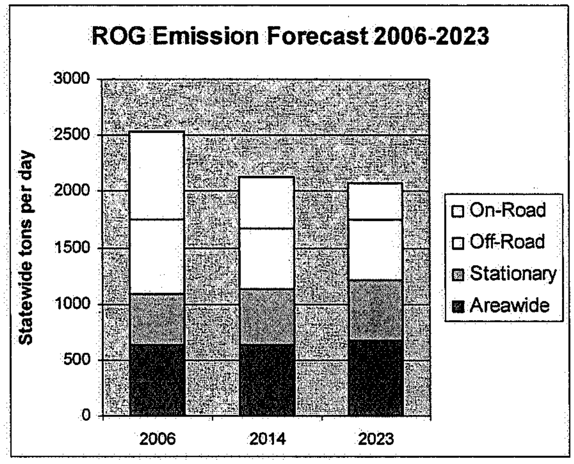
Forecasting Future Emissions

Estimates of projected future emissions depend on two independent variables: growth and control. Different methods are used to estimate the future growth of emission sources based on their type. And future emission controls are incorporated into the projected emissions for each source category based on when the controls are implemented, how much the controls reduce emissions, and how many units (vehicles, consumer products, etc.) are affected.

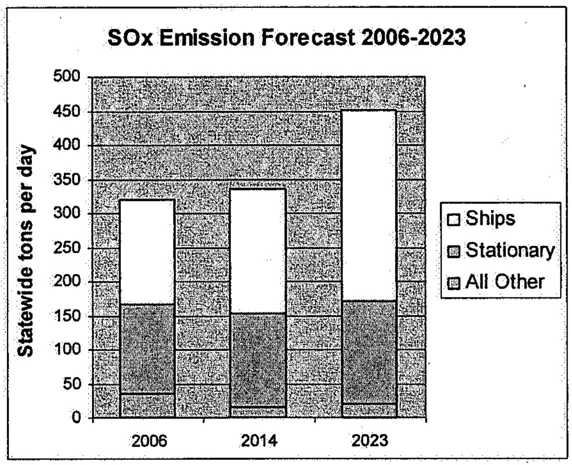
The charts on the next page show the change in total projected statewide emissions for NOx, ROG, and SOx from 2006 to 2023 and the relative emissions change in each of these emission source categories. They reflect projected growth in each category combined with the benefits of the existing control program (those emission controls adopted prior to 2007). For example, SOx emissions as a category continue to grow due to ship emission increases. This makes ship SOx emissions a high priority for control in the new SIP strategy. NOx and ROG emissions are decreasing as a result of existing control programs despite substantial growth in population, travel, and the economy.

ARB uses two computer models to simulate and forecast emissions for on- and off-road sources. For cars, sport utility vehicles, minivans, and trucks, ARB used EMFAC2007. For off-road vehicles and equipment, ARB used OFFROAD2007. Both models were released for public use in November 2006 after a multi-year development process. As required by federal guidance, EMFAC2007 uses the latest fleet information for vehicles age and population. The data is developed from the California Department of Motor Vehicle registration data through 2005. For SIP purposes, as required by State law, vehicle activity is based on local transportation agency projections, or California Department of Transportation data, if local data are not available.





Note: "Off-Road" includes trains, planes, and ships, as well as all other off-road vehicles and equipment.



Top Emission Sources

While the top emission categories are mobile sources in all California's nonattainment areas, there is variability in the relative contribution of different sources by region. This makes the overall statewide emission reduction strategy more challenging and will affect the priorities of local control plans. For example, controlling the emissions from ocean-going vessels will have a tremendous impact on SOx emissions in the South Coast and therefore is essential to that region's PM2.5 control plan. Reducing SOx from ships has much less consequence in the San Joaquin Valley, so increased NOx reductions from combustion sources will become even more important for the Valley's PM2.5 control strategy. The tables on the next two pages show the top emission sources of both NOx and ROG in the South Coast and the San Joaquin Valley.

Here are some things we have learned by analyzing the emissions inventory for these two areas:

- South Coast NOx emissions are significantly impacted by goods movement, with the ships, trains, trucks, and off-road equipment that move goods contributing about 30 percent of all South Coast NOx emissions. Aircraft NOx emissions are also increasing.

- The impact of goods movement in the San Joaquin Valley is felt mostly by the emissions contribution of heavy-duty trucks, which are projected to remain the largest NOx emitter through 2023.

- Emissions of NOx from manufacturing and industrial sources in the San Joaquin Valley become increasingly significant as emissions from mobile sources decline in the future.

- The large population in the South Coast is the main reason why consumer product emissions are projected to become the number one ROG emissions source by 2014.

- San Joaquin Valley ROG emissions are significantly impacted by agricultural sources such as livestock waste.

- The existing emission control program will cut heavy-duty truck NOx emissions about 70 percent in the San Joaquin Valley and South Coast by 2023, but they need to be cut even more by new strategies to attain ozone and PM2.5 standards.

- Mobile sources under federal and international jurisdiction (like ships, locomotives, and aircraft) contribute an increasingly greater proportion of total emissions, especially NOx, in future years as emission increases due to growth overwhelm the existing control program, while emissions of mobile sources under State jurisdiction decrease due to stringent controls.

South Coast Air Basin – Top Sources of NOx

Summer emissions, tons per day

Source Category	2006	2014	2023
HEAVY DUTY DIESEL TRUCKS	259	140	73
PASSENGER VEHICLES	204	101	53
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	120	81	41
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	87	53	35
SHIPS AND COMMERCIAL BOATS	75	87	116
GASOLINE-FUELED COMMERCIAL TRUCKS	36	24	17
LOCOMOTIVES	31	23	28
RESIDENTIAL FUEL COMBUSTION	18	16	14
MANUFACTURING & INDUSTRIAL (BOILERS, ENGINES)	17	15	15
SERVICE AND COMMERCIAL (BOILERS, ENGINES)	16	12	11
RECREATIONAL BOATS	16	17	18
AIRCRAFT	16	22	29
TOTAL OF TOP CATEGORIES	**896**	**589**	**450**
TOTAL	**971**	**650**	**505**
TOP CATEGORIES PERCENT OF TOTAL	**92%**	**91%**	**89%**

San Joaquin Valley – Top Sources of NOx

Summer emissions, tons per day

Source Category	2006	2014	2023
HEAVY DUTY DIESEL TRUCKS	285	155	75
FARM EQUIPMENT (COMBINES AND TRACTORS)	60	37	17
PASSENGER VEHICLES	58	31	16
MANUFACTURING & INDUSTRIAL (BOILERS, ENGINES)	39	44	48
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	34	22	12
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	34	23	15
LOCOMOTIVES	22	21	22
AGRICULTURAL IRRIGATION PUMPS	16	7	5
OIL AND GAS PRODUCTION (COMBUSTION)	11	10	10
COGENERATION (ELECTRICITY GENERATION AND HEAT RECOVERY)	9	7	8
GASOLINE-FUELED COMMERCIAL TRUCKS	9	7	6
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	9	9	9
GLASS AND RELATED PRODUCTS	8	9	11
TOTAL OF TOP CATEGORIES	**595**	**381**	**253**
TOTAL	**650**	**425**	**300**
TOP CATEGORIES PERCENT OF TOTAL	**92%**	**90%**	**84%**

Note: Emissions do not include impact of State Strategy proposed new measures.

South Coast Air Basin – Top Sources of ROG

Summer emissions, tons per day

Source Category	2006	2014	2023
PASSENGER VEHICLES	207	112	76
CONSUMER PRODUCTS	101	103	110
RECREATIONAL BOATS	64	53	51
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	52	40	38
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	31	29	31
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	28	15	12
PETROLEUM MARKETING (GASOLINE EVAPORATIVE LOSSES)	27	28	31
COATINGS (PAINTS AND THINNERS - NON ARCHITECTURAL)	27	25	28
GASOLINE-FUELED COMMERCIAL TRUCKS	24	13	8
GAS CANS	21	10	7
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	20	12	8
TOTAL OF TOP CATEGORIES	**600**	**441**	**399**
TOTAL	**732**	**567**	**534**
TOP CATEGORIES PERCENT OF TOTAL	**82%**	**78%**	**75%**

San Joaquin Valley – Top Sources of ROG

Summer emissions, tons per day

Source Category	2006	2014	2023
PASSENGER VEHICLES	62	37	24
WASTE DISPOSAL/COMPOSTING	57	72	80
LIVESTOCK WASTE (DAIRY CATTLE)	40	33	41
OIL AND GAS PRODUCTION (EVAPORATIVE LOSSES/FLARING)	28	26	23
CONSUMER PRODUCTS	24	26	30
PESTICIDES	22	20	20
HEAVY DUTY DIESEL TRUCKS	20	13	8
RECREATIONAL BOATS	20	17	17
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	13	12	13
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	11	12	13
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	10	6	4
FARM EQUIPMENT (COMBINES AND TRACTORS)	10	5	3
TOTAL OF TOP CATEGORIES	**317**	**279**	**277**
TOTAL	**452**	**410**	**414**
TOP CATEGORIES PERCENT OF TOTAL	**70%**	**68%**	**67%**

Note: Emissions do not include impact of State Strategy proposed new measures.

Setting the Emission Reduction Targets

U.S. EPA rules require the use of air quality modeling to set emission reduction targets. Modeling is also helpful in guiding the selection of the most effective pollutants to control. To set ozone emission reduction targets, air quality modeling has been conducted separately for two overarching areas. One area is Northern and Central California, encompassing the San Joaquin and Sacramento Valleys, the Bay Area and the Sierra Nevada Mountains. ARB staff has been doing this modeling. The other area is Southern California, including the South Coast Air Basin, Ventura County, Imperial County, and the Mojave Desert area. The South Coast air district has been doing this modeling. The South Coast air district has also been performing the air quality modeling to set its PM2.5 target.

Weight of Evidence Analysis

A Weight of Evidence analysis provides a set of complementary analyses that supplements the SIP-required modeling. These analyses can include consideration of measured air quality, emissions, and meteorological data, evaluation of other air quality indicators, and additional air quality modeling. A Weight of Evidence approach looks at the entirety of the information at hand to provide a more informed basis for the attainment strategy. While all analysis methods have inherent strengths and weaknesses, examining an air quality problem in a variety of ways increases the confidence one has in the results. This approach also provides a better understanding of the overall problem and the level and mix of emissions controls needed for attainment.

The discussion in Chapter 4 about South Coast PM2.5 pollution is a weight of evidence approach. More detailed weight of evidence analysis will be included in ARB staff reports on the local air district plans and in the local plans themselves.

South Coast Ozone Emission Reduction Targets

Under State law the South Coast air district is responsible for setting carrying capacities for the South Coast Air Basin. While the carrying capacities result in large emission reduction targets for both NOx and ROG, the South Coast modeling indicates that NOx reductions are more effective at reducing ozone in the long run, although ROG reductions are still needed to maximize progress. In fact, the air district modified the South Coast Air Basin carrying capacity in its February 2007 draft air plan, relying even more heavily on NOx reductions than in its earlier estimates.

The emission reduction targets based on the February 2007 carrying capacities are presented below.

Draft South Coast Ozone Emission Reduction Targets

(tons per day)	NOx	ROG
2006 Emissions Inventory	972	732
Carrying Capacity	114	420
Emission Reduction Target	**858**	**312**

It will be important to revisit the relative carrying capacities in subsequent SIPs to factor in inventory improvement, updated modeling, and control measure development.

South Coast PM2.5 Emission Reduction Targets

As discussed previously, unlike ozone, PM2.5 consists of many different components. These components can vary by location and season, with both local and regional scale contributions. This complexity and variability presents a unique challenge in modeling for attaining the annual standard, and introduces a higher level of uncertainty in the results. In addition, while there is a long history and body of experience for ozone model application, air quality modeling for PM2.5 is relatively more recent, and it has not been applied as extensively. ARB will continue to work with air districts on efforts to refine PM2.5 modeling techniques.

Draft South Coast PM2.5 Emission Reduction Targets

(tons per day)	NOx	ROG	SOx	Direct PM2.5
2006 Emissions Inventory	972	732	63	101
Carrying Capacity	443	469	19	88
Emission Reduction Target	**529**	**263**	**44**	**13**

San Joaquin Valley Emission Reduction Targets

ARB staff has been using photochemical models for Northern and Central California developed as part of the multi-million dollar Central California Air Quality Study. This modeling continues to confirm that NOx is the key to long term attainment in the San Joaquin Valley. (This is also true for the Sacramento Valley and the rural regions downwind.) ROG looks beneficial especially in the near term for maximum progress and to supplement NOx reductions long term.

The ozone emission reduction targets for San Joaquin Valley are shown in the following table. The ROG carrying capacity is implicit, based on the much larger benefit of NOx reductions demonstrated by the modeling.

San Joaquin Valley Ozone Emission Reduction Targets

(tons per day)	**NOx**	**ROG**
2006 Emissions Inventory	650	454
Carrying Capacity	160	342
Emission Reduction Target	**490**	**112**

San Joaquin Valley PM2.5 modeling is underway and carrying capacities and emission reduction targets will be developed later in 2007 for a PM2.5 plan that is due to U.S. EPA in April 2008.

3. ARB's 2007 SIP STATE STRATEGY

The State Strategy maps out how to achieve the emission reductions necessary to meet federal air quality standards. The two main emission reduction components of the State Strategy are the adopted SIP measures and proposed new measures. The adopted SIP measures include those adopted through 2006. Proposed new measures include those to be adopted after 2006.

Responsibility for implementing emission reduction measures is shared between the agencies with primary responsibility for controlling air pollution in California: the Air Resources Board, 35 local air pollution control and air quality management districts, and the U.S. Environmental Protection Agency. However, given the current status of statewide emissions, ARB has the lion's share of responsibility, followed by U.S. EPA.

Agency Roles in SIP Measure Development

Local Measures

Local air districts are primarily responsible for controlling emissions from stationary and areawide sources (with the exception of consumer products) through rules and permitting programs. Examples include industrial sources like factories, refineries, and power plants; commercial sources like gas stations, dry cleaners, and paint spray booth operations; residential sources like fireplaces, water heaters, and house paints; and miscellaneous non-mobile sources like emergency generators. Districts also inspect and test fuel vapor recovery systems to check that such systems are operating as certified.

State Measures

ARB is responsible for controlling emissions from mobile sources (except where federal law preempts ARB's authority) and consumer products, developing fuel specifications, establishing gasoline vapor recovery standards and certifying vapor recovery systems, providing technical support to the districts, and overseeing local district compliance with State and federal law. The Department of Pesticide Regulation is responsible for control of agricultural, commercial and structural pesticides, while the Bureau of Automotive Repair runs the State's Smog Check programs to identify and repair polluting cars.

Federal Measures

U.S. EPA has the authority to control emissions from mobile sources, including sources all or partly under exclusive federal jurisdiction (like interstate trucks, some farm and construction equipment, aircraft, marine vessels, and locomotives based in this country). U.S. EPA also has oversight authority for state air programs as they relate to the federal Clean Air Act. International organizations develop standards for aircraft and marine vessels that operate outside the U.S.

Federal agencies have the lead role in representing the U.S. in the process of developing international standards.

Adopted SIP Measures

Many measures already adopted by local, State and federal agencies are currently reducing emissions. Many will do so at an accelerated rate in the future. Some adopted measures are scheduled to go into effect years hence. Adopted SIP measures will have a very significant impact on emissions and air quality between now and the target dates (attainment years) in the areas of the State that do not meet federal ozone and PM2.5 air quality standards.

Adopted SIP measures have been developed over the years through the combined efforts of air pollution regulators – with a foundation of ARB's mobile source and fuels programs, complementary national actions for pollution sources under federal authority, and local air district programs for industrial and commercial sources -- as well as transportation plans that integrate transit and other alternatives to solo vehicle travel. ARB has adopted 46 emission-reducing control measures since the approval of the 1994 1-hour ozone SIP. These measures, shown on the table on Page 38 entitled "Air Resources Board SIP Control Measures (1994-2006)," comprise the bulk of the benefits of the adopted measures.

Mobile Sources

Cleaner Engines and Fuels

California has dramatically tightened emission standards for on-road and off-road mobile sources and the fuels that power them. The table below shows how significantly the adopted measures have controlled emissions from new engines for the major categories of mobile sources.

California's emission control program for on-road motor vehicles is the strongest in the world. New cars are now 99 percent cleaner than their uncontrolled counterparts. Trucks are now 90 percent cleaner, and will be 98 percent cleaner by 2010.

Working in concert with the U.S. EPA, standards for goods movement sources have also been tightened dramatically. By requiring low-sulfur fuel, SOx emissions from ship auxiliary engines will be cut 96 percent by 2010. New locomotive engines are now 50-60 percent cleaner. Harbor craft emission standards were cut roughly in half. And new cargo handling equipment will be 95 percent cleaner by 2011.

Impact of Existing Standards and Emission Limits

Source	Controlled Since	Level of Control*
ON-ROAD		
Passenger Cars	1961	**99% in 2006 (ROG + NOx)**
Trucks and Buses	1988	**90% by 2007, 98% by 2010 (NOx) 98% by 2007 (PM)**
Motorcycles	1975	**88% by 2008 (ROG + NOx)**
GOODS MOVEMENT		
Ship Auxiliary Engines (fuel)	2000	**96% (SOx), 83% (PM) by 2010**
Locomotives	1973	**60% in 2005 (ROG+NOx)**
Harbor Craft	2004	**50% in 2004 (NOx)**
Cargo Handling Equipment	2005	**95% by 2011-2012 (ROG+NOx, PM)**
OFF-ROAD SOURCES		
Large Off-Road Equipment	1996	**98% by 2015 (ROG + NOx)**
Personal Water Craft	1990	**88% by 2010 (ROG)**
Recreational Boats	1990	**89% by 2010 (ROG)**
Lawn & Garden Equipment	1990	**82-90% by 2010 (ROG)**
AREAWIDE SOURCES		
Consumer Products	1989	**50 categories controlled 50% (ROG)**

* Level of emissions control compared to uncontrolled source.

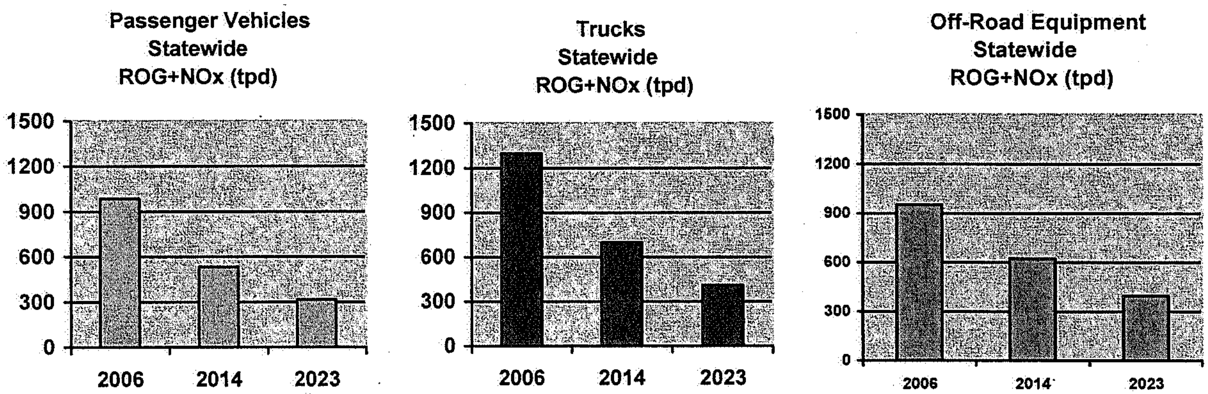
California has also drastically lowered standards for off-road sources, from lawn and garden equipment, to recreational vehicles and boats, to construction equipment and other large off-road sources. From 2010 through 2014, these new off-road sources will be manufactured with 80-98 percent fewer emissions than their uncontrolled counterparts.

ARB has worked closely with U.S. EPA to regulate large diesel, gasoline and liquid petroleum gas equipment – where authority is split between California and the federal government – and by 2014, new large off-road equipment will be 98 percent cleaner. ARB has also made great strides in reducing emissions from the smaller engines under State control, like those used in lawn mowers and jet skis, recreational vehicles and boats. From 2010 to 2015, these new off-road sources will be manufactured with 82-90 percent fewer emissions than their uncontrolled counterparts.

Air Resources Board SIP Control Measures (1994-2006)

Air Resources Board Action	Date	Air Resources Board Action	Date
In-Use Diesel Agricultural Engine Requirements	2006	California ZEV Requirement Update	2003
Consumer Product Lower Emission Limits	2006	Heavy-Duty Gas Truck Emission Standards	2002
Zero Emission Bus Rule Amendments	2006	Heavy-Duty Diesel Truck Emission Standards	2001
Off-Highway Recreational Vehicle Regulation Amendments	2006	Inboard and Sterndrive Marine Engine Emission Standards	2001
Forklifts and Other Spark-Ignition Equipment Regulation	2006	Architectural Coatings Suggested Control Measure	2000
Border Truck Inspection Program Protocol Improvements	2006	Urban Transit Bus Fleet Rule	2000
Ship Auxiliary Engine Cleaner Fuel Requirements	2005	Off-Road Diesel Equipment Emission Standards	2000
Diesel Cargo Handling Equipment Rule	2005	Reformulated Gas MTBE Phase Out	1999
Public and Utility Diesel Truck Fleet Rule	2005	Consumer Product Emission Limits	1999
Heavy-Duty Sleeper Truck Idling Limits	2005	Portable Fuel Can Regulation	1999
Portable Fuel Container Requirements	2005	Marine Pleasurecraft Emission Standards	1998
Transit Bus Rule Additions		Low-Emission Vehicle Program (LEV II) Exhaust Standards	1998
Off-Road Diesel Engine Tier 4 Standards	2004	Large Off-Road Gas/LPG Engine Emission Standards	1998
Harbor Craft and Locomotive Clean Diesel Fuel Requirement	2004	Cleaner Burning Gasoline Rule Improvements	1998
Idling Limits for Trucks	2004	On-Road Heavy-Duty Truck Exhaust Emission Standards	1998
Consumer Products Rule	2004	Light-Duty Vehicle Off-Cycle Emission Controls	1997
Chip Reflash to Detect Truck Emission Control System Failure	2004	Consumer Product Emission Limits	1997
Transportation Refrigeration Unit Rule	2004	Locomotive Memorandum of Agreement for the South Coast	1997
Portable Diesel Engine Emission Standards	2004	Medium- and Heavy-Duty Gas Truck Emission Standards	1995
Stationary Diesel Engine Regulation	2004	Aerosol Coatings Regulation	1995
Solid Waste Collection Vehicle Regulation	2003	Large Off-Road Diesel Statement of Principles	1996
Lawn and Garden Equipment Emission Standards	2003	Medium- and Heavy-Duty Gasoline Trucks	1995
Low Sulfur Diesel Fuel Regulation	2003	Off-Road Recreational Vehicles Regulation	1994

The charts below clearly illustrate the benefits of adopted SIP measures to reduce emissions from mobile sources. The downward emission trends are dramatic given California's projected growth in population, vehicle travel, and goods movement activities. But because on-road and off-road mobile sources together account for so much of the State's inventory of ozone and PM2.5 forming emissions, further reductions in mobile source emissions are essential if air quality standards are to be realized.



Cleaning Up the Legacy Fleet

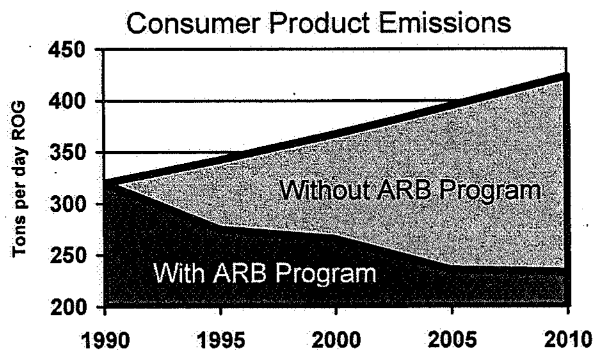
Adopted SIP measures have made significant strides in reducing emissions from those mobile sources already in use – the legacy fleet -- by keeping existing vehicles cleaner longer, getting cleaner technology on older vehicles and equipment, and replacing older dirtier vehicles and equipment with cleaner ones. Whereas new engine emissions have been regulated for a long time, most of the in-use control programs have just begun to evolve and have an impact. We still have a lot of work to do to clean up the legacy fleet. That is why the majority of new measures in the State Strategy are in-use measures.

Many programs and rules are currently in place to reduce emissions from the mobile source legacy fleets. The Smog Check Program ensures that passenger vehicles stay clean as they age and on-board diagnostic systems identify smog control problems. Heavy-duty truck inspection programs help control smoke emissions and detect emission control malmaintenance and tampering.

ARB has adopted 20 in-use regulations in the last five years. In-use regulations have required use of cleaner fuels, greatly reducing emissions from ships and harbor craft. Excessive truck and bus idling has been restricted. ARB has adopted public and private fleet rules that require local governments and private companies to incorporate the cleanest vehicles and equipment into their fleets. In-use testing procedures and verification requirements for in-use emission control technology have been strengthened. And other operational and emission control technology requirements that help reduce emissions from existing vehicle and equipment have been put into place.

Incentive programs have worked hand-in-hand with in-use regulations, providing added emissions benefits. California is currently investing up to $140 million per year to clean up older, higher-emitting sources through the Carl Moyer Program. The Smog Check Breathe Easier Campaign pays motorists $1,000 to permanently retire their high-polluting vehicles. And local governments use special vehicle registration fees to fund projects that further reduce emissions from motor vehicles.

Consumer Products



ARB has adopted standards to limit emissions from nearly 50 consumer product categories (such as hair sprays, deodorants, and cleaning compounds), as well as over 35 architectural coatings and aerosol paints categories. The Board has adopted and implemented voluntary provisions to offer greater compliance flexibility to consumer product manufacturers while retaining the air quality benefits. Without these actions, ROG emissions from these products would be roughly 60 percent greater in 2010. But, as you can see from the above chart, the impact of population growth begins to counter the benefits of adopted measures – more controls are needed.

Local Rules and Programs

<u>Stationary and Area Sources</u>

Local air districts are primarily responsible for controlling emissions from stationary and areawide sources, with the exception of consumer products, through regulations and permits. Stationary sources include industrial sources like factories and power plants, commercial sources like gas stations and dry cleaners, and residential sources such as fireplaces and water heaters. Areawide sources are diffuse sources of emissions that are spread over a wide area, such as paints and pesticides.

Local air districts help reduce emissions through limits on emissions from new sources (the New Source Review program) and technology-based requirements for existing sources, called Best Available Retrofit Control Technology and Reasonably Available Control Technology requirements. Air districts adopt and enforce rules governing these sources of emissions.

Businesses in California are subject to the most stringent air quality rules in the country. Local air districts have adopted a number of innovative rules and programs over the years to help reduce emissions. For example, South Coast's innovative program, RECLAIM, provides market incentives for companies to use the cleanest possible technologies. And the San Joaquin Valley has adopted a first-of-its-kind indirect source rule that ensures that new developments bear their fair share of the pollution burden. ARB has suggested over 50 control strategies for stationary sources that many local air districts have adopted.

The proposed local air district measures for each nonattainment area are listed, described, and quantified in the attainment plans for each area. The local measures, coupled with the State Strategy measures, must provide the necessary emission reductions to meet the federal standards.

Transportation and Land Use Planning

In California, local governments are responsible for transportation and land use planning, and transportation plans are an important part of the SIP. Federal law requires a metropolitan region's transportation plan to be complementary to and conform with the region's air quality plan. Transportation and land use strategies can help to reduce the rate of growth in vehicle travel and traffic congestion, which helps reduce the growth in vehicle emissions. All the major metropolitan regions in California have approved plans emphasizing land use strategies that complement their transit and transportation systems and bring more people closer to more destinations. These strategies will help curb emissions by reducing trip distances and increasing use of public transit, carpooling, walking, and biking.

ARB's Proposed New SIP Measures

If emission reductions from the adopted measures are not enough to attain the federal standards, sufficient emission reductions from new strategies must be achieved in order to meet the emission reduction target.

ARB staff is proposing a comprehensive and far reaching set of new measures to achieve emission reductions needed to address California's most challenging ozone and PM2.5 problems. These measures are designed to make maximum progress toward the federal 8-hour ozone standard in the South Coast and the San Joaquin Valley. The measures include aggressive near-term NOx and SOx emission reduction goals, reflecting the nature and scope of the PM2.5 problem in these regions. To achieve the emission reductions needed for both ozone and PM2.5, the State Strategy proposes new near-term actions that can be completed by 2010 or soon thereafter.

Focus of Proposed New Measures

Mobile sources are the largest contributor to PM2.5 and ozone-forming emissions. Air quality science indicates that reductions of NOx are more beneficial than reductions of other pollutant precursors to help reduce levels of both ozone and PM2.5. The simple conclusion is that mobile source NOx reductions must be a main objective of the State Strategy. And since the State and federal government have almost exclusive authority over mobile source emissions, they also have the bulk of the responsibility for implementing the State Strategy.

Mobile sources currently produce about 90 percent of all NOx emissions in the South Coast. About 90 percent of mobile source NOx emissions are produced by five major sources – passenger vehicles, heavy-duty diesel trucks, large off-road equipment, and two goods movement-related sources -- ships, and locomotives. Reducing NOx emissions from these five major sources is therefore the key to meeting the objective of the State Strategy.

Mobile Sources → 90% of All NOx Emissions

Passenger Vehicles
Heavy-Duty Trucks
Construction Equip
Ships
Locomotives
→ 90% of Mobile Sources

More than any other pollution control effort, ARB's mobile source program has moved the State's nonattainment areas closer to meeting federal air quality standards. The majority of emission reductions from adopted SIP measures comes from emission standards for new on-road and off-road mobile sources and fuels. But as new engines have become cleaner and cleaner, the emissions contribution from older vehicles has been growing to the extent that it will soon make up the majority of mobile source emissions. For example, all on-road vehicles 14 years old or older will produce almost 60 percent of total on-road NOx emissions by 2014 but just 20 percent of total miles traveled. That is why

On-Road Vehicles 14 Years Old or Older In 2014
→ 60% of NOx Emissions
→ 20% of Miles Traveled

the majority of proposed new measures in the State Strategy are in-use measures – programs to help clean up the legacy fleet of older, dirtier vehicles and equipment. We simply cannot wait for the natural turnover of older vehicles (1-5 percent annual turnover depending on vehicle or equipment type) being replaced with newer ones.

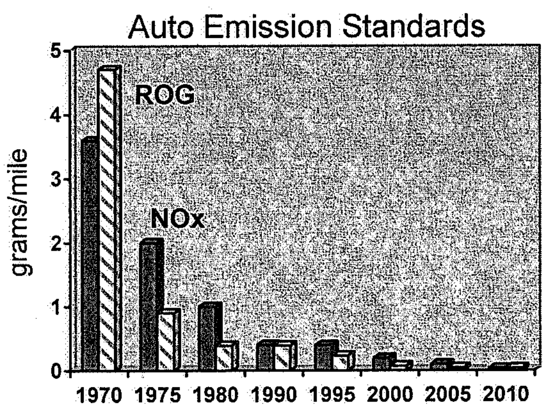
While action on the proposed in-use measures will be completed by 2010, their implementation will extend past 2010 and through 2014 to 2020. Longer-term actions will center on the final increment needed to attain the standard in the areas with the worst ozone pollution.

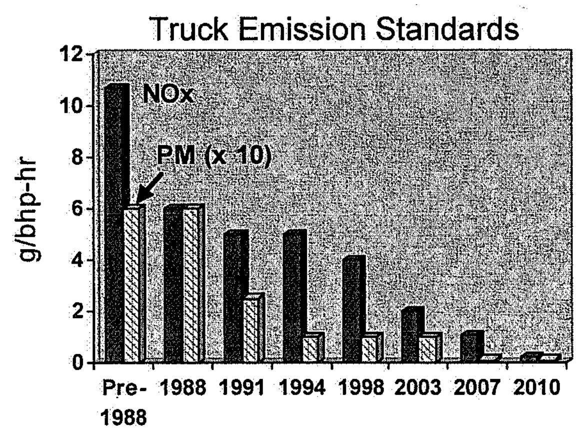
Passenger Vehicles and Heavy-Duty Trucks

Despite statewide growth in vehicle travel of 35 percent over the last 15 years, total car and truck emissions (ROG+NOx) have decreased almost 50 percent.

California has led the way in adopting stringent regulations for passenger vehicles. Compared to uncontrolled vehicles, cars are now 99 percent cleaner. A new 1965 car produced about 2,000 pounds of ozone-forming ROG emissions during 100,000 miles of driving. California's low-emission standards, coupled with reformulated gasoline, have cut that to less than 50 pounds for the average new car today. By 2010, California's standards will further reduce ROG emissions from the average new 2010 car to approximately 10 pounds.

ARB's first diesel engine regulations went into effect in 1988. Significant gains began with the introduction of California Clean Diesel fuel in 1993. U.S. EPA and ARB worked together to develop and adopt the next phases of on-road diesel engine control, with cleaner fuel in 2006 and even cleaner engines in 2007 that will reduce per-truck particulate matter emissions by another 90 percent. By 2010, new trucks will be 98 percent cleaner than new pre-1988 models, providing needed NOx reductions.





As new cars and trucks become cleaner, the emissions contribution from older vehicles has been growing to the extent that it will soon make up the majority of mobile source emissions. Thus, California's emission control program has also had to focus on cleaning up those vehicles already in use – the "legacy" or "in-use" fleet.

California's Smog Check Program is the cornerstone of the passenger vehicle in-use strategy, currently keeping over 400 tons of smog-forming gases from entering the air statewide each day. Passenger vehicles are also required to have software incorporated into their on-board computers to detect emission control system malfunctions as they occur. ARB's heavy-duty vehicle inspection program and periodic smoke inspection program reduce emissions from the legacy truck fleet. Trucks will also be required to have the same emission control malfunction detection software as passenger vehicles beginning in 2013.

Cars and heavy-duty diesel trucks currently produce about 50 percent of the total NOx emissions in both the South Coast and San Joaquin Valley. By 2023, that percentage will be cut almost in half. But cars and trucks still account for so much of the State's inventory of ozone and PM2.5 emissions, further reductions are essential if air quality standards are to be realized.

Proposed New Passenger Vehicle and Heavy-Duty Truck Measures

Passenger Vehicles

Since California's passenger vehicle emissions standards have done their job to cut emissions to near-zero levels, the control focus must shift to keeping vehicles clean over their lifetimes. The State Strategy envisions an even stronger Smog Check program that would reduce an additional 40 tons per day of emissions statewide in 2014. Proposed new Smog Check measures include annual inspections for cars with high failure rates, such as vehicles over 15 years old and vehicles accumulating high annual miles of travel, and adding inspections of motorcycles and smaller diesel vehicles. More attention will be paid to evaporative emissions through the addition of a low-pressure evaporative test, even as exhaust emission cutpoints are tightened.

The State Strategy proposes to increase the number of vehicles that are voluntarily retired by implementing a scrappage program for vehicles that are off cycle from their Smog Check inspections. This strategy will depend upon funding and would be targeted primarily in the South Coast and San Joaquin Valley. We will also continue to ensure that the fuels used in California are the cleanest-burning available, and mitigate the additional evaporative emissions resulting from the addition of ethanol to gasoline.

These proposed passenger vehicle measures would reduce total NOx and ROG emissions in the South Coast by about 32 tons per day in 2014 and over 22 tons in 2020. Likewise, this measure will reduce total NOx and ROG emissions in the San Joaquin Valley by over 10 tons in 2014 and about 7 tons in 2020.

Heavy-Duty Diesel Trucks

Substantially reducing emissions from existing trucks is key to meeting federal air quality standards, as well as achieving diesel risk reduction and goods movement clean air goals. The State Strategy foresees an expansive in-use diesel truck emission reduction program that would reduce NOx emissions by 47 tons per day in the South Coast and 61 tons per day in the San Joaquin Valley by 2014. Direct PM2.5 emissions would also be reduced 2-3 tons per day in both the South Coast and San Joaquin Valley during the same time period.

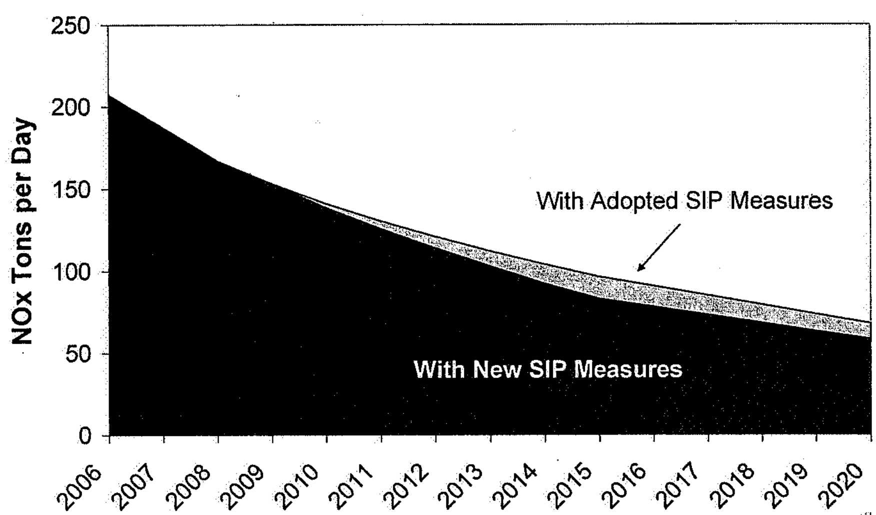
A comprehensive fleet modernization program beginning in 2010 would replace older trucks, repower trucks with cleaner engines, and retrofit trucks with devices to reduce both NOx and PM. The proposed modernization program would be equivalent to replacing approximately 30 percent of the oldest trucks by 2014 with 2010 model year or newer trucks, and will be accomplished through private truck fleet regulations. It is envisioned that the use of public incentive funds will be needed as well to facilitate fleet modernization on the scale necessary to attain PM2.5 and ozone standards within SIP deadlines.

The in-use diesel truck program also proposes to reduce emissions from trucks registered outside of California and to lessen the effects of emission control deterioration.

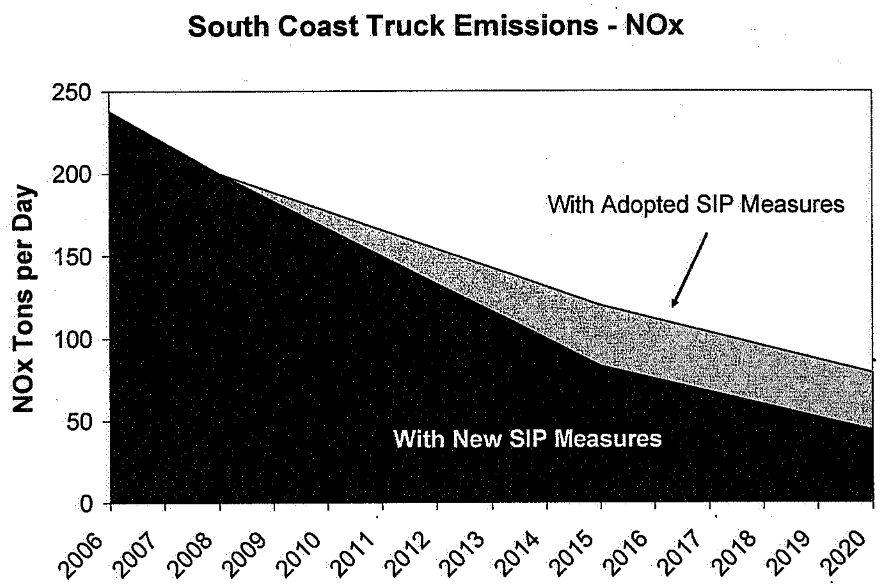
<u>Impact of Car and Truck SIP Measures</u>

Adopted SIP measures would reduce passenger vehicle NOx emissions in the South Coast by 67 percent between 2006 and 2020. Proposed new SIP measures would reduce that by another 15 percent by 2020.

South Coast Passenger Vehicle Emissions - NOx



Heavy-duty truck NOx emissions would be reduced by adopted SIP measures 67 percent between 2006 and 2020. Proposed new SIP measures would reduce NOx emissions by another 45 percent by 2020.



Good Movement Sources

The goods movement sector includes the ships, trains, port trucks, and related sources that help move materials and goods from the grower or manufacturer to the consumer. The air quality impact of the goods movement sector is a major issue in areas that host ports, large rail facilities, and major truck routes. Many entities have developed or are developing plans to address the impacts of goods movement, including the California Environmental Protection Agency and the Business, Transportation & Housing Agency, the Air Resources Board, the South Coast Air Quality Management District, several California ports, and two major railroads.

Two factors increase the importance of addressing emissions from goods movement sources. First, international trade through California's ports is growing rapidly: the volume of goods moving through the Port of Los Angeles and the Port of Long Beach – the nation's busiest port complex – is expected to more than double by 2020. Second, the most prominent sources in this sector have historically not been regulated as aggressively as stationary sources or other mobile sources. Goods movement sources are also powered by diesel engines that last longer than their gasoline-powered counterparts, and are often rebuilt before being replaced with newer, cleaner equipment. As a result new engine standards alone will not provide emission reductions in the timeframe allowed to attain the federal PM2.5 and ozone standards.

New measures in the State Strategy focus on the following goods movement sources: ships, locomotives, harbor craft, and port trucks. They closely mirror the measures included in Emission Reduction Plan for Ports and Goods Movement in California, approved by ARB in April 2006, and summarized briefly in Chapter 1. It is estimated that these measures will reduce 20 tons per day of

SOx, 49 tons per day of NOx, and about 4 tons per day of direct PM2.5 in the South Coast by 2014.

Ships

Emissions from ocean-going vessels, unlike most major pollution sources, are not projected to decrease in future years, since ships have little or no emission controls and run on high-emitting bunker fuel, and shipments of cargo containers are projected to grow significantly over the next two decades. Ships currently emit half the statewide SOx emissions, and it is estimated that ships will jump from the sixth to the second highest statewide NOx producer by 2023. It is essential to reduce ship emissions as they are entering our ports and when they are docked through application of demonstrated control technologies, use of cleaner fuels, and operational efficiencies. Since ARB does not have authority to set ship engine emission standards, we must work with national and international authorities, as well as the ports, to implement many of the control measures.

ARB took a big step in reducing emissions from ships in December 2005 by adopting a rule phasing in the use of cleaner low-sulfur fuel in ship auxiliary engines that will reduce SOx emissions from auxiliary engines by 96 percent and PM2.5 emissions by 83 percent beginning in 2010.

Proposed New Ship Measures

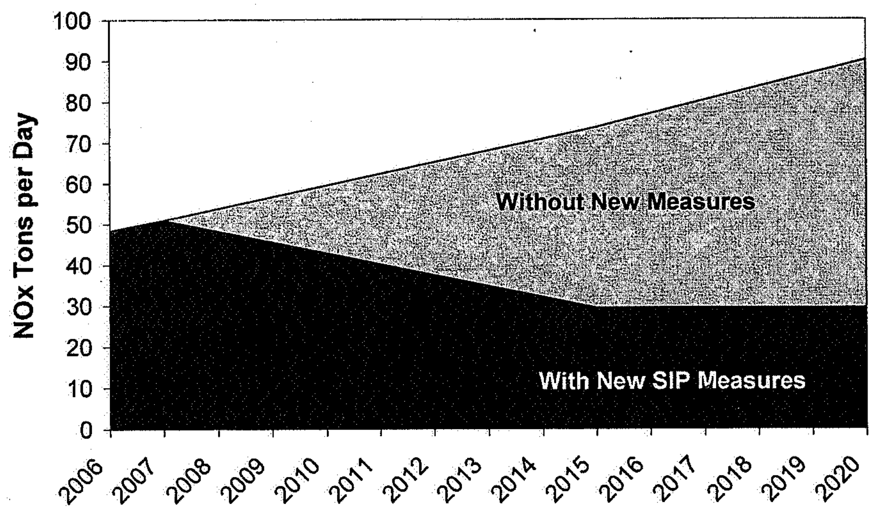
In addition to the 2005 auxiliary engine fuel rule, the State Strategy proposes to reduce emissions from ship auxiliary engines through cold ironing and other clean technology. Cold ironing allows ships to turn off their auxiliary engines and instead plug into an electrical system for power when they are docked at a port. This measure would phase in the number of ships capable of using cold ironing and other at-dock technologies such as the "hood", which fits onto a ship's exhaust stack and cleans the emissions, and is estimated to reduce NOx emissions about 19 tons per day in 2014 and 28 tons per day in 2020.

The State Strategy proposes to reduce emissions from ship main engines through a variety of measures. A main engine fuel rule, patterned after the auxiliary engine fuel rule, would help reduce emissions by introducing a cleaner, low-sulfur fuel beginning no later than 2010. Increasing the use of cleaner new engines or retrofitted engines beginning in 2010 could be implemented via regulation, incentives, voluntary agreements, or a combination of these approaches. Higher ship speeds cause much higher emissions. So a measure is proposed that would strengthen a current voluntary program by requiring ships to reduce their speeds to 12 knots within 40 nautical miles of the Ports of Los Angeles and Long Beach. The combination of ship main engine measures would reduce both NOx and SOx emissions by 20 tons per day and direct PM2.5 emissions by over 2 tons per day in 2014. These reductions would increase substantially through 2023.

Impact of Ship SIP Measures

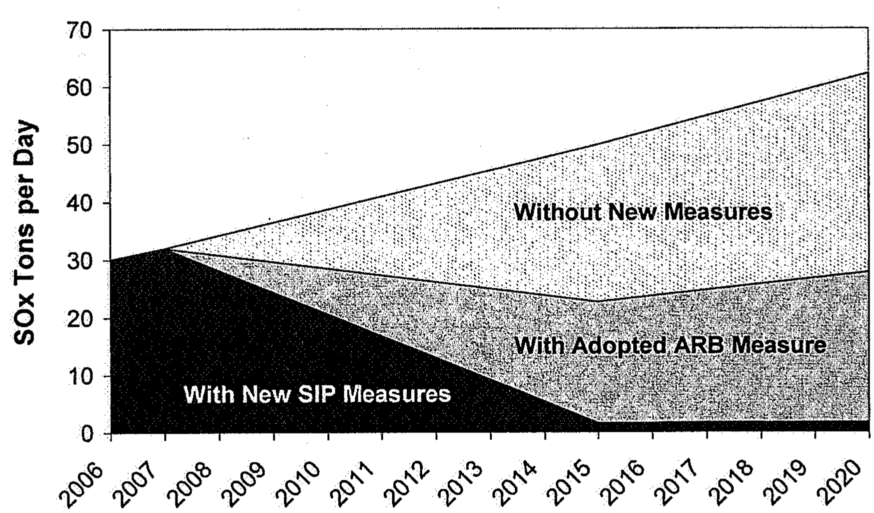
Without new SIP measures, ship NOx emissions are estimated to increase almost 90 percent between 2006 and 2020. With proposed new SIP measures, NOx emissions from ships would be 67 percent less than the projected 2020 levels and about 35 percent less than 2006 levels.

South Coast Ship Emissions - NOx



It is estimated that SOx emissions from ships will double without the adopted and new SIP measures. The adopted SIP measure (auxiliary engine fuel rule) will help reduce SOx more than 50 percent from projected 2014 levels, but emissions would then begin increasing due to goods movement growth. With proposed new SIP measures, SOx emissions would be reduced to only 2 tons per day in the South Coast by 2014 and remain at that low level through 2020.

South Coast Ship Emissions - SOx



Locomotives

Locomotives pose a difficult challenge due to their long life, interstate operations, and California's reliance on U.S. EPA to adopt new engine standards. A rule adopted by ARB in 2004 now requires locomotives operating in California to use cleaner, low-sulfur fuel that will reduce SOx emissions 90 percent. Several strategies are underway to clean up locally-based switcher engines, reduce idling emissions at railyards, and concentrate the cleanest available line haul engines in the South Coast. These activities are important for community health and NOx emission reductions in the short term. But without the introduction of cleaner new locomotive engines into California operation, growth is expected to quickly catch up to these current actions and begin to steer the NOx emissions curve upward.

In 1998, ARB reached agreement with the rail industry to accelerate introduction of Tier 2 locomotives into the South Coast Air Basin to achieve a 67 percent reduction. However, as shown below, emissions are projected to begin increasing after 2010 due to growth. A similar agreement is needed to accelerate introduction of the next generation of cleaner locomotives once EPA adopts new standards.

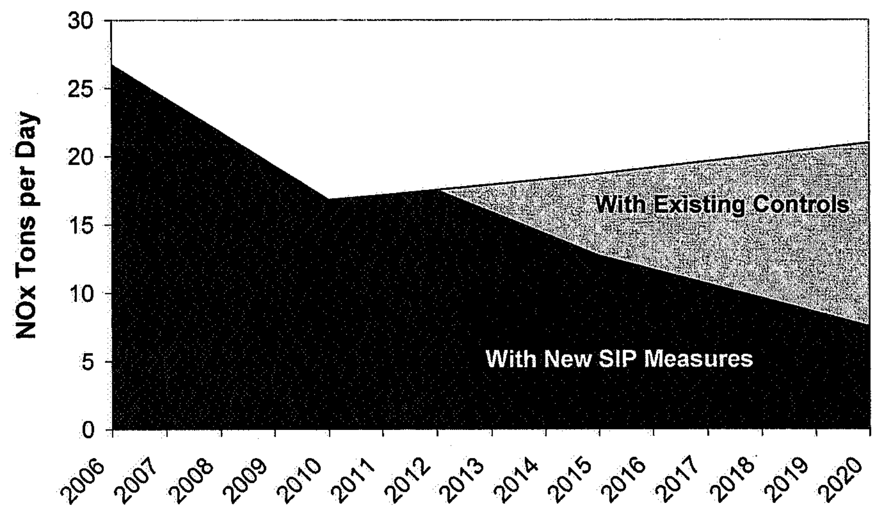
Proposed New SIP Measures

The State Strategy proposes U.S. EPA adoption of more stringent new engine standards and a new industry commitment to accelerate introduction of cleaner engines in California to meet the attainment needs of the South Coast and the San Joaquin Valley. It is anticipated that the new standards will reduce NOx and PM emissions by 90 percent. The proposed measure would call for replacement of existing locomotive engines with cleaner engines and rebuilds of older engines until 100 percent of the statewide locomotive fleet has been upgraded. ARB is pushing U.S. EPA to adopt the standards with earliest possible implementation, as this measure can only occur once U.S. EPA adopts new locomotive standards.

Impact of Locomotive SIP Measures

The proposed new SIP measures would reduce NOx emissions from locomotives by 13 tons per day in the South Coast and 16 tons per day by from 2006 to 2020.

South Coast Locomotive Emissions - NOx



Harbor Craft

Standards adopted by U.S. EPA provide for new harbor craft engines that have roughly 50 percent less NOx emissions than uncontrolled engines. The State Strategy proposes a new measure requiring harbor craft owners to replace older engines with the newer, cleaner engines and/or add control technologies that reduce emissions, reducing NOx emissions in the South Coast about 5 tons per day by 2014.

Port trucks

Most port trucks start out as long-haul trucks and then are put into short-haul use as they get older and are no longer reliable enough for long-haul service. Because port trucks are purchased used, emission standards for new trucks will reduce emissions from trucks servicing the ports later than they will impact the long-haul fleet. The State Strategy proposes a port truck modernization program that would phase in beginning in 2008 and would include replacing older trucks with newer, cleaner trucks and retrofitting engines with emission-reducing control technology, reducing South Coast NOx emissions 2 tons per day by 2014 and 8 tons per day by 2020.

Large Off-Road Equipment

Emission standards for new off-road diesel engines have become increasingly more stringent over the past decade, ensuring that new construction, mining, industrial and oil drilling equipment become progressively cleaner. By 2015, new large off-road equipment will produce 98 percent less ROG+NOx than their uncontrolled counterparts. However, large diesel off-road equipment with more than 25 horsepower remain in use for long periods of time, sometimes up to 60 years. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with the result that the emission reductions and associated health benefits from these cleaner engines will also be fairly slow to materialize.

Proposed New Large Off-Road Equipment Measure

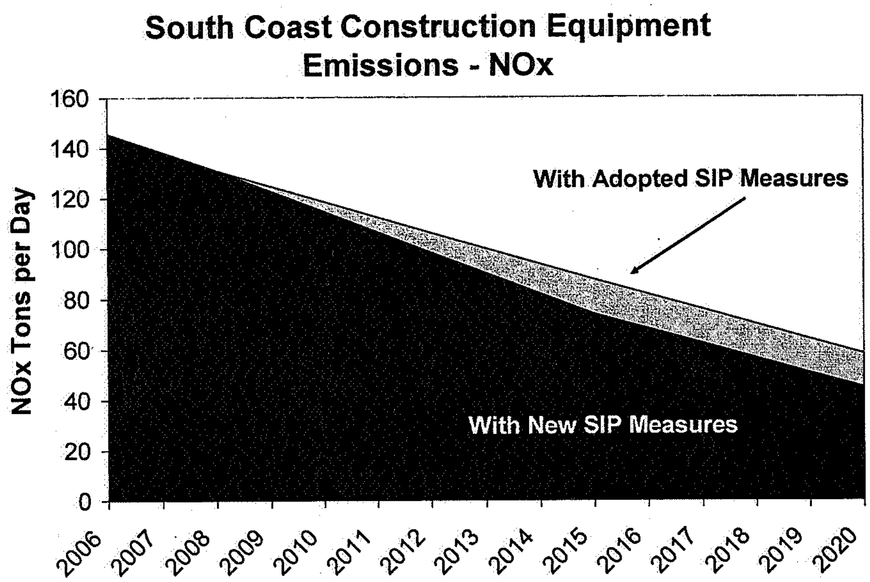
ARB staff is currently in the process of developing a statewide in-use off-road equipment regulation which could require initial NOx and PM emissions averages to be met, with increasingly lower emissions averages over time. Staff began work on the rule in 2004 as part of the Diesel Risk Reduction Program. During early SIP development work in 2006, staff identified the necessity for large NOx emission reductions from off-road equipment and other diesel sources to meet the health-based federal air quality standards. Consequently, staff revised the control concept extensively to meet California's clean air needs relative to diesel particulates, ozone, and PM2.5.

This proposed measure would require owners of equipment larger than 25 horsepower to meet a stringent average emissions level across all of their equipment. The fleet average approach provides equipment owners flexibility in how they will comply, including: swapping older, dirtier engines with newer, cleaner engines; purchasing newer equipment (with cleaner engines); and, adding emission control devices to older engines. Equipment owners could also restrict unnecessary equipment idling.

This measure would reduce 10.5 tons per day of NOx and about 3 tons per day of direct PM2.5 in the South Coast and nearly 4 tons per day of NOx and a ton per day of direct PM2.5 in the San Joaquin Valley by 2014. It would also cut direct PM2.5 emissions by more than half in 2014 and by 70 percent in 2023.

Impact of Large Off-Road Equipment SIP Measures

Adopted SIP measures would reduce large off-road equipment NOx emissions in the South Coast by almost 60 percent between 2006 and 2020. Proposed new SIP measures would reduce that by another 30 percent by 2020.



Agricultural Equipment

The State Strategy will assess an equipment modernization program once modeling for the San Joaquin Valley's PM2.5 SIP shows to what extent accelerated fleet modernization may be needed.

Other Off-Road Sources

For many gasoline-fueled off-road sources, evaporative emissions are a significant portion of total emissions. Leaky hoses, tanks, and other parts of an engine's fuel system and refueling infrastructure release hundreds of tons of ROG into the atmosphere a day. Success with low- to no-evaporative emission technology in on-road sources supports strategies to reduce evaporative emissions to similar low levels in off-road sources. Many newly-regulated sources have exhaust standards but do not yet have evaporative standards. The State Strategy proposes to set standards where there are none and make standards more stringent in sources that are not adequately controlled.

Off-road sources used mainly for recreational purposes are large emission contributors, especially during the summer ozone season. The main focus of the State Strategy on this wide array of smaller off-road sources is evaporative emissions. Recreational marine boat engines and off-road recreational vehicles are the biggest targets, with standards being implemented by 2010 and ROG emission reductions growing through 2023 as these newer, cleaner engines become a bigger part of the overall recreational fleet. Refueling tanks, portable fuel tanks, and gas station fueling hoses, where emissions are the result of evaporation or permeation of ROG from gasoline, are also targeted. The proposed measures covering these off-road sources would reduce a combined 7 tons per day of ROG in the South Coast and about 4 tons per day in the San Joaquin Valley by 2014.

Areawide Sources

Consumer Products

Chemically formulated consumer products such as automotive care products, household care products, and personal care products have been regulated as a source of ROG emissions in five rulemakings since 1989. As a result of these measures, statewide emissions from consumer products will be reduced by over 170 tons per day in 2010, a 40 percent reduction. Despite this progress, population growth in the years ahead is expected to reverse the downward trend of emissions from consumer products, after the latest standards become effective. Therefore, additional controls for this sector will remain important. Indeed, consumer products are expected to become the largest source of ROG emissions in the South Coast, and the third largest source in the San Joaquin Valley by 2020.

The State Strategy will continue ARB's commitment to reduce ROG emissions from consumer products. Rulemakings are expected to be promulgated between 2007 and 2012, expanding beyond the current category-by-category standards and pursuing innovative approaches, reducing ROG emissions about 13 tons in the South Coast and almost 4 tons per day in the San Joaquin Valley by 2020.

Pesticides

Pesticide emissions from agricultural and commercial uses fall under the Department of Pesticide Regulation's (DPR) authority. A measure to reduce pesticide emissions was included in the SIP adopted in 1994. The State Strategy includes an updated version of that measure. It is a strategy to reduce ROG emissions from pesticides through regulations that may include limitations on the use of products formulated as fumigants, registration standards requiring liquid products that contribute less to ozone formation, and incentives promoting pest management practices that use less pesticide.

Local Measures

The proposed new local air district measures, coupled with the new State Strategy measures, must provide the necessary emission reductions to meet the federal standards. The new local measures for each nonattainment area are listed, described, and quantified in the attainment plans for each area.

Need for Technology Development and Long-term Measures

In developing the proposed State Strategy, ARB staff analyzed whether current NOx technologies for mobile sources are clean enough to provide all the emission reductions needed for ozone attainment in the South Coast and San Joaquin Valley. ARB included in this analysis the phasing in of the cleanest new technology standards from 2007-2017 that ARB and U.S. EPA have already adopted for diesel engines: 0.2 g/bhp-hr on-road truck standards in 2010, full off-road Tier 4 standards in 2014, and the recent U.S. EPA-proposed low-NOx standards for locomotive engines starting in 2017. The table below summarizes this analysis. For both areas, the totals of remaining emissions after full clean-up of the legacy diesel fleets are still greater than the NOx carrying capacities.

The clear conclusion is that even cleaner emission standards are needed than are in place today. This demonstrates that it necessary for the South Coast and San Joaquin Valley SIPs to rely on cleaner – yet to be developed – technologies as allowed by federal Clean Air Act section 182(e)(5) for areas with the worst pollution.

All New Fleets Analysis -- Unconstrained by Cost

Source	**Remaining NOx 2020 Emissions (tpd) ***	
	South Coast	**San Joaquin Valley**
Passenger vehicles	*18*	*5*
Diesel trucks	*37*	*43*
Construction and other equipment	*14*	*5*
Farm equipment	*1*	*7*
Locomotive	*7*	*5*
Ships and harbor craft	37	1
Aircraft	27	5
Stationary/area-wide sources	55	103
Subtotal of remaining emissions from above categories	195	173
All other NOx sources	52	22
Total of all remaining emissions	247	195
Carrying capacity	114	160

* Numbers may not add exactly due to rounding

For this analysis, ARB staff assumed that in 2020 all passenger cars would be 10 years old or younger, all diesel trucks would meet the 2010 NOx standards, all diesel construction and farm equipment would meet the most stringent tier 4 standards, all locomotives would meet U.S. EPA's proposed 2017 NOx standards, and the new stationary sources measure in the district SIPs would be fully implemented.

The top five rows are italicized to indicate the categories for which we assume that all vehicles and equipment meet the cleanest adopted emission standards. Included in the category "all other NOx sources" are commercial gas trucks, motorcycles, buses, motor homes, off-road recreational vehicles, and gas powered off-road equipment.

ARB staff did the analysis starting with 2020 baseline emissions since that year corresponds to the last federal attainment deadline before the 2024 extreme-classification deadline under which the long-term measure provisions of federal law apply. The numbers would look nearly identical for an analysis for any year between now and 2020 as the starting point. (For example, ARB staff calculated the "total of remaining emission" for the San Joaquin Valley using a 2018 starting point. The resulting "total of remaining emission" was approximately 195 tons per day.) The carrying capacity is independent of the year. Therefore, the analysis and conclusion that it is necessary for the South Coast and San Joaquin Valley ozone SIPs to rely on cleaner, yet to be developed, technologies is general and does not change with year analyzed.

The results for the San Joaquin Valley demonstrate that the need for cleaner technologies includes cleaner technologies for industrial sources, not just vehicles. Close to half of the San Joaquin Valley remaining emissions, 103 tons per day compared to a carrying capacity of 160 tons per day, are from stationary and area-wide sources. Clearly, long-term reductions from new technologies for both mobile and stationary sources will be needed.

Process for Identifying Long-Term Emission Reductions

ARB has a long-standing history of successfully adopting and implementing both technology-advancing regulations and innovative emission control techniques. By working closely with research scientists and the regulated industry, ARB staff have been able to craft regulations that are stringent enough to compel technology development, yet flexible enough to encourage industry innovations.

ARB staff believe a directed process is needed to ensure that future emission reduction opportunities are identified that are large enough and arrive in time to meet the attainment deadline.

To accomplish this, ARB staff proposes to take the lead in a coordinated government, private, and public effort to establish emission goals for critical emission source categories. Each category's goal will serve as a general target for how much cleaner that emission source category will need to be for attainment purposes. The setting of the source category emission goals must be science-based in two ways. First, the goals must be tied to the State's overall emission reduction needs. Although, estimated emission reduction needs will change as modeling and emission inventories are updated, a working estimate of how far technology needs to be pushed is critical to a successful outcome. Second, the goals must reflect a reasonable assessment of how far technology can progress over the time available for attainment.

This process of goal setting will give direction and distance to ARB and air district regulatory efforts to set the next generation of emission standards. As ARB and air districts identify future feasible emission reduction measures toward the goals, those measures will be incorporated into future SIPs. However, to keep near-term focus on the need to find more emission reductions, ARB staff proposes to periodically brief the Board on emerging emission reduction opportunities and promising technologies.

Potential Long-Term Concepts

Although the identification of long-term emission reductions will begin with the emission goal setting for critical emission source categories, specific approaches that ARB will evaluate for possible inclusion in the next SIP update include the following:

Passenger vehicles: look for further reductions from reduced deterioration of emission reduction components. While new cars are very clean, it may be possible to improve the on-board diagnostic capability of passenger vehicles and heavy-duty trucks to better target sources of emissions and to improve and encourage higher rates of repair.

Tighten emission standards wherever possible: review all categories of engines and vehicles to ensure that the cleanest cost-effective technologies are in place. For example:

- Exhaust and evaporative standards for on-road motorcycles.
- Second generation catalyst-based emission standards for inboard/stern drive marine engines.
- Tighter exhaust emission limits for small off-road engines.

Cleaner ground support equipment: push for increased electrification. Captured vehicle and equipment fleets used at airports are cleaner today through natural turnover and accelerated turnover spurred through cooperative State and local government and air company efforts. However, additional opportunities for increased electrification remain.

Air quality priority for federal transportation funding: work with local governments to prioritize federal transportation funding uses to better support air quality goals. The federal Congestion and Air Quality Improvement (CMAQ) Program annually provides to county transportation agencies more than $200 million in the South Coast and about $50 million in the San Joaquin Valley through 2009. The purpose of the CMAQ Program, according to Federal Highway Administration 2006 guidance, is to fund transportation projects that will contribute to attainment of national ambient air quality standards.

Ideas Requiring Further Exploration

Air quality control is an ever emerging field. At ARB, new ways to control air pollutants and improve public health are continually developed through research and other staff work. At any one time, there are always emission reduction ideas on the horizon that we have not fully explored or developed. Some of these approaches that are in various stages of development could turn out to be effective strategies at some point in the future.

The following approaches show promise as potential emission reduction strategies. However, because of technological constraints and uncertain authority, they are less defined and will require significant exploration prior to becoming concepts.

Explore opportunities for cleaner fuels. The near-term focus for fuels-related efforts in California will be to develop low carbon fuels in response to the Governor's 2007 Executive Order. Separate from that effort, ARB will continue to evaluate the opportunities for cost-effective reformulations to reduce criteria pollutant emissions.

Pursue additional emission reductions from consumer products. Despite the actions to date and the new measures proposed in this plan, consumer products continue to be an ever larger percentage of ROG emissions because of population growth. ARB will continue to look for even cleaner consumer product technologies and innovative approaches to reduce emissions such as reactivity-based and market-based strategies. This would continue the search for new approaches to achieve emission reductions initiated within the near-term consumer product measure.

Explore approaches to further reduce volatile emissions from pesticides. With the Department of Pesticide Regulation as the lead, work with interested stakeholders to determine how pesticide emissions could be further reduced.

Continue and enhance current public education and outreach programs. Public and private energy conservation and efficiency programs would continue and expand. The establishment of a statewide public education campaign to reduce air pollution could be considered, and might include ideas to engage the public through: (1) public education that more clearly connects voluntary clean air actions with public health benefits, and (2) increasing awareness of available low-emitting consumer products, paints, vehicles, lawn equipment, and recreational vehicles licensed to use clean air "green" labels.

Advocate for efficient regional land use and transportation strategies. In California, local governments have the authority over most transportation funding and land use decisions. The most effective way for regions to curb long-term growth of vehicle travel and lessen auto emissions is to build on and enhance current efforts to implement transportation and land use strategies proven to reduce vehicle trips and decrease average trip lengths.

State Implementation Plan Commitments

This section sets forth the State's SIP commitments for the 2007 State Strategy for two of the areas that need the emission benefits from the proposed, new State measures to demonstrate attainment – South Coast and San Joaquin Valley. Specific commitments for emission reductions as needed for attainment in other nonattainment areas, such as the Antelope Valley and Western Mojave Desert, Sacramento, and Ventura County, will be developed later and brought for Board consideration with SIPs for these regions.

The State's SIP commitments consist of three components:

1. Commitment to achieve emission reductions by specific dates;
2. Commitment to propose defined new SIP measures; and
3. A long-term strategy commitment.

The total emission reductions and the obligation to propose specific measures for Board consideration would become enforceable upon approval by U.S. EPA of the State Strategy and each district's attainment plan. The commitments for emission reductions are calculated using the planning inventory described in Appendix A; progress will be tracked in the same inventory currency to assess compliance.

The total emission reductions from the new measures necessary to attain the federal standards are an enforceable State commitment in the SIP. While the proposed State Strategy includes estimates of the emission reductions from each of the individual new measures, it is important to note that the commitment of the State Strategy is to achieve the total emission reductions necessary to attain the federal standards, which would be the aggregate of all existing and proposed new measures combined. Therefore, if a particular measure does not get its expected emission reductions, the State still commits to achieving the total aggregate emission reductions, whether this is realized through additional reductions from the new measures, or from alternative control measures or incentive programs.

For informational purposes, the tables below show the expected emission reductions from the proposed new SIP measures in the South Coast and San Joaquin Valley in 2014, 2020, and 2023. The first table shows the expected NOx and ROG emission reductions for South Coast and San Joaquin Valley for 2023, the year in which the emission reduction target must be met for the expected ozone attainment date of 2024 for these areas. The second table shows the expected NOx and ROG emission reductions for the two areas for 2020 to help illustrate the progress that will be made prior to the proposed 2024 attainment deadlines for the South Coast and San Joaquin Valley. The third and fourth tables show the expected emissions reductions from NOx, ROG, SOx, and direct PM2.5 in the South Coast and San Joaquin Valley in 2014, the year in which emission reduction targets must be met for the federal PM2.5 standard.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast and San Joaquin Valley -- 2023

	South Coast		San Joaquin Valley	
Proposed New SIP Measures	**NOx**	**ROG**	**NOx**	**ROG**
Passenger Vehicles	**7.1**	**10.5**	**2.1**	**3.3**
Smog Check Improvements (BAR)	6.9	7.5	2.1	1.9
Expanded Vehicle Retirement	0.2	0.5	0.04	0.1
Modifications to Reformulated Gasoline Program	--	2.5	--	1.3
Heavy-Duty Trucks	**18.3**	**1.7**	**21.2**	**2.3**
Cleaner In-Use Heavy-Duty Trucks	18.3	1.7	21.2	2.3
Goods Movement Sources	**99.2**	**1.9**	**16.4**	**1.3**
Ship Auxiliary Engine Cold Ironing & Clean Technology	30.8	--	--	--
Cleaner Main Ship Engines and Fuel	39.9	--	--	--
Port Truck Modernization	7.0	--	--	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	15.6	1.9	16.4	1.3
Clean Up Existing Harbor Craft	5.9	NYQ	--	NYQ
Off-Road Equipment	**13.9**	**1.9**	**5.4**	**0.6**
Cleaner In-Use Off-Road Equipment (over 25hp)	13.9	1.9	5.4	0.6
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	NYQ
Other Off-Road Sources	**2.4**	**24.0**	**0.6**	**11.4**
New Emission Standards for Recreational Boats	2.4	17.6	0.6	5.3
Expanded Off-Road Rec. Vehicle Emission Standards	--	6.4	--	6.1
Additional Evaporative Emission Standards	--	NYQ	--	NYQ
Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	NYQ
Areawide Sources	**--**	**13.7**	**--**	**6.3**
Consumer Products Program	--	13.7	--	3.8
Pesticides: DPR Regulation	--	NYQ	--	2.5
Emission Reductions from Proposed New Measures	**141**	**54**	**46**	**25**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation.

Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover. Note: Emission reductions reflect the combined impact of regulations and supportive incentive programs. Emission reduction estimates for each proposed measure are shown for informational purposes only. Actual emission reductions from any particular measure may be greater than or less than the amounts shown.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast and San Joaquin Valley -- 2020

	South Coast		San Joaquin Valley	
Proposed New SIP Measures	**NOx**	**ROG**	**NOx**	**ROG**
Passenger Vehicles	**9.6**	**12.9**	**2.7**	**4.1**
Smog Check Improvements (BAR)	8.3	8.7	2.4	2.2
Expanded Vehicle Retirement	1.3	1.2	0.3	0.3
Modifications to Reformulated Gasoline Program	--	3.0	--	1.6
Heavy-Duty Trucks	**26.9**	**2.6**	**30.2**	**3.3**
Cleaner In-Use Heavy-Duty Trucks	26.9	2.6	30.2	3.3
Goods Movement Sources	**87.1**	**1.8**	**15.6**	**1.2**
Ship Auxiliary Engine Cold Ironing & Clean Technology	28.3	--	--	--
Cleaner Main Ship Engines and Fuel	32.3	--	--	--
Port Truck Modernization	8.0	--	--	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	13.4	1.8	15.6	1.2
Clean Up Existing Harbor Craft	5.1	NYQ	--	NYQ
Off-Road Equipment	**18.7**	**2.9**	**7.0**	**1.0**
Cleaner In-Use Off-Road Equipment (over 25hp)	18.7	2.9	7.0	1.0
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	NYQ
Other Off-Road Sources	**1.6**	**17.9**	**0.4**	**8.7**
New Emission Standards for Recreational Boats	1.6	12.8	0.4	3.8
Expanded Off-Road Rec. Vehicle Emission Standards	--	5.1	--	4.9
Additional Evaporative Emission Standards	--	NYQ	--	NYQ
Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	NYQ
Areawide Sources	**--**	**13.5**	**--**	**6.1**
Consumer Products Program	--	13.5	--	3.6
Pesticides: DPR Regulation	--	NYQ	--	2.5
Emission Reductions from Proposed New Measures	**144**	**52**	**56**	**24**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation.

Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover. Note: Emission reductions reflect the combined impact of regulations and supportive incentive programs. Emission reduction estimates for each proposed measure are shown for informational purposes only. Actual emission reductions from any particular measure may be greater than or less than the amounts shown.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast -- 2014

Proposed New SIP Measures	NOx	ROG	Direct PM2.5	SOx
Passenger Vehicles	**14.4**	**17.7**	**0.3**	**--**
Smog Check Improvements (BAR)	12.0	10.5	0.2	--
Expanded Vehicle Retirement	2.4	2.8	0.05	--
Modifications to Reformulated Gasoline Program	--	4.4	--	--
Heavy-Duty Trucks	**47.3**	**5.1**	**3.0**	**--**
Cleaner In-Use Heavy-Duty Trucks	47.3	5.1	3.0	--
Goods Movement Sources	**49.4**	**0.7**	**3.6**	**20.1**
Ship Auxiliary Engine Cold Ironing & Clean Technology	18.5	--	0.3	0.4
Cleaner Main Ship Engines and Fuel	20.0	--	2.4	19.7
Port Truck Modernization	2.0	--	0.5	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	4.3	0.7	0.2	--
Clean Up Existing Harbor Craft	4.6	--	0.2	--
Off-Road Equipment	**10.5**	**2.7**	**2.6**	**--**
Cleaner In-Use Off-Road Equipment (over 25hp)	10.5	2.7	2.6	--
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	--
Other Off-Road Sources	**0.4**	**6.6**	**--**	**--**
New Emission Standards for Recreational Boats	0.4	4.2	--	--
Expanded Off-Road Rec. Vehicle Emission Standards	--	2.4	--	--
Additional Evaporative Emission Standards	--	NYQ	--	NYQ
Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	NYQ
Areawide Sources	**--**	**12.9**	**--**	**--**
Consumer Products Program	--	12.9	--	--
Pesticides: DPR Regulation	--	NYQ	--	--
Emission Reductions from Proposed New Measures	**122**	**46**	**9**	**20**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation.

Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover. Note: Emission reductions reflect the combined impact of regulations and supportive incentive programs. Emission reduction estimates for each proposed measure are shown for informational purposes only. Actual emission reductions from any particular measure may be greater than or less than the amounts shown.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

San Joaquin Valley -- 2014

Proposed New SIP Measures	NOx	ROG	Direct PM2.5	SOx
Passenger Vehicles	**3.8**	**6.5**	**0.1**	**--**
Smog Check Improvements (BAR)	3.3	2.9	0.05	--
Expanded Vehicle Retirement	0.5	0.7	0.01	--
Modifications to Reformulated Gasoline Program	--	2.9	--	--
Heavy-Duty Trucks	**61.4**	**6.4**	**3.6**	**--**
Cleaner In-Use Heavy-Duty Trucks	61.4	6.4	3.6	--
Goods Movement Sources	**7.2**	**0.5**	**0.2**	**--**
Ship Auxiliary Engine Cold Ironing & Clean Technology	--	--	--	--
Cleaner Main Ship Engines and Fuel	--	--	--	--
Port Truck Modernization	--	--	--	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	7.2	0.5	0.2	--
Clean Up Existing Harbor Craft	--	NYQ	--	--
Off-Road Equipment	**3.7**	**0.9**	**0.8**	**--**
Cleaner In-Use Off-Road Equipment (over 25hp)	3.7	0.9	0.8	--
Cleaner In-Use Agricultural Equipment	NYQ	NYQ	NYQ	--
Other Off-Road Sources	**0.1**	**3.5**	**--**	**--**
New Emission Standards for Recreational Boats	0.1	1.3	--	--
Expanded Off-Road Rec. Vehicle Emission Standards	--	2.2	--	--
Additional Evaporative Emission Standards	--	NYQ	--	NYQ
Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	NYQ
Areawide Sources	**--**	**5.7**	**--**	**--**
Consumer Products Program	--	3.2	--	--
Pesticides: DPR Regulation	--	2.5	--	--
Emission Reductions from Proposed New Measures	**76**	**23**	**5**	**0**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Dept. of Pesticide Regulation.

Locomotives measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover. Note: Emission reductions reflect the combined impact of regulations and supportive incentive programs. Emission reduction estimates for each proposed measure are shown for informational purposes only. Actual emission reductions from any particular measure may be greater than or less than the amounts shown.

Commitments to Reduce Emissions

The tables below describe the emission reduction commitment proposal for Board approval. ARB staff proposes to commit to achieve the emission reductions set forth in these tables, by the dates indicated in the table on Page 65 entitled, "Schedule for Board Consideration of Proposed ARB Rulemaking." The reductions may be achieved through a combination of actions, including regulations, incentives, and other enforceable mechanisms.

Summary of Emission Reduction Commitments – South Coast

Year	NOx	ROG	Direct PM2.5	SOx
2014	122	46	9	20
2020 [1]	144	52	--	--
2023	141	54	--	--
2023 CAA 182(e)(5) measures	241 [2]	40 [2]	--	--

[1] The 2020 commitment in the South Coast is necessary to provide for attainment in the downwind nonattainment areas.
[2] The reductions of NOx and ROG from 182(e)(5) measures will be reassessed as new SIPs are developed and revised.

Summary of Emission Reduction Commitments – San Joaquin Valley

Year	NOx	ROG	Direct PM2.5	SOx
2014	76	23	5	0
2020	56	24	--	--
2023	46	25	--	--
2023 CAA 182(e)(5) measures	81 [1]	-- [1]	--	--

[1] The reductions of NOx and ROG from 182(e)(5) measures will be reassessed as new SIPs are developed and revised.

Summary of Emission Reduction Commitments – Coachella Valley

Year	NOx	ROG
2018	7	2

Commitment to Propose Defined New SIP Measures

In addition to the commitment to reduce emissions by 2014, 2020 and 2023, ARB staff also proposes to commit to submit to the Board and propose for adoption the list of proposed new ARB control measures shown in the table below. The Board shall take action on or before the dates set forth in the following table. Such action by the Board may include any action within its discretion.

Schedule for Board Consideration of Proposed ARB Rulemaking

Proposed New SIP Measures	Year
Cleaner In-Use Off-Road Equipment	2007
Modifications to Reformulated Gasoline Program	
Cleaner Main Ship Fuel	
Clean Up Existing Harbor Craft	
Enhanced Vapor Recovery for Above Ground Storage Tanks	
Cleaner In-Use Heavy-Duty Trucks	2008
Port Truck Modernization	
Ship Auxiliary Engines	
Cleaner Line-Haul Locomotives (Enforceable Agreement)	
Consumer Products Program I	
Cleaner In-Use Agricultural Equipment	2009-2010
New Emission Standards for Recreational Boats	
Expanded Off-Road Recreational Vehicle Emission Standards	
Additional Evaporative Emission Standards	
Consumer Products Program II	2010-2012

State Strategy
Proposed New SIP Measures
Implementing Agency – Expected Action – Expected Implementation

Proposed New SIP Measures	Implementing Agency	Expected Action	Expected Implemen-tation
Passenger Vehicles			
Smog Check Improvements	BAR	2007-2008	By 2010
Expanded Vehicle Retirement	ARB/BAR	2008-2014	2008-2014
Modifications to Reformulated Gasoline Program	ARB	2007	Phase-in starting 2010
Trucks			
Cleaner In-Use Heavy-Duty Trucks	ARB	2008	2010-2015
Goods Movement Sources			
Auxiliary Ship Engine Cold Ironing and Other Clean Technology	EPA/ARB/ Local	2007-2008	Phase-in starting 2010
Cleaner Main Ship Engines and Fuel	EPA/ARB Local	Fuel: 2007	2007-2010
		Engines: 2009	Phase-in starting 2010
Port Truck Modernization	ARB/Local	2007-2008	2008-2020
Accelerated Introduction of Cleaner Line-Haul Locomotives	EPA/ARB	2007-2008	Starting in 2012
Clean Up Existing Harbor Craft	ARB	2007	2009-2018
Off-Road Equipment			
Cleaner In-Use Off-Road Equipment	ARB	2007	Phase-in starting 2008
Cleaner In-Use Agricultural Equipment	ARB	2009-2010	TBD
Other Off-Road Sources			
New Emission Standards for Recreational Boats	ARB	2009-2010	2012-2013
Expanded Off-Road Recreational Vehicle Emission Standards	ARB	By 2010	2012-2015
Enhanced Vapor Recovery for Above Ground Storage Tanks	ARB	2007	Phase-in starting 2008
Additional Evaporative Emission Standards	ARB	By 2010	2010-2012
AREAWIDE SOURCES			
Consumer Products Program	ARB	2007-2008	By 2010
		2010-2012	By 2012-2014
DPR Pesticide Regulation	DPR	2008	2008

DPR = Department of Pesticide Regulation. BAR = Bureau of Automotive Repair

TBD = To Be Determined

Commitment to Reduce Emissions via Long-Term Strategy

Consistent with section 182(e)(5) of the federal Clean Air Act, this SIP includes long-term commitments to achieve the last increment of emission reductions necessary to meet attainment goals in the South Coast and San Joaquin Valley. As the State agency charged with ensuring California's SIP compliance, ARB is ultimately responsible for ensuring the necessary measures are identified no later than 2020 (three years prior to the attainment year) and the emission reductions achieved by 2023.

After adoption of the State Strategy, ARB staff proposes to initiate a coordinated government, private, and public effort to establish emission goals for critical mobile and stationary emission source categories. Following the setting of emission goals, ARB will start an ongoing public process to assess technology advancement opportunities for the critical categories. ARB staff will periodically brief the Board at public meetings on emerging emission reduction opportunities, promising technologies, and the progress made in developing long-term emission reduction measures. As ARB staff identifies feasible technology-forcing emission reduction measures, staff will propose those measures to the Board for inclusion into the SIP.

No later than 2020, ARB and the two air districts will prepare a revision to the 8-hour Ozone SIP that (1) reflects any modifications to the 2023 emission reduction target based on updated science, and (2) identifies any additional strategies, including the implementing agencies, needed to achieve the necessary emissions reductions by 2023. If the specific measures developed to satisfy the long-term obligation affect on-road motor vehicle emissions, we will work with the air districts and transportation planning agencies to revise the transportation conformity budgets accordingly.

South Coast: After accounting for the anticipated benefits of both adopted and new defined State and local measures, the 2003 SIP demonstrates a need for another 281 tpd ROG and NOx reductions from long-term measures. This represents 24 percent of the total reductions needed by 2023. We believe that this gap can be bridged through a cooperative effort by the local, State and federal agencies responsible for specific emission sources. This effort should focus on how to most effectively achieve the additional reductions, considering the availability and cost of potential controls.

San Joaquin Valley: After accounting for the anticipated benefits of both adopted and new defined State and local measures, the State Strategy demonstrates a need for another 81 tpd NOx reductions from long-term measures. This represents 13 percent of the total NOx and ROG reductions needed by 2023. We believe that this gap can be bridged through a cooperative effort by the local, State and federal agencies responsible for specific emission sources. This effort should focus on how to most effectively achieve the additional reductions, considering the availability and cost of potential controls.

Role of Funding and Incentive Programs

Over the past 40 years, California has steadily improved air quality in the face of tremendous economic and population growth. The vast majority of that progress has come from effective regulations. Accordingly, ARB staff expects State and federal regulations to play the primary role in implementing the State Strategy. In the regulatory paradigm, polluting sources pay for the necessary emission controls as part of doing business. Regulated industries may pass these costs on to consumers in the form of higher prices, although competition and other factors may prevent some companies from recouping all of their control costs. Low-interest loans with extended payment periods are available to aid smaller businesses that need upfront capital to comply.

In recent years, regulatory programs have been supplemented with financial incentives to accelerate voluntary actions, such as replacing older equipment. Incentive programs like the Carl Moyer Program are both popular and effective. They also help to demonstrate emerging technologies that then can be used to set a tougher emissions benchmark for regulatory requirements. Most of the existing incentive programs are designed to pay for the incremental cost between what is required by regulation and advanced technology that exceeds that level. The incentive programs are publicly funded through fees paid by California vehicle owners as part of their annual registrations, smog inspections or new tire purchases. California is currently investing up to $140 million per year to clean up older, higher emission sources.

The support for clean air incentive funding from Governor Schwarzenegger, the Legislature, and California's voting public is reflected in the passage on November 7, 2006, of the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. The Bond Act includes $1 billion to accelerate the cleanup of air pollution caused by goods movement activities in California. With appropriation by the Legislature, and subject to such conditions and criteria contained in a statute that it will enact, ARB will appropriate this money to fund emission reductions from activities related to the movement of freight along California's trade corridors.

Federal Actions Needed

Measures in the State Strategy to reduce emissions from interstate and international sources rely on the federal government to develop more stringent emission standards and to ensure these standards go into effect as soon as possible. Emission reductions from locomotives, off-road equipment, marine auxiliary engines, and harbor craft are a significant part of the State Strategy. Proposed State measures would accelerate the introduction of cleaner engines and equipment, but the emission reductions rely on the availability of cleaner new engines.

ARB is proposing several measures to reduce ship emissions through a combination of regulations, incentives, and actions by ports and the private sector. However, national and international action to clean up shipping fleets is also needed to fully realize our clean air goals. And aircraft emissions, which will become one of the South Coast's top five NOx sources by 2020, are unaddressed in the State Strategy due to the lack of effective international standards.

California must rely on U.S. EPA to represent its interests before foreign or international regulatory bodies that have the ability to reduce emissions from international goods movement sources. In this role, U.S. EPA should advocate for the adoption of cleaner ship emission standards and less polluting practices by the International Maritime Organization.

Possible Federal Actions

Adopt more stringent standards for sources under federal control. U.S. EPA should move as fast as possible to lower standards for sources under its control, keeping in mind California's air quality challenge and attainment deadlines. There are categories of emission sources that we do not have the authority to regulate at the State level. We also do not have the ability to regulate sources in markets outside of California that then operate within California. Not only would federal action lower emissions for new sources, but it would allow State and local actions to lower emissions from existing sources by setting in-use rules that speed up the integration of the cleaner engines and technology into California fleets. These sources include: ships, locomotives, harbor craft, aircraft, and off-road equipment and vehicles.

Federal incentives for cleaner technology. Federal funding sources for clean air projects, as well as federal tax incentives promoting the manufacture, sale, and purchase of cleaner vehicles, equipment, and technology, could enhance California's aggressive incentive programs.

Ozone Attainment Demonstrations

The table on the following page illustrates how the State Strategy will meet the emission reduction targets for ozone in the South Coast and San Joaquin Valley.

This document has presented ARB staff's assessment of the State Strategy for the San Joaquin Valley and the South Coast in detail. ARB staff has also evaluated the impact of the proposed State Strategy on all 15 ozone nonattainment areas. For the remaining areas, modeling results and air quality data analyses show that, with the continued reductions in emissions on track to occur in each area, all will be able to show attainment by 2021 or earlier with identified measures.

ARB staff expects the districts within the Sacramento nonattainment area will request a reclassification from serious to severe and will need additional reductions from ARB's proposed new measures to attain by 2019. San Diego is projected to attain by its deadline, while Ventura may consider a reclassification to either Serious or Severe. Transport impacted areas, especially downwind of the South Coast—the Antelope Valley, the Mojave Desert, and the Coachella Valley—will need to rely on new reductions that will occur upwind. We expect the local districts to request reclassification to get the needed time. Areas downwind of the Central Valley—Western Nevada, Amador, Calaveras, Tuolumne, Mariposa, and Kern Counties—are projected to attain by their 2014 deadline with already adopted measures. Air quality modeling for these areas is new and ARB staff is continuing to evaluate the results. Finally, three areas—the Bay Area, Butte County, and the Sutter Buttes—now attain the ozone standard.

Attainment demonstrations for these areas will be included in the individual ARB staff reports for each area.

Setting the Ozone Emission Reduction Target (tons per day)

	Nonattainment Area			
	South Coast (2023)		San Joaquin Valley (2023)	
	NOx	ROG	NOx	ROG
2006 Emissions Inventory	972	732	650	454
Carrying Capacity	114	420	160	342
Emission Reduction Target	858	312	490	112

(2006 Emissions Inventory) – (Carrying Capacity) = (Emission Reduction Target)

2006 Emissions Inventory = Amount of ozone-forming emissions.
Carrying Capacity = Pollutant emissions limit that ensures air quality standards are met.
Emission Reduction Target = Amount of emissions that must be reduced to meet the standard.

Meeting the Ozone Emission Reduction Target (tons per day)

	Nonattainment Area			
	South Coast (2023)		San Joaquin Valley (2023)	
	NOx	ROG	NOx	ROG
Emission Reduction Target	858	312	490	112
Emission Reductions from Adopted SIP Measures	467	199	355	43
Emission Reductions from New Local Measures	9	19	8	47
Emission Reductions from New State Measures	141	54	46	25
Long-Term Measures	241	40	81	--
Total Reductions	**858**	**312**	**490**	**115**

Emission Reductions from Adopted SIP Measures = Emissions reduced from measures adopted through 2006.
Emission Reductions from New Measures = Emissions reduced from measures in the State Strategy or new local measures adopted after 2006.
Long-Term Measures = Emissions reduced from measures adopted after 2020 that rely on new or evolving technology, as allowed in section 182(e)(5) of the Clean Air Act.

Tracking Progress

The Clean Air Act requires that SIPs show there will be steady progress in reducing emissions during the years leading to the attainment date, called reasonable further progress, equal to about 3 percent per year. (Each nonattainment area's reasonable further progress is illustrated in the local plans and in Appendix D.) Along with tracking progress to meet the SIP requirements, ARB will have a stringent tracking process for strategies under its jurisdiction. There will be periodic updates to ARB's governing board on the SIP's New Strategies. In addition, other ARB programs vital to the SIP have their own deadlines and tracking schedules. The goal of ARB's Diesel Risk Reduction Plan is to reduce the health risk from diesel emissions 75 percent by 2010 and 85 percent by 2020. The Emission Reduction Plan for Ports and Goods Movement in California has specific emission reduction milestones in 2010, 2015 and 2020. ARB is committed to achieving all of its goals in these plans and the SIP and will be tracking progress on each.

Contingency Measures Requirement

The federal Clean Air Act requires attainment plans to identify "contingency measures" to be implemented if nonattainment areas (except those designated "marginal") fail to meet reasonable further progress requirements or to attain the federal air quality standards on time. These contingency measures are to take effect without further ARB or air district action, and thus must be measures that have already been adopted when the SIP is submitted to U.S. EPA.

The bulk of emission reductions needed to attain the federal standards are achieved through the mobile source measures in the State Strategy's existing program. As we have noted previously, California's mobile source program has been very successful in reducing emissions in California and represents the foundation supporting attainment of the federal standards. ARB has a well established history of adopting and implementing mobile source control regulations on-time or early. As a result, we expect to achieve and even exceed reasonable further progress goals without the need for contingency measures. However, the Clean Air Act requirements necessitate that we provide contingency measures regardless of our expected progress in reducing emissions toward the attainment goals.

For areas designed basic, moderate, and serious, reasonable further progress can be demonstrated with already adopted measures and therefore contingency measures are not necessary. For areas designated severe and extreme, the emission reductions from adopted measures that go beyond the reasonable further progress requirements will constitute California's contingency measure commitment implemented in the unlikely event that the State does not meet the reasonable further progress goals.

A more detailed analysis of the contingency measure commitment is included in Appendix D.

Subject: Hotel Reservations Have Been Made for Rob Oglesby and Lisa Macumber--No action needed by you. Thanks!
From: oawolowo <oawolowo@arb.ca.gov>
Date: Wed, 06 Jun 2007 11:01:35 -0700
To: Lori Andreoni <landreon@arb.ca.gov>

Lori,

I found another hotel for Rob and Lisa to stay at on June 20 and 21. Therefore, they will not be staying at the Marriott. Thanks.
Also, I just spoke to Traci Sakahara at the Marriott and she said their system was down (not sure if it was down yesterday when I made the reservation through the "800" number or if it is just down now.) Nevertheless, I cancelled Rob's one-night reservation (6/21) at the Marriott w/ Traci by giving her Rob's confirmation number.

Ollie

4. PM2.5 Attainment in the South Coast

South Coast air district modeling conducted in early 2007 indicated that the adopted and new SIP measures in the Proposed State Strategy would bring South Coast PM2.5 levels down to 15.7 ug/m^3 by 2014. While this is tremendous progress, it is still 0.7 ug/m^3 above the standard. The South Coast air district also used air quality modeling to identify additional reductions the district believes are needed beyond those in the State Strategy. The South Coast air district's emission reduction targets and the additional reductions needed to meet the district's targets are shown in the table below.

South Coast Air District Proposed Attainment Demonstration

	NOx	ROG	SOx	Direct PM2.5
Emission Reductions Needed	203	59	24	14
Reductions from New Measures	129	52	23	11
Additional Reductions Needed to Meet South Coast Targets	**74**	**7**	**1**	**3**

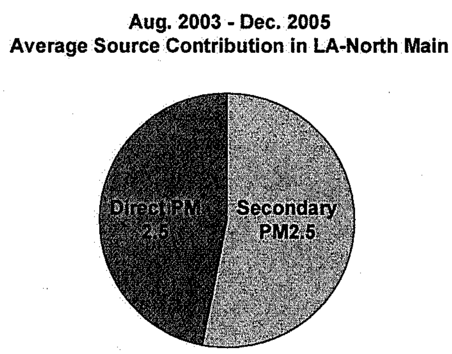
However, the additional large NOx reductions called for by the South Coast air district is just one potential way to close the 0.7 ug/ m^3 gap. This chapter explores alternatives for attaining the federal PM2.5 standard by the 2015 deadline. It starts by characterizing the PM2.5 problem to give context to the complexities of PM2.5 sources, formation, and control. It looks at closing the gap through aggressive direct particulate matter reductions: local measures to decrease emissions from residential wood burning, restaurant cooking, and fugitive dust. It analyzes the South Coast air district staff's ideas for mobile source measures to see if it is feasible to get the additional NOx emission reductions called for by the South Coast air district. Finally, it makes recommendations for Board consideration regarding actions to meet the South Coast PM2.5 challenge.

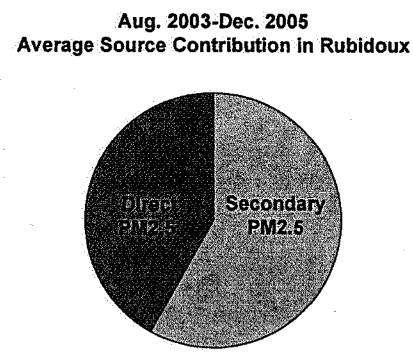
Nature of PM2.5 Pollution

Assessing how emissions affect the air we breathe is more complicated for PM2.5 than it is for ozone. While ozone has just two key precursors, PM2.5 is a complex mix of particles, some formed in the air and some emitted directly.

PM2.5 can be formed in the air from the reaction of the precursor gases – primarily NOx, SOx, ROG, and ammonia. The resulting particles are referred to as secondary PM2.5. The two main components of secondary PM2.5 in the South Coast are ammonium nitrate and ammonium sulfate, which are formed when NOx and SOx interact with ammonia. PM2.5 can also be directly emitted into the air in forms such as smoke, dust, and soot. The main contributors of directly emitted PM2.5 are organic and elemental carbon, emitted from sources like residential wood burning, commercial cooking, gas and diesel engines, and airborne soil (dust).

Special monitoring and analytical tools are used to determine which sources contribute to PM2.5 levels in a specific area and how much. Because the PM2.5 problem can have localized as well as regional components, strategies that focus on the major contributors of PM2.5 in specific areas can be critical to meeting air quality standards.



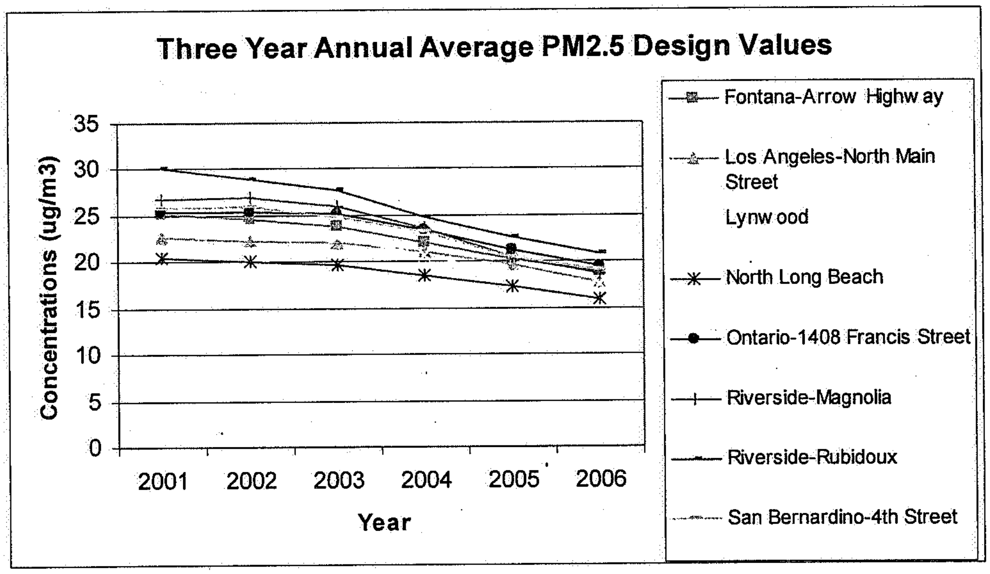


The figure above shows the results of an ARB staff source attribution analysis of data from PM2.5 captured on filters at two monitoring sites in the South Coast: the Los Angeles-North Main (LA-North Main) site, located in an industrial area 1.5 miles northeast of downtown Los Angeles, and the Riverside-Rubidoux (Rubidoux) monitoring site in western Riverside County. The analysis shows that secondary PM2.5 caused primarily by NOx and SOx emissions contributes over half of the PM2.5 pollution in both areas. This highlights the need for substantial emission reductions from mobile sources, which are the main sources of NOx and SOx. But directly emitted particles also contribute a very large portion of PM2.5 pollution. A good portion of directly emitted particles are from sources other than motor vehicles.

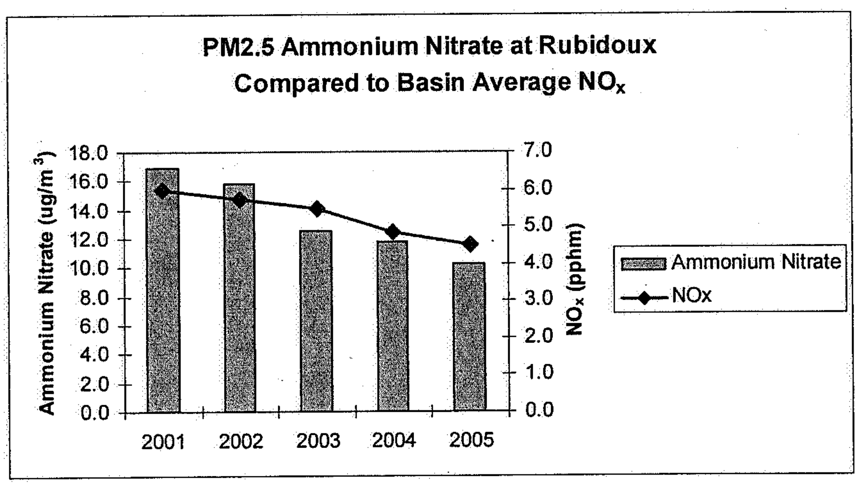
PM2.5 Emission Trends – Steadily Getting Better

Emission control measures adopted to date, especially mobile source controls, have resulted in tremendous progress in reducing PM2.5 in the South Coast. Air quality data collected since initial PM2.5 monitoring began in 1990 show that between 1990 and 1998, PM2.5 annual average concentrations dropped by 30 to 40 percent throughout the air basin. PM2.5 annual average concentrations have dropped a further 20 to 30 percent since the official regulatory monitoring program for the federal PM2.5 standard began in 1999.

The figure below shows that all monitors in the South Coast Air Basin have recorded a significant decrease in annual average design values.[1] The peak annual average design value of 30 ug/m^3 in 2001, twice the level of the federal standard, dropped to 20.8 ug/m^3 in 2006. The South Coast now attains the federal 24-hour standard of 65 ug/ m^3, further demonstrating the progress made in reducing particulate pollution in the region.



The graph below shows that the primary reason for the improvement is the drop in NOx levels. The graph shows the large drop in NOx concentrations measured in the air, and the strong relationship between that drop and the reduction in the measured secondary ammonium nitrate component of PM2.5. The basin's measured ambient NOx average has decreased 25 percent since 2001, while PM2.5 ammonium nitrate concentrations decreased by 40 percent.

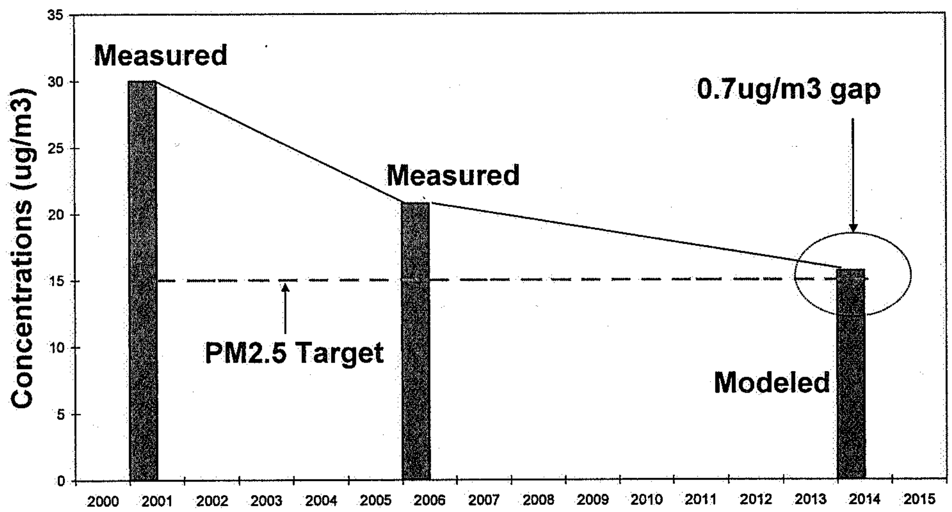


[1] Design values are based on the arithmetic mean of measured levels averaged over three years. So 2001 values are based on average levels from 1999, 2000, and 2001.

The PM2.5 Challenge

PM2.5 progress over the last 15 years shows a trend suggesting that attainment of the standard by 2015 with the proposed State Strategy is possible. The chart below illustrates that progress from 2001 to 2006 gets PM2.5 levels almost two-thirds of the way to meeting the 15 ug/m^3 standard, from 30 ug/m^3 to 20.8 ug/m^3.

South Coast PM2.5 Air Quality and Modeling (Rubidoux)



However, South Coast air district modeling shows a less positive picture. The South Coast air district's most recent modeling, released in February 2007, predicts that although we will get 95 percent of the way to the 15.0 ug/m^3 target by 2014 with adopted and proposed new SIP measures, we will fall just short, reaching only15.7 ug/m^3. The model's prediction that PM2.5 progress will slow down, as indicated by the trend line in the chart above, is somewhat surprising considering that emissions, specifically NOx emissions, are projected to drop by about 6 percent per year from 2006 to 2014 – about twice as fast as they fell between 2001 and 2006.

Even more surprising were the South Coast air district modeling results indicating that it would take over 70 tons per day of additional NOx reductions to bridge the 0.7 ug/m^3 gap. Although measured data show a much greater response to past emission reductions than the model shows with the future reductions, federal rules require the use of models in SIPs. If a NOx-focused approach is used to close the 0.7 ug/m^3 gap, as the South Coast district advocates, much larger NOx reductions than those proposed in the State Strategy will be needed.

Closing the Gap with Direct PM2.5 Reductions

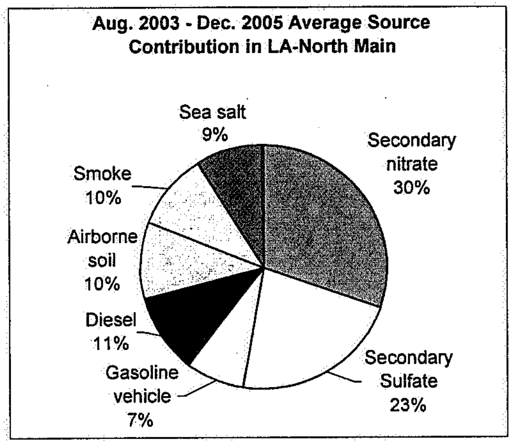
The previous figure shows the magnitude of the 0.7 ug/m^3 gap identified by South Coast air district modeling in relation to the progress we expect with the proposed State Strategy. The progress projected in PM2.5 levels from 2006 to 2014 is largely the result of ARB's existing mobile source control program plus the new measures in the proposed State Strategy. Emissions from mobile sources of NOx and SOx, the two key precursor pollutants of secondary PM2.5, are projected to drop by roughly 55 percent and 75 percent, respectively, between 2001 and 2014. Directly emitted particles from mobile sources are projected to drop 35 percent during this same time.

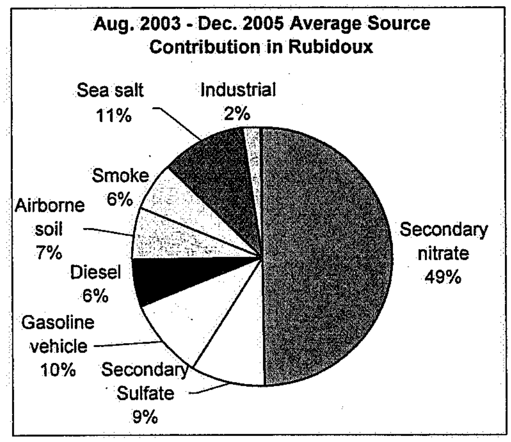
A look at the South Coast air district's emissions inventory shows that directly emitted PM2.5 from sources under district control are projected to increase – not decrease – by about 5 percent between now and 2014. Since the district's modeling indicates that a ton of directly emitted particles has a greater impact on PM2.5 levels than a ton of NOx emissions, the District should explore additional measures to reduce emissions from these sources as a way to cut PM2.5 levels and close the 0.7 ug/m^3 gap.

South Coast PM2.5 Source Contributions

Numerous source apportionment studies have been conducted in the South Coast reflecting snapshots of different sites and time. While the precise contribution varies, these studies have all identified diesel and gasoline vehicle exhaust, smoke from wood burning and cooking, and fugitive dust as important contributors to measured particulate matter concentrations. For this SIP, ARB staff conducted new source apportionment analysis (Positive Matrix Factorization) using monitoring data from 2003 through 2005 at Los Angeles and Riverside. This analysis, in conjunction with the results from past studies and assessment of the current emissions inventory, served as a screening tool to identify potential sources of primary PM2.5 that could provide opportunities for further control.

ARB staff analyzed data from the LA-North Main and Rubidoux monitoring sites using the Positive Matrix Factorization (PMF) analysis method to identify the sources that contributed to PM2.5 captured on filters at those sites. The results of this analysis, illustrated in the pie charts below, indicate that sources of directly emitted particles are significant contributors to PM2.5 concentrations. Two key categories are smoke and airborne soil, which each contribute 6-10 percent to observed annual average concentrations in Los Angeles and Riverside. The smoke category reflects contributions from residential wood burning as well as managed and wildland fires; smoke from commercial cooking is also in this category. The airborne soil category reflects dust kicked up by vehicles traveling on paved and unpaved roads, and dust from construction and agricultural activities.





ARB staff solicited peer review of the recent source apportionment modeling, which concurred that the source contribution estimates were in the ballpark of expected values and suggested improvements for several technical aspects of the source apportionment modeling. Therefore, the body of evidence continues to suggest the significance of sources such as wood burning, cooking, and fugitive dust as opportunities for further targeted control efforts.

Due to the significant population growth in the basin, emissions from residential wood burning, commercial cooking and fugitive dust will continue to increase. Stricter controls are needed to mitigate the emissions growth and provide emission reductions needed for PM2.5 attainment by the 2015 deadline.

Measures for Residential Wood Burning

ARB staff estimates that wood smoke contributes about 1.5 ug/m^3 to measured annual average PM2.5 levels at Rubidoux, based on staff's PMF source attribution analysis. Wood smoke concentrations are higher during the winter months of November through February, when residential wood burning is the most likely source. The analysis also shows that wood smoke levels are higher on weekends and holidays, indicating that much of this residential wood burning s done for ambience and not for home heating purposes. Because the source attribution analysis suggested that residential wood burning was likely a significant part of PM2.5, ARB staff next used the South Coast air district's air quality model to evaluate the potential for reductions.

Residential wood burning rules are feasible. A number of air districts in the State have already adopted comprehensive residential wood burning programs, including the San Joaquin Valley and Great Basin Valley air districts. An important component of these residential wood burning programs is the mandatory curtailment of the use of fireplaces and woodstoves on days with expected high levels of particulate matter. These programs, particularly the San Joaquin Valley's, demonstrate both their feasibility and their cost-effectiveness.

Experience in the San Joaquin Valley has shown that public education about the health impact of wood smoke and the importance of curtailing wood burning is critical. Therefore, a phased approach in the South Coast has the best chance of success. For example, the program could begin as a voluntary program with an aggressive public education and information campaign. This could be followed by a mandatory program to restrict residential burning on selected days from November through February (with exemptions where no alternative heat source or natural gas service is available). Over the course of the program, analysis of measured air quality data would show its effectiveness and allow the district to optimize the program to get the needed reductions by 2014.

ARB staff analyzed the impact of a full moratorium on residential wood burning from November through February using the South Coast district's air quality model. The air quality modeling analysis showed that annual average PM2.5 levels at Rubidoux would drop by 0.9 ug/m^3 with a full moratorium between November and February. ARB staff also did a separate source attribution data analysis to assess the potential impact of a wood burning moratorium. The data analysis corroborated the modeling analysis.

Although assuming a moratorium would be 100 percent effective is not realistic, the potential reductions from a complete moratorium are greater than needed to close the 0.7 ug/m^3 gap. A residential wood burning program would only need to be 80 percent effective to fully close the 0.7 ug/m^3 attainment gap (0.9 ug/m^3 X 0.80 = 0.72 ug/m^3.)

The South Coast air district is currently developing a residential wood burning program, but the staff's most recent draft rule falls short of what is needed for PM2.5 attainment. The South Coast should include a comprehensive suite of requirements in the rule to both minimize the current level of burning, and to prevent further growth in this category. Feasible measures in rules adopted by other California air districts include a mandatory curtailment program, limits on the installation of wood burning devices in new homes and commercial facilities, and the required replacement of non-EPA compliant wood burning stoves.

If measured air quality in 2014 indicates the need, a temporary moratorium in residential wood burning could be implemented. The South Coast's modeling projects that the measures identified in ARB staff's proposed State Strategy will reduce NOx emissions sufficiently to bring the Air Basin into attainment by about 2017, indicating that the district would at some time have the option of lifting the most stringent elements of its localized controls for directly emitted PM2.5.

Enhance Control of Smoke from Commercial Cooking

As discussed previously, some of the smoke particles in the air come from restaurant cooking. By looking at the seasonal profile of the wood smoke levels as well as weekend versus weekday patterns, ARB staff estimated that cooking operations could comprise about one third of the wood combustion contribution and therefore contribute approximately 0.5 ug/m^3 to annual average PM2.5 at Rubidoux.

The South Coast currently has a rule that applies to chain-driven charbroilers. However, a 1997South Coast survey found that only four percent of restaurant cooking operations operate chain-driven broilers, with the rest operating under-fire broilers, griddles, or deep fat fryers. The Bay Area air district is in the process of developing a new rule that would require the installation of high-efficiency filters on all types of cooking operations.

Therefore, as a further means to reduce direct PM2.5 emissions, the South Coast air district could potentially strengthen its rule along the lines the Bay Area air district is exploring. This would require the installation of high-efficiency filters in both existing and new restaurants for under-fried broilers, griddles, and deep fat fryers, in addition to the existing provisions for chain-driven broilers. If a strengthened rule could get 20 percent reductions from these currently uncontrolled sources, it could reduce Rubidoux PM2.5 levels by another 0.1 ug/m^3.

Strengthen Fugitive Dust Control

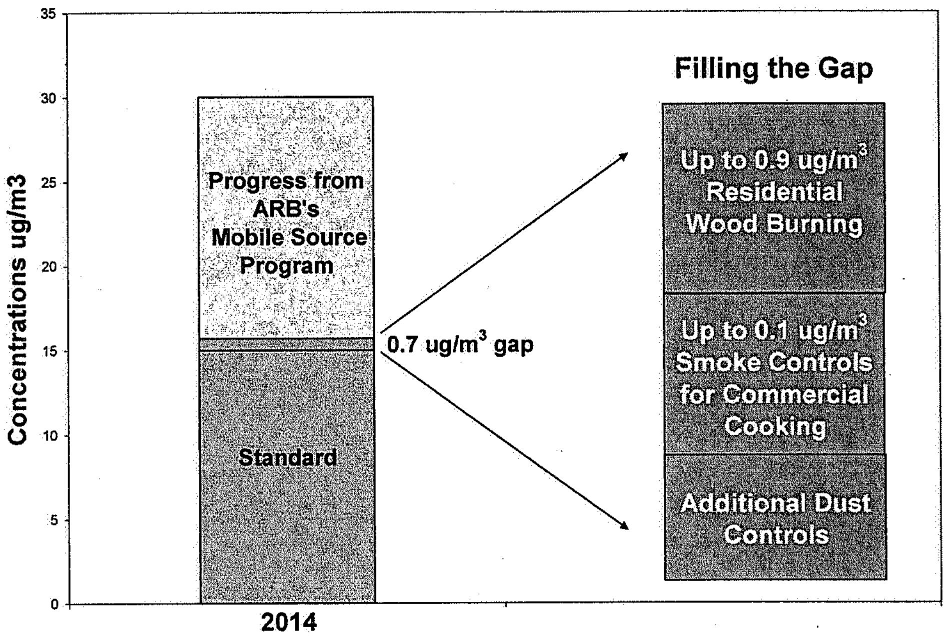
Airborne soil is a third category of directly emitted PM2.5 that can provide an additional opportunity for further emission reductions. The estimated annual average contribution from airborne soil at Rubidoux is approximately 1.6 ug/m^3. Sources of this soil include dust that is generated from travel on paved and unpaved roads, construction and agricultural activities, and dust that is kicked up by high winds.

The South Coast has a comprehensive fugitive dust rule to reduce emissions from these activities. Required mitigation measures include application of water or other chemical stabilizers, paving and landscaping, minimization of dust track-out, and street-sweeping. However, the South Coast air district has adopted more focused dust controls for the Coachella Valley. Applying the focused Coachella Valley dust rules basin-wide may provide additional reductions. Likewise, increased fugitive dust enforcement activities or other targeted measures could be implemented to further reduce this source of PM2.5.

Estimated Impact of Local Direct PM2.5 Measures

These measures – residential wood burning, commercial cooking, and dust -- are reasonable, feasible, and cost-effective. The recommended temporary mandatory wood burning curtailment could be implemented with minor direct cost to the public. Other air districts have already adopted or are pursuing rules implementing these measures. Of course, given the magnitude of the South Coast PM2.5 challenge, the South Coast air district may need to do more.

Using both modeling and PMF analysis, ARB staff quantified potential benefits of the measures. The figure below illustrates how these measures could close the 0.7 ug/m^3 gap to reach attainment by 2015.



Analysis of South Coast Air District Staff's Proposed Additional Mobile Source Measures

As part of its draft plan, the South Coast AQMD has proposed several measures for reducing emissions from on-road and off-road mobile sources that the district staff believes will achieve 70+ additional tons per day of NOx reductions – the additional NOx reductions that the South Coast modeling indicates are needed to meet the PM2.5 standard. ARB staff have reviewed and assessed the proposed measures.

Summary Analysis of South Coast Proposed Mobile Source Measures (NOx emissions, summer planning average tpd)

Measure	AQMD proposed reductions	ARB Staff Assessment	ARB Staff Comments
ATPZEV Penetration	1	0 – 0.1	Penetration of 100,000 vehicles not practical by 2014.
Light-Duty On-Board Diagnostics	3	--	State law currently prohibits used car retrofit requirements.
Heavy-Duty Trucks	21	0-12	Only feasible if subsidized. Funding not secured.
Port Trucks	6	0-6	Only feasible if subsidized. Funding not secured.
Construction Equipment	16	0-16	Only feasible if subsidized. Funding not secured.
Cargo Handling Equipment	1	0-1	Less practical for industry than lease agreements with ports.
Locomotives	16	--	Requires early U.S. EPA standards; ARB is preempted.
Ground Support Equipment	1	0-0.2	LAX settlement agreement covers 70% of GSE NOx emissions.
Transport Refrig-eration Units	1	--	Not technically feasible.
Recreational Boats	1	0-1	Not practical on this scale. Funding not secured.
Lower sulfur gasoline	5	--	Not necessary. Reductions already accounted for.
Further reductions from diesel fuel	4	--	Not cost-effective. High total cost.
Total	71	0-36	About half of the tons are technically feasible, but only if subsidized at a cost in the billions of dollars.

The bulk of the additional NOx reductions from the South Coast staff's proposed measures are from sources already identified for aggressive new controls in the State Strategy: heavy-duty trucks, port trucks, large off-road equipment, and locomotives. The State Strategy is estimated to achieve 322 tons per day of NOx reductions from already-adopted measures and 122 tons per day of NOx reductions from proposed new measures in the South Coast Air Basin by 2014. The State Strategy includes proposed measures to turn over and clean up the existing fleet of diesel vehicles and equipment at a scale that far exceeds anything attempted in the regulatory landscape to date.

The South Coast air district staff's proposal looks to reduce 71 additional tons per day of NOx through public funding assistance that would be used to increase the rate of turnover and clean up of the legacy fleet beyond that of the State Strategy. It estimates the public funding need at $600 million per year from 2009 through 2014, for a total of $3 billion.

ARB staff agrees with the South Coast air district staff's assessment that the district's suggested measures will cost billions of dollars, but ARB staff believes that only about 50 percent of the reductions, at most, are technically feasible even if subsidized. ARB staff believes that the turnover necessary to get reductions of this magnitude in this short time frame would not be possible. Furthermore, the funding for the scale of the measures envisioned by the South Coast air district staff is not currently available, so the measures cannot be included as approvable measures in the SIP.

The following is a brief assessment of each of South Coast air district staff's proposed measures:

<u>Accelerated Penetration of ATPZEVs (SCONRD-01)</u>

Measure summary:
This measure proposes that ARB use a combination of mandates and incentives to increase sales of advanced technology partial zero emission vehicles (ATPZEVs) that have an all-electric drive range (i.e. plug-in hybrid vehicles) to 100,000 vehicles in the South Coast by 2014, and 1,000,000 vehicles by in the South Coast by 2020. The district estimated reductions of 1.0 tpd NOx and 0.5 tpd VOC in 2014. The AQMD did not conduct a cost-effectiveness analysis.

ARB staff assessment:
Availability of an almost all-electric drive range ATPZEV is unrealistic based on available technology. Most optimistic projections indicate that 10,000 plug-in hybrids with a 10 mile drive range could be on the road in California by 2014 if three to four automobile manufacturers commit to producing them. The cost of plug-in hybrid vehicles could be approximately $2,000-5,000 more than hybrid vehicles on the market today. The uncertainty surrounding plug-in hybrids stems from the higher cost of larger batteries and commitment from automobile manufacturers to produce these vehicles.

Conversion of current ATPZEVs to plug-in hybrids is technologically possible, but not feasible on this scale under the South Coast proposed timeframe. Conversion packs used to enhance current hybrid technology have not been certified to meet safety or emission standards.

OBD III for Light and Medium-Duty Vehicles (SCONRD-02)

Measure summary:
This measure would require a higher level of on-board diagnostics (OBD III) on all new vehicles starting in 2012, and would require that existing 1996-2012 vehicles be retrofitted with OBD III by 2020. It would achieve about 0.5 tpd NOx in 2014 at a total retrofit cost of $746 million, plus additional costs for new vehicles built in 2013 and later.

ARB staff assessment:
State law (Health & Safety Code section 43600) prohibits ARB from requiring the installation of control devices on used motor vehicles except when required or authorized by statute. Statutes enacted since have given ARB authority to require retrofit controls on heavy-duty vehicles. But no such statute has been enacted for light-duty vehicles, so ARB's authority to mandate the installation of OBD retrofit kits on used light-duty vehicles is unclear. Consumer acceptance is also an issue.

Further Emission Reductions from On-Road Heavy-Duty Vehicles (SCONRD-03)

Measure summary:
This proposed measure calls for the reduction of 21 tons per day of NOx in 2014 beyond the State Strategy's proposed fleet modernization measure. The State Strategy's proposed measure would achieve reductions equivalent to replacing 30 percent of the heavy-duty fleet by 2014. The district's proposal would retrofit or replace an additional pre-2010 or trucks at the rate of 15 percent per year above the proposed ARB program..

ARB staff assessment:
To achieve the 21 tons per day of NOx reduction estimated, ARB staff estimated that more trucks would need to be replaced or retrofited in the 2011-2014 timeframe than suggested in the district's proposal, and that NOx retrofit efficiencies would need to be significantly higher than today's technology. Currently, only one low-NOx catalyst device is verified for a 30 percent NOx reduction, and no devices are verified for on-road use that have a higher NOx removal efficiency.

Using South Coast's proposed strategy, ARB staff has estimated a 12 tons per day NOx reduction at an estimated cost of $812 million. This strategy could be implemented using available technology; however, it would add almost $1 billion to the cost of the very aggressive fleet modernization proposed by ARB.

Further Emission Reductions from Heavy-Duty Trucks providing Freight Drayage Services (SCONRD-04)

Measure summary:
This proposed measure would retrofit and replace port trucks so that much of the port truck fleet would meet 2007-2010 standards by 2012, and the remainder would be equipped with PM and NOx retrofit devices. The district's proposal would achieve approximately an additional 6 tons per day NOx reduction in 2014 for an investment of over $1.8 billion. About half the replacement engines would use alternative fuels.

ARB staff assessment:
The technology for this proposed measure should be available; however, it is unknown how many alternative fuel engines will be certified to the 2007 and 2010 standards. This measure is dependent on securing sufficient incentive funding and is only feasible if subsidized.

Construction/Industrial Equipment Fleet Modernization (SCOFFRD-01)

Measure summary:
This measure proposes to reduce an additional 16 tons per day of NOx in 2014 from large off-road equipment by achieving a 2018 fleet average in 2014 (equivalent of ~Tier 3) with emission reductions equivalent to repowering all Tier 0 and Tier 1 equipment with Tier 3 or better engines (i.e., 2010 on-road engines). In 2020, the measure proposes to get reductions equivalent to repowering all Tier 2 equipment with Tier 4 or better engines and retrofitting all Tier 3 engines with selective catalytic reduction (SCR).

ARB staff assessment:
It is not technologically feasible to repower all Tier 0 and Tier 1 equipment with Tier 3 engines due to space constraints and other considerations. Repowers with Tier 4 engines will be even more challenging, if possible at all. Because of these technological constraints, a significant portion of the off-road equipment would have to be replaced to achieve the projected reductions. Equipment replacement is more expensive than repowering, and would substantially increase the cost of this measure and the magnitude of subsidies needed.

This measure is feasible only if subsidized. The increased costs of replacing equipment makes the proposed measure much less feasible from a cost-effectiveness standpoint.

Further Reductions from Cargo Handling Equipment (SCOFFRD-02)

Measure summary:
This measure would require the repowering of non-yard trucks (i.e., container cranes and loaders, front-end loaders, bulldozers, etc.) with Tier-4 offroad engines or the retrofitting of these engines with SCR. This measure is designed

to be phased in and to reduce NOx emissions from such equipment by 30%, and a total of 1 ton per day of NOx, by 2014.

ARB staff assessment:
The repowering of non-yard trucks with Tier-4 engines will be difficult due to the larger engine compartments required for these advanced emission control power systems in comparison to in-use engine compartments. As a result, many vehicles would probably be retrofitted with SCR systems in order to comply. While there are no technological barriers to SCR retrofits on these vehicles, the cost of these modifications will increase the capital investment requirements for terminal operators. Lease provisions requiring the same improvements will allow terminal operators to be eligible for subsidies from the Ports of Los Angeles and Long Beach.

Further Reductions from Locomotives (SCOFFRD-03)

Measure summary:
This measure recommends retrofitting remaining Tier 2 locomotive engines with DPF and SCR technology to achieve Tier 4 emission levels, which the district projects would reduce NOx emissions by an additional 11 tons per day of NOx in 2014.

ARB staff assessment:
The State Strategy proposes an aggressive penetration rate to introduce Tier 4 engines and retrofits for Tier 2 engines that depends on U.S. EPA adopting strict standards that go into effect before 2014. (U.S. EPA has proposed standards for new engines that go into effect by 2017; however, ARB staff continues to make the case that California needs earlier implementation.) The retrofit technology needed to bring locomotives up to Tier 4 standards has not been tested on locomotives as large as the long-haul locomotives used in the U.S. The availability of proven and tested technology at the scale envisioned is unsure. Since there is uncertainty about the introduction of the new standards prior to 2014, staff believes that the 4 tons per day of NOx emission reductions from locomotives in the South Coast proposed in the State Strategy is the maximum commitment that should be made by the Board given the federal preemption.

Emission Reductions from Airport Ground Support Equipment (SCOFFRD-04)

Measure summary:
This measure proposes to reduce NOx emissions from ground support equipment by an additional 0.8 tons per day in 2014 through increased electrification and a lower fleet average.

ARB staff assessment:
A Stipulated Agreement settling litigation between the owners of Los Angeles International Airport (LAX) and neighboring cities over environmental impacts resulting from airport expansion requires LAX to implement a phased program to convert all ground support equipment to "extremely low emission technology

(such as electric power, fuel cells, or other future technological developments)" by 2015. This agreement will cover 70 percent of all ground support equipment in the air basin. If subsidized, this proposed measure could possibly achieve 0.2 tons per day of NOx from the remaining ground support equipment at the other airports in the air basin.

Further Emissions Reductions from Transport Refrigeration Units (SCOFFRD-05)

Measure summary:
This measure proposes to retrofit in-use transport refrigeration units (TRUs) with SCR systems to reduce NOx emissions by 80 percent, reducing NOx by 1.1 additional tons per day by 2014.

ARB staff assessment:
This measure has not been demonstrated to be technologically feasible due to the lack of SCR system testing on engines as small as those powering TRU systems. SCR is most effective when used in systems that can maintain a high, constant exhaust temperature to support the reaction that occurs on the catalyst's surfaces. In general, SCR is not viable for engines of less than 150 horsepower as they do not usually reach or maintain the needed exhaust temperatures.

Accelerated Turnover and Catalyst Based Standards for Pleasure Craft (SCOFFRD-06)

Measure summary:
This proposed measure calls for providing $52 million in incentives in 2014 for Southern Californians to purchase new recreational boats and jet skis sooner than they would have without the incentives. It is estimated to achieve 1 ton per day of additional NOx reductions in 2014.

ARB staff assessment:
While technically feasible if subsidized, it is not practical to assume that 50,000 recreational boats and jet skis could be replaced in a very short period of time. No pilot projects have been conducted to test the feasibility and/or success of incentive-based replacement programs for pleasure craft.

Further Emission Reductions from Gasoline Fuels (SCFUEL-01)

Measure summary:
This measure calls for ARB to adopt a sulfur content limit of 10 ppm for future gasoline fuels, reducing NOx an estimated 5 tons per day by 2014.

ARB staff assessment:
This measure is not necessary. The South Coast air district analyzed the potential emissions reductions using the sulfur cap limits specified in the California reformulated gasoline (CaRFG) regulations. However, while the cap limit for sulfur is 30 parts per million by weight (ppmw), the average sulfur content

in gasoline marketed in California is 10ppmw. The emission benefits from this low sulfur gasoline have been used to allow other CaRFG limits to increase while minimizing costs and maximizing production.

The Board is tentatively scheduled to consider amendments to the CaRFG regulation in June that would offset the increase in hydrocarbon evaporative permeation emissions resulting from the use of ethanol. The only practical path to offset this increase in hydrocarbon emissions is to use more ethanol, going from an average of 5.7% to 10% ethanol content. While this decreases hydrocarbon emissions, it increases emissions of NOx. , Refiners are expected to decrease sulfur levels even further to avoid this NOx increase, and as a result future CaRFG-compliant gasolines are expected to have an average of 5 to 7ppmw sulfur. This is approximately the sulfur content that refiners would aim for to ensure continued compliance with a 10ppmw cap. This means that there are no emission benefits to be gained from adopting a 10ppmw sulfur limit.

<u>Further Emission Reductions from Diesel Fuels (SCFUEL-02)</u>

Measure summary:
This measure calls for ARB to adopt new regulations requiring the use of diesel fuel alternatives to replace 10 percent of conventional diesel fuel, reducing NOx emissions by an additional 4 tons per day by 2014.

ARB staff assessment:
South Coast staff expects the largest portion of the diesel fuel alternatives to be met through the use of gas to liquid (GTL) diesel, which has zero sulfur. They project that GTL diesel will cost 15 cents more per gallon than conventional diesel. ARB staff believes that the South Coast staff estimated cost for the GTL is low by a factor of 2 to 5. The cost to produce GTL is about $0.15 per gallon higer than the cost production cost of diesel, but this is based on the natural gas feedstock being virtually free. The cost of transporting the fuel to California, would add approximately another $0.15 per gallon. In addition, California would have to compete with the rest of the world to obtain GTL diesel, which means we would have to pay an "incentive cost".– we would have to pay more than other countries that also prize GTL for its ability to improve the overall quality of diesel. These factors make the proposed measure not feasible due to total cost and emission reduction cost-effectiveness.

How to Advance South Coast PM2.5 Attainment – Recommendations for Board Consideration

ARB staff has assessed the PM2.5 challenge in the South Coast starting with the premise that, as shown by South Coast air district modeling, additional measures are needed to reduce PM2.5 levels by 0.7 ug/m^3. ARB staff has concluded the following:

- Given the PM2.5 progress measured over the last 15 years, and the new emission reductions that will occur, the South Coast may attain the standard by 2015 with the mobile source measures in the proposed State Strategy. Nevertheless, U.S. EPA requires the use of models in SIPs to demonstrate attainment; therefore, additional emission reductions should be identified.

- The large new NOx and SOx reductions from mobile sources identified in the proposed State Strategy will provide the vast majority of the emission reductions that will occur by 2015.

- Reversing the trend of rising PM2.5 emissions from sources under air district control through aggressive local measures to reduce directly emitted PM2.5 is critical to attainment.

- Closing the 0.7 ug/m^3 attainment gap by 2015 with additional NOx reductions is not realistic. The South Coast air district's suggested mobile source measures are not feasible without billions of dollars of unsecured subsidies.

- Feasible local air district measures for residential wood burning, commercial cooking, and dust exist to close the 0.7 ug/m^3 gap and reach attainment by 2015.

5. PROPOSED NEW SIP MEASURES – Descriptions

Introduction

ARB staff is proposing a comprehensive and far reaching set of new measures to achieve emission reductions needed to address California's most challenging ozone and PM2.5 problems. These measures are designed to make maximum progress toward the federal 8-hour ozone standard in the South Coast and the San Joaquin Valley. The measures include aggressive near-term NOx and SOx emission reduction goals, reflecting the nature and scope of the PM2.5 problem in these regions. To achieve the emission reductions needed for both ozone and PM2.5, the State Strategy proposes new near-term actions that can be completed by 2010 or soon thereafter.

Need for Fleet Modernization

More than any other air pollution control effort, ARB's mobile source program has moved the State's nonattainment areas closer to meeting federal air quality standards. California has dramatically tightened emission standards for new on-road and off-road mobile sources and fuels. As new engines have become cleaner and cleaner, the emissions contribution from older vehicles has been growing to the extent that it will soon make up the majority of mobile source emissions. For example, by 2014, heavy-duty trucks 14 years or older will produce 51 percent of total heavy-duty truck NOx emissions while only traveling 20 percent of total truck miles. The same holds true for all on-road vehicles combined, where vehicles over 14 years old will produce almost 60 percent of total NOx emissions by 2014 but just 20 percent of total miles traveled.

The benefits of in-use control programs are limited by the underlying engine technology and controls. As a result, the majority of new measures in the State Strategy are "in-use" measures – programs to help clean up or replace older, dirtier vehicles and equipment. We simply cannot wait for the natural turnover of older vehicles and equipment (1-5 percent annual turnover depending on vehicle or equipment type) being replaced with newer, cleaner vehicles. The challenge is that these measures have a much more direct impact on businesses and individuals in California than do new engine standards that must be met by manufacturers. ARB's fleet rules will affect owners of public and private vehicles and equipment that operate in nonattainment areas throughout the State.

Compliance flexibility has historically been included in ARB regulations – allowing the most cost-effective methods to be used by those who must meet emission requirements. And while lower-cost add-on control devices can play a role in lowering emissions from mobile fleets, more costly engine and vehicle replacements will be needed in many cases. This will place a substantial financial burden on owners of vehicles and equipment but is necessary in order to achieve air quality standards. Increased incentive funds can supplement ARB's regulatory actions and further accelerate air quality progress. It is important to recognize that at current funding levels, incentive funds can pay for only a relatively small portion of the cost for necessary modernization of California's diesel engine fleets.

The nature of the proposed new measures (enforceable rules) and California's history of supportive financial incentives provide a sound basis for reductions from incentive programs to meet federal requirements for SIP approval.

Accountability for Emission Reductions

California's SIP must outline the plan for meeting air quality standards in all of its nonattainment areas. ARB staff's SIP State Strategy proposal for Board approval includes an enforceable commitment to achieve the overall goals set. The details of each new measure are publicly considered during separate formal rulemaking processes. If a particular measure does not ultimately achieve the emission reductions estimated in the SIP, the State is still bound to achieve the total aggregate emission reduction commitment, whether this is realized through additional reductions from other new measures, or from alternative control measures or incentive programs.

Summary of Proposed New SIP Measures

ON-ROAD SOURCES

Passenger Vehicles

Improvements and Enhancements to California's Smog Check Program

Low Pressure Evaporative Test. Require low pressure evaporative system testing and repair of evaporative system leaks for all vehicles subject to Smog Check inspection.

More Stringent Cutpoints. Set more stringent pass/fail cutpoints to ensure more cars would have more complete and durable repairs.

Annual Inspections for Older Vehicles. Inspect older vehicles annually rather than every two years. Older vehicles tend to have greater deterioration of emission controls, and consequently, higher emissions.

Annual Inspections for High Annual Mileage Vehicles. Inspect annually, rather than every two years, vehicles that accrue very high mileage on an annual basis. High mileage vehicles tend to have greater deterioration of emission controls and, consequently, higher emissions.

Add Visible Smoke Test. As part of the Smog Check test, include a check for visible smoke to identify vehicles with excess particulate matter emissions.

Inspection of Light- and Medium-Duty Diesels. Include light- and medium-duty diesel vehicles in the Smog Check program to provide for improved maintenance and reduced emissions for this part of the fleet, and require the repair of poorly maintained or old emission systems.

Inspection of Motorcycles. Include motorcycle inspections as part of Smog Check. Studies indicate that motorcycles are subject to high rates of exhaust system tampering.

Expanded Passenger Vehicle Retirement. Increase the number of vehicles that are voluntarily retired by implementing a scrappage program for vehicles that are off-cycle from their Smog Check inspections.

Modifications to Reformulated Gasoline Program. Modify California's Reformulated Gasoline Program to offset ROG emissions due to the increased use of ethanol. This rulemaking activity is currently underway and is intended to fully mitigate the emission increase, which has been incorporated in the current emissions inventory.

<u>Trucks</u>

Cleaner In-Use Heavy-Duty Trucks. This proposed measure is a comprehensive in-use diesel truck emissions reduction program that includes a fleet modernization rule and an excess emissions program. Fleet modernization would focus on overcoming the typically slow rate of heavy-duty truck turnover by requiring truck owners to meet specified emission levels through replacing or cleaning up the oldest trucks in their fleets, and would also include a program for out-of-state trucks. The excess emissions program would target deterioration emissions to keep ultra-clean trucks running cleaner longer.

GOODS MOVEMENT SOURCES

Ship Auxiliary Engine Cold Ironing and Other Clean Technology. Reduce emissions from ships at berth with at-dock technologies such as cold ironing (electrical power) and other clean technologies.

Cleaner Ship Main Engines and Fuel. Further reduce emissions from main engines through added retrofits such as selective catalytic reduction. Support efforts by ports and appropriate local entities to accelerate use of cleaner ships and rebuilt engines through other tools such as lease restrictions. Require ships to use low sulfur diesel fuel in main engines when operating within 24 nautical miles of shore.

Port Truck Modernization. Retrofit or replace older heavy-duty diesel trucks that service ports. Work with port authorities to prevent adding older trucks to the fleet. ARB rulemaking process for this proposed measure has begun in parallel with development proposals by the Ports of Los Angles and Long Beach.

Accelerated Introduction of Cleaner Line-Haul Locomotives. Replace existing locomotive engines with cleaner Tier 4 engines beginning in 2012 and conduct concurrent rebuilds of older engines to Tier 2.5 standards. This measure requires early introduction of U.S. EPA Tier 4 standards.

Clean Up Existing Commercial Harbor Craft. Require owners of existing commercial harbor craft to replace old engines (both propulsion and auxiliary) with newer cleaner engines and/or add emission control technologies that clean up engine exhaust. ARB rulemaking for this proposed measure is underway.

OFF-ROAD SOURCES

Construction and Other Equipment

Cleaner In-Use Off-Road Equipment. Establish fleet average emission limits for off-road equipment (over 25 horsepower) that would require older, dirtier engines to be replaced with engines reflecting current technologies or retrofitted with emission control devices. ARB rulemaking for this proposed measure is in process.

Agricultural Equipment

Agricultural Equipment Fleet Modernization. Accelerate the modernization of the fleet of agricultural equipment used in California, removing older, dirtier equipment from service to be replaced with engines reflecting cleaner technologies.

Evaporative and Exhaust Strategies

New Emission Standards for Recreational Boats. Adopt catalyst-based standards (5 g/kW-hr) for new outboard and personal water craft (jet ski) engines and evaporative emission standards to address all sources of recreational boat evaporative emissions.

Off-Road Recreational Vehicle Expanded Emission Standards. Adopt exhaust and evaporative emission standards to reduce the amount of ROG from off-highway motorcycles and all-terrain vehicles.

Additional Evaporative Standards *Portable Outboard Marine Tank Evaporative Standards.* Set evaporative standards for removable fuel tanks used on outboard recreational boats. *Refueling Gasoline Tank Evaporative Standards.* Set evaporative standards for refueling gasoline tanks typically mounted on pickups and large recreational vehicles and used to refuel equipment and other smaller vehicles. *Gas Station Refueling Hose Evaporative Standards.* Set evaporative standards for gas station pump hoses.

Enhanced Vapor Recovery for Above Ground Storage Tanks. Implement an enhanced vapor recovery certification process and new performance standards and specifications for large fuel tanks used extensively in agricultural operations.

AREAWIDE SOURCES

Consumer Products

Tighten Standards. Tighten standards or require product reformulation for consumer products categories through several rulemakings through 2012.

Pesticides

New Pesticide Strategies. The California Department of Pesticide Regulation will reduce emissions from commercial and agricultural pesticide use in California through reformulation, reduced usage, and innovative technologies and practices.

Improvements and Enhancements to California's Smog Check Program

California's passenger vehicle emissions standards have been extremely effective -- a new 2005 car was 97 percent cleaner than a new 1980 car. In order to reduce the emissions necessary to reach air quality goals, however, the focus must shift to keeping vehicles clean over their lifetimes. The Smog Check program is the cornerstone of this effort, keeping over 400 tons of smog-forming emissions from entering the air each day.

The State Strategy envisions an even stronger Smog Check program, adding tests that will reduce excess emissions and including vehicle types that are now exempt to better ensure that all passenger vehicles in California keep running clean. Staff has estimated that adding the following tests to Smog Check will reduce ROG and NOx emissions from passenger vehicles another 10 percent in 2014. This equates to reducing about 11 tons per day of ROG and 12 tons per day of NOx in the South Coast in 2014.

Low Pressure Evaporative Test
Over half of smog-forming emissions from 1976 through 1995 cars comes from fuel evaporating from leaks in the fuel system. A functional check of the gas cap is currently included in Smog Check, but not a check of the vehicle's fuel tank and vapor lines, which play an important part in controlling evaporative emissions. This measure would add a low pressure evaporative test to Smog Check to examine for leaks in the fuel tank and vapor lines.

More Stringent Cutpoints
One approach to getting more complete repairs and lower emissions is to increase the stringency of the inspection standards (cutpoints) used to determine if the vehicle initially passes or fails. This measure would set more stringent cutpoints, ensuring that more cars would have more complete and durable repairs.

Annual Inspections for Older Vehicles
Vehicles 15 years or older have a failure rate more than twice the average. This measure would require older vehicles to be tested annually, shortening the time they are emitting excess emissions prior to being repaired.

Annual Inspections for High Annual Mileage Vehicles
About 3 percent of cars are driven over 25,000 miles per year. These vehicles fail Smog Check at about twice the average rate. This measure would require high-mileage vehicles to be tested annually which would shorten the time they are emitting excess emissions prior to being repaired.

Add Visible Smoke Test.
Excess soot from smoking passenger vehicles is estimated at about one and a half tons per day statewide and is a public health concern. An inspection for excessive smoke is currently not part of the Smog Check program, but soon will be due to newly enacted legislation (AB 1870, Lieber, Chapter 761 of 2006) that establishes visible smoke as a cause for Smog Check failure.

Inspection of Light- and Medium-Duty Diesels.
There are over 200,000 diesel passenger cars and trucks operating in California. While diesel vehicles have low ROG emissions, older diesels tend to emit higher levels of NOx and particulate matter than gasoline vehicles. Diesel vehicles, however, are not currently required to take part in the Smog Check program. This measure would develop a Smog Check inspection program for diesel passenger cars and trucks that would allow identification and repair of high-emitting diesel vehicles.

Inspection of Motorcycles.
There are about 400,000 motorcycles registered in California. They are currently exempt from Smog Check. While motorcycles do not have a high rate of emission control deterioration, surveys indicate a high level of exhaust system tampering. This measure would require some form of motorcycle Smog Check inspections to help reduce excess motorcycle emissions.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	245	138	109	98
	Emission reductions:				
	Low Pressure Evaporative Test		**4.1**	**3.2**	**2.2**
	More Stringent Cutpoints		**0.8**	**0.6**	**0.6**
	Annual Inspect Older Vehicles		**3.1**	**2.5**	**2.3**
	Annual Inspection for High Annual Mileage Vehicles		**0.5**	**0.4**	**0.4**
	Inspection of Motorcycles		**2.0**	**2.0**	**2.0**
	Total potential reductions		**10.5**	**8.7**	**7.5**
NOx	Baseline emissions	243	128	88	74
	More Stringent Cutpoints		**2.0**	**1.4**	**1.1**
	Annual Inspect Older Vehicles		**7.2**	**4.9**	**4.2**
	Annual Inspection for High Annual Mileage Vehicles		**1.6**	**1.1**	**0.9**
	Inspection of Light- and Medium-Duty Diesels		**0.6**	**0.3**	**0.1**
	Inspection of Motorcycles		**0.6**	**0.6**	**0.6**
	Total potential reductions		**12.0**	**8.3**	**6.9**
PM2.5	Baseline emissions	6.2	7.8	9.0	9.4
	Add Visible Smoke Test		**0.2**	**0.2**	**0.2**
	Inspection of Light- and Medium-Duty Diesels		**0.02**	**0.01**	**< 0.01**
	Total potential reductions		**0.2**	**0.2**	**0.2**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	77	48	36	34
	Low Pressure Evaporative Test		**0.8**	**0.6**	**0.4**
	More Stringent Cutpoints		**0.2**	**0.2**	**0.2**
	Annual Inspect Older Vehicles		**0.7**	**0.5**	**0.5**
	Annual Inspection for High Annual Mileage Vehicles		**0.2**	**0.1**	**0.1**
	Inspection of Motorcycles		**1.0**	**1.0**	**1.0**
	Total potential reductions		**2.9**	**2.2**	**1.9**
NOx	Baseline emissions	68	40	28	24
	More Stringent Cutpoints		**0.4**	**0.3**	**0.2**
	Annual Inspect Older Vehicles		**1.5**	**1.1**	**0.9**
	Annual Inspection for High Annual Mileage Vehicles		**0.8**	**0.5**	**0.5**
	Inspection of Light- and Medium-Duty Diesels		**0.3**	**0.2**	**0.2**
	Inspection of Motorcycles		**0.3**	**0.3**	**0.3**
	Total potential reductions		**3.3**	**2.4**	**2.1**
PM2.5	Baseline emissions	1.4	1.8	2.1	2.4
	Add Visible Smoke Test		**0.05**	**0.05**	**0.05**
	Inspection of Light- and Medium-Duty Diesels		**< 0.01**	**< 0.01**	**< 0.01**
	Total potential reductions		**0.05**	**0.05**	**0.05**

Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include criteria pollutant benefits from the greenhouse gas limits for motor vehicles adopted in 2004 and emission reductions from the Carl Moyer Program.

Baseline emissions are for all light- and medium-duty passenger cars, SUVs and trucks, and all gasoline heavy-duty trucks. Reductions have been estimated in the following manner:

Low Pressure Evaporative Test—ARB staff has estimated the percent reduction in emissions from the low pressure test using before and after repair data collected in two studies done by ARB and one U.S. EPA study. The percent reduction was estimated separately for hot soak, diurnal, and running loss evaporative emissions. The percent reductions were then applied to EMFAC baseline evaporative emissions for the light duty fleet in order to calculate evaporative emissions benefits in tons per day.

More Stringent Cutpoints—The reductions are based on more stringent initial inspection standards (cutpoints) taken from a study by Sierra Research using failure rate data collected from the California, Arizona, and Wisconsin inspection programs. Sierra Research identified model year groups of vehicles for which cutpoints could be lowered and estimated the impact on emission rates for each group. The fractional changes in emission rates were then applied to EMFAC baseline emissions to calculate emissions benefits in tons per day.

Annual Inspections for Older Vehicles—Staff used the EMFAC emissions model to estimate the emissions reductions of an annual inspection compared to biennial inspection. EMFAC allows the user to choose either an annual or biennial program. Emission reductions were estimated by comparing the emissions with an annual program to those with a biennial program for vehicles over 15 years old. 15 years of age was selected because this is the point at which vehicles start failing at twice the fleet average yet account for less than 25 percent of Smog Check tests.

Annual Inspections for High Annual Mileage Vehicles—ARB conducted a voluntary inspection program on high mileage taxi cab fleets in the San Francisco and Los Angeles areas. Smog Check data suggest that up to 3 percent of the fleet accumulates high annual mileage. The estimated reductions from 20,000 taxicabs were ratioed to the assumed 3 percent of the enhanced program area fleet driven high mileage. We assumed that one-half of the 3 percent of the fleet that are high annual mileage vehicles would be identified as accruing high annual mileage, tested annually, and repaired, resulting in emission reductions.

Visible Smoke Test—Based on data from a survey done for South Coast AQMD, Sierra Research has estimated that approximately 200,000 smoking gasoline vehicles are driven daily statewide. Based on data from the South Coast survey and data from Southwest Research Institute testing, the benefits of repairing a smoking vehicle average 0.25 gram/mile. We are assuming that half of the 200,000 smoking vehicles would fail the current tailpipe test in Smog Check. We have estimated benefits for the visible smoke test by assuming it would fail the other half (100,000) of the smoking vehicles per biennial cycle, which equals 50,000 failures per year. Reductions statewide are based on repairing 50,000 vehicles driving 30 miles per day with a 0.25 gram/mile total PM reduction.

Inspection of Light and Medium Duty Diesels- Benefits are based on an inspection program as stringent as the current program for gasoline cars and trucks. We are assuming a diesel inspection program would get the same percent reduction in emissions that the current enhanced Smog Check program is achieving.

Inspection of Motorcycles—Benefits are based on assuming a motorcycle inspection program would get half of the percent reduction in emissions that the current enhanced Smog Check program is achieving.

Timing

Action: 2007-2008
Expected Implementation: By 2010

Staff Proposed SIP Commitment

ARB staff proposes to work with BAR to begin to implement the measure in 2010. ARB and BAR staff will initiate an effort to develop program improvements to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as implemented may provide more or less than the amount shown.

Expanded Passenger Vehicle Retirement

The bulk of emissions from passenger vehicles comes from older vehicles. The Smog Check program helps older California cars run cleaner. To meet clean air goals, however, we need to reduce emissions from these older vehicles even more. Owners of vehicles that fail Smog Check inspections are currently given the option of fixing their vehicles or receiving a monetary incentive for voluntarily retiring them. This measure would expand the Smog Check vehicle retirement program to vehicles that are off-cycle from their Smog Check inspections.

It is estimated that the vehicle retirement program could increase its scope from the current 18,000 vehicles per year statewide to approximately 50,000 per year in the South Coast and 10,000 per year in the San Joaquin Valley, which reflects retiring about half of one percent of vehicles subject to Smog Check in each region. The annual retirement of these vehicles in the South Coast and San Joaquin Valley would result in combined ROG and NOx emissions benefits of 2 percent of passenger vehicle emissions in 2014.

Funding for vehicle retirement at both State and local program levels comes from fees on newer cars exempt from Smog Check. Increasing the scope of the program post 2010 would require additional State or local funding.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	206	112	86	76
	Potential reductions		**2.8**	**1.2**	**0.5**
NOx	Baseline emissions	204	101	65	53
	Potential reductions		**2.4**	**1.3**	**0.2**
PM2.5	Baseline emissions	9.4	7.7	8.6	9.0
	Potential reductions		**0.05**	**0.06**	**0.06**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	62	37	27	24
	Potential reductions		**0.7**	**0.3**	**0.1**
NOx	Baseline emissions	58	31	19	16
	Potential reductions		**0.5**	**0.3**	**0.04**
PM2.5	Baseline emissions	2.1	1.8	2.0	2.2
	Potential reductions		**0.01**	**0.01**	**0.01**

Baseline emissions include emissions from light- and medium-duty passenger cars, trucks and sport utility vehicles. Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include emission reductions from the Carl Moyer Program and criteria pollutant benefits from the greenhouse gas limits for motor vehicles adopted in 2004.

Emission reductions were estimated assuming a 3-year credit life and that, on average, 16-year-old vehicles will be replaced with 8-year-old vehicles. These assumptions are based on data collected in ARB's Voluntary Accelerated Light-Duty Vehicle Retirement Program.

Timing

Action: 2008 - 2014
Expected Implementation: 2008 - 2014

Staff Proposed SIP Commitment

ARB staff proposes to work with BAR to begin implementing the measure by 2008. ARB and BAR staff will initiate an effort to expand the existing program to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as implemented may provide more or less than the amount shown.

Modifications to Reformulated Gasoline Program

Gasoline fuel combustion is the major source of energy for passenger transportation. Since 1992, ARB has worked to ensure the use of cleaner burning gasoline to improve air quality throughout the state. One of the many components of the most recent gasoline reformulation program, CaRFG3, was the removal of the oxygenate MTBE due to concerns with groundwater contamination. However, the substitute oxygenate, ethanol, has resulted in greatly increased evaporative emissions due to fuel system permeation.

This proposed measure would make modifications to the CaRFG3 program to eliminate or offset all ethanol permeation effects. The effects on ROG emissions from all gasoline-fueled on-road vehicles have been estimated to be a 3 percent increase in the South Coast and a 6 percent increase in the San Joaquin Valley. The effects are greater in the San Joaquin Valley due to much higher overall temperatures that affect permeation.

ARB is scheduled to consider modifications to the CaRFG3 program in 2007.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	245	138	109	97
	Potential reductions		**4.4**	**3.0**	**2.5**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	77	48	36	34
	Potential reductions		**2.9**	**1.6**	**1.3**

Baseline emissions are the emissions from all gasoline-fueled on-road vehicles. The estimated reductions are equal to the incremental ROG emissions resulting from ethanol permeation which will be offset by this measure.

Timing

Action: 2007
Expected Implementation: Phase in starting 2010

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2007. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Cleaner In-Use Heavy-Duty Trucks

Federal and State engine standards will ensure that by 2010 all new diesel heavy-duty trucks are 90 percent cleaner than new 2006 trucks. This tremendous progress is on top of a 65 percent reduction in NOx and an 85 percent reduction in particulate matter since 1990. Since trucks last a long time, we must bring newer trucks into the fleet at a faster pace, clean up older dirtier trucks, and keep the clean trucks clean longer to help meet air quality goals.

Between now and 2014 existing programs reduce heavy duty truck emissions by 50 percent. This proposed measure would reduce 2014 emissions another 30 percent. The measure would accomplish these new reductions through a program to reduce emissions from the legacy fleet involving accelerating the turnover to new truck engines and retrofitting the remaining trucks with emission reduction devices, and through an excess emissions program.

Legacy Fleet Emission Reduction Program

Newer heavy-duty trucks are typically used in long-haul service. After seven or eight years, they are often sold and their service is typically shifted to shorter-haul work. These trucks may remain in service within a given region for another twenty years or more.

An in-use truck program would focus on overcoming the slower rate of heavy-duty truck turnover to cleaner engines and retrofitting the remaining trucks with emission control devices such as particulate matter filters. The most comprehensive way to accomplish this would be through an "in-use" fleet rule that would require truck owners to meet specified emission levels. The proposed measure would address fleets operating in California regardless whether they are registered out of state. The emission reduction impact of the proposed in-use fleet program would be equivalent to replacing by 2014 approximately 30 percent of the oldest trucks with 2010 models year or newer trucks. The proposed measure would generate additional emission reductions beyond 2014, achieving reductions needed to meet the ozone air quality standard.

ARB staff has recently begun informational workshops on a heavy-duty truck in-use fleet rule, and has started to identify and explore the many emissions inventory, technology, financial, and logistical issues involved in crafting the most effective rule possible. ARB staff will be studying and requesting feedback from stakeholders on many issues, including: the characteristics of trucks registered outside of California; cost implications, especially to truck owner-operators, and ways to avoid any competitive disadvantage for various categories of truck owners; and the most efficient use of limited public incentive funds to achieve maximum emission benefits and lessen financial burden on truck owners.

Excess Emissions Program

An estimate of deterioration of emission controls has historically been built into ARB's projections of future emissions. As new engine technologies are introduced over the next few years, we need to ensure that the complex engine electronics and control devices used to make trucks so much cleaner are not more prone to failure, tampering or malmaintenance, and that deterioration does not reduce the benefits of the new standards. As the 2010 new engine standards are implemented, we will evaluate the in-use emissions and develop approaches to reduce excess emissions from trucks.

Under an existing program, heavy-duty trucks are inspected at random roadside locations for excessive smoke, and are inspected for tampered emission control systems. Owners of vehicles that do not pass these inspections are issued citations that require prompt repairs and carry civil penalties. This measure could include an expansion of this program.

While the design and evaluation of the specific program features has yet to be determined, ARB staff estimates that this concept has the potential to reduce NOx deterioration emissions by approximately 50 percent.

Estimated Emission Reductions

South Coast

	(tons per day)	**2006**	**2014**	**2020**	**2023**
ROG	Baseline emissions	16	10	7	6
	Potential reductions		**5.1**	**2.6**	**1.7**
NOx	Baseline emissions	238	131	79	65
	Potential reductions		**47.3**	**26.9**	**18.3**
PM2.5	Baseline emissions	10.2	5.3	3.3	2.8
	Potential reductions		**3.0**	**1.5**	**1.0**

San Joaquin Valley

	(tons per day)	**2006**	**2014**	**2020**	**2023**
ROG	Baseline emissions	20	13	9	8
	Potential reductions		**6.4**	**3.3**	**2.3**
NOx	Baseline emissions	277	150	88	72
	Potential reductions		**61.4**	**30.2**	**21.2**
PM2.5	Baseline emissions	11.4	5.5	3.2	2.6
	Potential reductions		**3.6**	**1.6**	**1.2**

Baseline emissions represent emissions from diesel-fueled medium- and heavy heavy-duty trucks. (Note: Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include sleeper truck idling restrictions, diesel engine software upgrade, and emission reductions from the Carl Moyer Program.)

Timing

Action: 2008
Expected Implementation: 2010-2015

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2008. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Ships

Auxiliary Engine Cold Ironing and Other Clean Technology
Cleaner Main Engines and Fuel

Ships bring the majority of internationally traded goods to California. Due to the international nature of goods movement, marine vessels are subject to international and national standards set by the International Maritime Organization and U.S. EPA. However, ships are historically a largely unregulated sector. In 2006, ship emissions ranked as the largest contributor to SOx emissions, fifth largest contributor to NOx emissions, and seventh largest contributor to directly emitted PM2.5 in the South Coast. With the predicted growth in goods movement through California by 2020 (especially through the Ports of Los Angeles and Long Beach), emissions from ships are expected to increase significantly.

In April 2006, ARB adopted the Emission Reduction Plan for Ports and Goods Movement in California, which calls for aggressive measures for ships and other port-related sources. The proposed emission reduction targets in these measures are the same goals set in that plan. Even before the adoption of the plan, work had begun to help meet its goals. In December 2005, ARB approved an Auxiliary Engine Fuel Rule that will phase in cleaner low-sulfur fuel from 2007 to 2010. This rule will reduce SOx emissions from auxiliary engines by 96 percent, PM emissions by 83 percent, and NOx emissions by 6 percent beginning in 2010.

The proposed measures outlined below will continue to work toward the goals outlined in the goods movement plan to considerably reduce ship emissions. Marine fuel standards, cold ironing (port electrification), vessel speed reduction, and retrofitted diesel engines will ensure cleaner air around ports and reduced regional emissions. These measures are split by the type of engine used on a ship. Typically, ships use auxiliary engines while they are docked at the port or to run lights and other amenities while they are transiting. Main engines and boilers are used when ships are maneuvering within port waters or transiting throughout open waters.

Auxiliary Engine Measures

In addition to the Auxiliary Engine Fuel Rule, a new proposed measure for reducing auxiliary engine emissions is at-dock modifications including cold ironing and other advanced pollution reduction systems such as the "hood". Cold ironing allows ships to turn off their auxiliary engines and instead plug into an electrical system for power when they are docked at the port. This is extremely beneficial to surrounding communities as it reduces exposure to multiple pollutants. The "hood" is a device that fits onto a ship's exhaust stack and cleans the emissions. This measure would phase in the number of ships that will be capable of using cold ironing and technologies such as the "hood". A combination of cold ironing and other at-dock technologies would reduce SOx emissions by 54 percent in 2014 and 72 percent in 2023 and both NOx and PM emissions by 65 percent in 2014 and 82 percent in 2023.

Main Engine and Boilers

A Main Engine Fuel Rule, patterned after the Auxiliary Engine Fuel Rule, would help reduce emissions by introducing a cleaner, low-sulfur fuel beginning no later than 2010. This proposed rule would apply to ships using their main engine while maneuvering and transiting near the California coast and would reduce SOx emissions by 96 percent, PM emissions by 83 percent, and NOx emissions by 6 percent no later than 2010.

A highly effective measure to reduce main engine emissions would be to increase the use of cleaner new engines or retrofitted engines. The measure could be implemented via regulation, incentives, voluntary agreements, or a combination of these approaches. By 2014, ships visiting California ports would have either new engines or a mix of retrofit technology (e.g., technology similar to a catalytic converter on a passenger car) that would achieve an overall reduction of NOx and PM of 30 percent. In 2023, ships visiting California would be equipped with an even cleaner technology mix, resulting in a 70 percent reduction of NOx, 50 percent reduction of PM, and 40 percent reduction of SOx.

Vessel Speed Reduction (VSR) is an additional measure that would reduce main engine ship emissions. Presently, ships entering the Ports of Los Angeles and Long Beach have voluntarily agreed to reduce their speed to 12 knots within 24 nautical miles of the ports. It is estimated that there is a 48 percent compliance rate associated with this voluntary measure. In order to further reduce main engine emissions, ARB would require ships to reduce their speeds to 12 knots within 40 nautical miles of the Ports of Los Angeles and Long Beach. The efficacy of the VSR program in reducing emissions changes over time as the vessel speeds are a function of the vessel type. It is estimated that ships will get larger and, therefore, their speeds will change. VSR is 30-35 percent effective in reducing SOx emissions, 40-50 percent effective in reducing PM2.5 emissions, and 35-50 percent effective in reducing NOx emissions over time.

Estimated Emission Reductions
(tons per day ship emissions 0-100 nautical miles from the California coast)

South Coast (Auxiliary Engines)*

	(tons per day)	2006	2014	2020	2023
SOx	Baseline emissions	17.2	1.1	1.5	1.8
	Potential reductions	**0.0**	**0.4**	**0.7**	**0.7**
NOx	Baseline emissions	26.6	37.2	48.7	56.3
	Potential reductions	**0.0**	**18.5**	**28.3**	**30.8**
PM2.5	Baseline emissions	2.2	0.6	0.8	0.9
	Potential reductions	**0.0**	**0.3**	**0.4**	**0.5**

* ARB 2005 Auxiliary Engine Fuel Rule emission reductions are accounted for in the baseline.

South Coast (Main Engines and Boilers)

	(tons per day)	2006	2014	2020	2023
SOx	Baseline emissions	14.7	20.7	26.3	29.7
	Potential reductions	**0.0**	**19.7**	**25.4**	**28.8**
NOx	Baseline emissions	24.4	33.4	41.4	46.3
	Potential reductions	**0.0**	**20.0**	**32.3**	**39.9**
PM2.5	Baseline emissions	1.8	2.6	3.3	3.7
	Potential reductions	**0.0**	**2.4**	**3.1**	**3.6**

Since the control measures apply to the same source, the control percentages were applied sequentially to calculate total reductions.

Timing

Main Engine Fuel ATCM
Action: 2007
Expected Implementation: 2007-2010.

Cold Ironing
Action: 2007-2008
Expected Implementation: Starting in 2010 – 10 percent by 2010, 60 percent by 2014, and 80 percent by 2020.

Cleaner Engines (New and Retrofits)
Action: 2009
Expected Implementation: Phase-in starting in 2010.

Vessel Speed Reduction
Action: 2007
Expected Implementation: 2008.

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board beginning 2007. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Port Truck Modernization

Trucks serving California ports are a vital part of the goods movement system. Trucks transfer incoming cargo containers from the ports to intermodal distribution centers for transport via long-haul rail or truck to their ultimate destination in California or throughout the U.S. Trucks also carry agricultural products from the Central Valley and other farming regions, and exports, to the ports for shipment overseas. Port-related truck activity is growing. The number of containers carried by truck to and from the Ports of Los Angeles and Long Beach, for example, is expected to grow by a factor of 2.5 within twenty years. Because trucks in port service tend to be older and dirtier than the truck fleet as a whole, it is important that the impact of these vehicles be mitigated more quickly to address community health issues and to meet air quality goals.

This proposed measure would reduce NOx and diesel PM2.5 emissions from the existing port truck fleet, as well as additional trucks entering port service. The basis for this strategy closely follows the goals outlined in the Emission Reduction Plan for Ports and Goods Movement in California (April 2006). Rulemaking is currently in progress for the port truck modernization rule, which would take place in two phases. The Ports of Los Angeles and Long Beach are also developing approaches to reduce port truck emissions on a parallel track. A mix of regulatory and other actions may be used to achieve the emission reduction target.

With the current ARB concept, trucks in regular port service that are model year 1993 and older would be replaced with 1998 and newer trucks by 2011. In addition, all trucks in regular port service would be retrofitted with verified devices that reduce diesel PM by 85 percent or more. Retrofits that also provide NOx reductions would be used to the greatest extent feasible. The second phase would require pre-2003 trucks in regular port service to meet or exceed 2010 federal engine standards by the end of 2017, and pre-2007 trucks in regular port service to meet or exceed 2010 federal engine standards by the end of 2019. Additionally, the proposal would require trucks entering port service for the first time between 2008 and 2011 to meet or exceed 2003 federal engine standards and be equipped with diesel particulate filters. Trucks entering port service between 2012 and 2014 would need to meet or exceed 2007 federal engine standards, and trucks entering port service in 2015 and later would need to meet or exceed 2010 federal engine standards.

This proposed measure would reduce port truck NOx emissions in the South Coast Air Basin by about 10 percent in 2014 and 50 percent in 2023. Also, diesel PM emissions from port trucks in the South Coast Air Basin would be reduced by more than 50 percent in 2014.

The reductions from this measure would complement the reductions achieved by the proposed cleaner in-use heavy-duty truck measure. The regulation currently being developed for port trucks would apply only to those heavy heavy-duty trucks in primary port service. The private fleet rule currently under development would provide the reductions cited for the in-use heavy-duty truck measure by including trucks not in port service as well as trucks in the medium heavy-duty category.

Estimated Emission Reductions

South Coast

	(tons per day)	**2006**	**2014**	**2020**	**2023**
NOx	Baseline emissions	22	18	15	15
	Potential reductions		**2**	**8**	**7**
PM2.5	Baseline emissions	1.0	0.8	0.6	0.6
	Potential reductions		**0.5**	**0.3**	**0.3**

Baseline emissions are for port trucks, based on inventories developed for the Emission Reduction Plan for Ports and Goods Movement. Emission reduction estimates are based on the assumption that port trucks are older, on average, than the fleet as a whole (age distribution was based on a 2002 study by Starcrest International). The number of trucks in regular port service is projected to grow from approximately 12,000 in 2005 to 15,000 in 2010, 18,000 in 2015 and 21,000 in 2020. Staff assumed that port trucks make trips of lower average speed (35 mph), owing to short hauls to distribution centers and congested conditions near the ports.

Port truck emissions are small for the San Joaquin Valley so reductions for this measure are not significant. Goods movement-related emissions from trucks in the San Joaquin Valley are generated primarily by line-haul trucks and not port trucks. Line-haul truck emissions are significantly reduced in the proposed cleaner in-use heavy-duty truck measure.

Timing

Action: 2007-2008
Expected Implementation: 2008-2020

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2008. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast nonattainment area in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Accelerated Introduction of Cleaner Line-Haul Locomotives

Line-haul locomotives used to pull rail cars long distances account for about 95 percent of total train emissions. U.S. EPA proposed new Tier 4 standards to reduce NOx and PM emissions by 90 percent. These emission standards would build on existing federal requirements for using low sulfur diesel fuel. They include new engine standards and rebuild standards, and require aftertreatment technology. Since the useful life of a locomotive can exceed 30 years, the accelerated use of Tier 4 or equivalent technology is necessary to provide diesel PM and NOx reductions needed to meet attainment deadlines. ARB is pushing U.S. EPA to accelerate introduction of Tier 4 standards on an earlier timeframe, beginning in 2012.

The proposed measure calls for replacing existing locomotive engines with Tier 4 engines beginning in 2012 and conducting concurrent rebuilds of older engines to Tier 2.5 standards. This can only occur once U.S. EPA accelerates implementation of the Tier 4 engine standards for locomotives. It is estimated that by 2023, this measure would reduce NOx by 70 percent and direct PM2.5 by about 75 percent.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	2.3	2.3	2.4	2.5
	Potential reductions		**0.7**	**1.8**	**1.9**
NOx	Baseline emissions	26.7	18.3	21.0	22.6
	Potential reductions		**4.3**	**13.4**	**15.6**
PM	Baseline emissions	0.78	0.71	0.75	0.77
	Potential reductions		**0.20**	**0.56**	**0.59**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	1.6	1.5	1.6	1.6
	Potential reductions		**0.5**	**1.2**	**1.3**
NOx	Baseline emissions	21.5	19.9	20.6	21.1
	Potential reductions		**7.2**	**15.6**	**16.4**
PM	Baseline emissions	0.58	0.53	0.53	0.54
	Potential reductions		**0.18**	**0.42**	**0.46**

Baseline emissions represent line-haul and switcher locomotives.

Emission reduction estimates are based on, beginning in 2012, 10 percent of the existing engines being replaced by Tier 4 engines and 5 percent upgraded to Tier 2.5 standards until 100 percent of the statewide fleet has been upgraded.

Timing

Action: U.S. EPA adopts Tier 4 standards in 2007. Voluntary agreement to accelerate implementation – 2008.

Expected Implementation: Introduction of 10 percent Tier 4 and upgrades to Tier 2.5 at 5 percent are expected to begin 2012.

Staff Proposed SIP Commitment

ARB staff will continue to encourage U.S. EPA to accelerate implementation of the Tier 4 engine standards. Once the new standards are in place, ARB staff commits to work with the railroads to bring the cleanest locomotives in to California service.

Clean Up Existing Commercial Harbor Craft

Commercial harbor craft are marine vessels that operate primarily along California's coastline and inland waterways. They include tugboats, work boats, crew/supply boats, ferries, excursion boats, commercial and sport fishing boats, and other harbor vessels. The diesel propulsion and auxiliary engines used on these vessels were built for long life and have essentially uncontrolled emissions.

U.S. EPA adopted harbor craft engine standards that apply to new engines beginning in 2004. The engines meeting the new U.S. EPA standards have roughly 50 percent less NOx than uncontrolled engines. Since the useful life of harbor craft vessels is so long, the benefits of new engine standards accrue slowly over time. However, to accelerate emission reductions, many of these vessels can be repowered with newer, cleaner engines.

There are also emission control technologies, called "add-on" controls or retrofits, that can reduce both NOx and diesel particulate matter. Retrofit control technologies have been shown to dramatically reduce emissions when used with heavy-duty diesel engines in land-based operations and can be adapted to marine applications.

ARB is in the process of developing a regulation that would require owners of existing commercial harbor craft to replace old engines with newer cleaner engines and/or to add retrofit emission control technologies. It would address both propulsion and auxiliary engines. The regulation would take into account the fact that harbor craft vessel types are diverse and may require various combinations of emission reducing strategies and that some vessel configurations may not accommodate retrofits. Fishing boats in particular will be difficult to retrofit and may face difficult unique economic constraints.

The proposed regulation is one of the measures in ARB's Goods Movement Plan and is scheduled for adoption in 2007. ARB staff estimates that the harborcraft regulations will reduce NOx and PM emissions 30 percent by 2014, and 40 percent by 2020,based on the capabilities of existing control technologies.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
NOx	Baseline emissions	23.1	15.7	12.7	12.7
	Potential reductions		**4.6**	**5.1**	**5.9**
PM2.5	Baseline emissions	1.1	0.7	0.6	0.6
	Potential reductions		**0.2**	**0.2**	**0.3**

The baseline harbor craft inventory is taken from the Emission Reduction Plan for Ports and Goods Movement, April 2006. Direct PM2.5 numbers reflect diesel PM. Emission reduction estimates assume the regulation will reduce emissions 30 percent by 2014, and 40 percent by 2020. (Emission reductions were estimated for the San Joaquin Valley but found to be insignificant.)

Timing

Action: 2007
Expected Implementation: 2009-2018

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2007. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast nonattainment area in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Cleaner In-Use Off-Road Equipment

Adopted emission standards for new off-road diesel engines are becoming increasingly more stringent, ensuring that new construction, mining, industrial, oil drilling and airport ground support equipment become progressively cleaner. The cleanest standards for NOx emissions in these categories will phase in from 2013-2015. However, large diesel off-road equipment with more than 25 horsepower remain in use for long periods of time, often 25 years or more. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with the result that the emission reductions and associated health benefits from these cleaner engines will also be slow to materialize. Accelerating the introduction of cleaner engines and emissions control technologies into the statewide fleet is necessary to meet air quality standards.

This proposed measure would require owners of equipment larger than 25 horsepower to meet a stringent average emissions level across all of their equipment. The fleet average approach provides equipment owners flexibility in how they will comply, including: swapping older, dirtier engines with newer, cleaner engines; purchasing newer equipment (with cleaner engines); and, adding emission control devices to older engines. It also allows fleet owners to maintain a fleet with some engines which are cleaner than the fleet average and others which are dirtier, so that, on average, the fleet meets the target. ARB staff is also proposing idling limits similar to those the Board has adopted for heavy duty trucks.

ARB staff has proposed a statewide in-use off-road diesel equipment regulation which could require initial NOx and PM emissions averages to be met, with increasingly lower emissions averages over time. Staff began work on the rule in 2004 as part of the Diesel Risk Reduction Program. During early SIP development work in 2006, staff identified the necessity for large NOx emission reductions from off-road equipment and other diesel sources to meet the health-based federal air quality standards. Consequently, staff revised the control concept extensively to meet California's clean air needs relative to diesel particulates, ozone, and PM2.5.

This measure would reduce NOx emissions from large diesel off-road equipment in the South Coast Air Basin by approximately 10 percent in 2014 and by about 30 percent in 2023.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	20.2	13.3	9.3	8.1
	Potential Reductions		**2.7**	**2.9**	**1.9**
NOx	Baseline Emissions	143.2	96.1	59.0	46.5
	Potential Reductions		**10.5**	**18.7**	**13.9**
PM2.5	Baseline Emissions	8.1	4.9	2.6	1.8
	Potential Reductions		**2.6**	**1.8**	**1.3**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	6.1	4.2	3.1	2.7
	Potential Reductions		**0.9**	**1.0**	**0.6**
NOx	Baseline Emissions	47.6	32.8	21.6	17.7
	Potential Reductions		**3.7**	**7.0**	**5.4**
PM2.5	Baseline Emissions	2.3	1.5	0.8	0.6
	Potential Reductions		**0.8**	**0.6**	**0.4**

Baseline emissions are from the OffRoad2007 model.

Emission reduction estimates are based on expected emission reductions from ARB's proposed In-Use Off-Road Diesel Vehicle rule currently under development. Because the proposed rule is under development, the estimated reductions are subject to change.

The rule proposal applies declining fleet averages for large fleets beginning in 2010. For NOx, the fleet averages for 2014 for most engine sizes are more stringent than Tier 1 emission levels. The corresponding PM fleet averages for 2014 are cleaner than Tier 2 emission levels. In 2020, fleet averages for NOx and PM are more stringent than Tier 3 emission levels. The means to reach these fleet averages are left to the equipment owners to decide. However, if a fleet cannot meet the NOx averages, it must turnover 8 percent of its total horsepower per year to cleaner engines (minimum Tier 2 engine) in the initial years and 10 percent per year in years after 2015. A fleet must retrofit 20 percent of its total horsepower with diesel particulate filters if it cannot meet the PM average. The rule would also restrict unnecessary idling.

Timing

Action: 2007
Expected Implementation: Phase-in starting 2008

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2007. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Cleaner In-Use Agricultural Equipment

New engines used in agricultural operations must meet the same standards as other off-road engines, ensuring that new equipment become progressively cleaner. Just as in other off-road applications, diesel agricultural equipment can remain in use for long periods of time. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with a direct impact on the pace that emission reductions materialize.

The cleanup of agricultural in-use equipment is primarily an issue in the San Joaquin Valley with its large agricultural economy. Natural turnover of the agricultural fleet will reduce emission significantly by the Valley's expected 2024 ozone attainment deadline. Modeling for the Valley's PM2.5 SIP due in 2008 will show what accelerated fleet modernization may be needed. Once that information is available, ARB staff will quantify reductions from this measure. ARB staff is also supporting efforts to obtain additional incentive funding to accelerate progress.

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	13	7	4	3
	Potential Reductions		NYQ	NYQ	NYQ
NOx	Baseline Emissions	62	38	23	18
	Potential Reductions		NYQ	NYQ	NYQ
PM2.5	Baseline Emissions	3.5	2.0	1.1	0.7
	Potential Reductions		NYQ	NYQ	NYQ

Timing

Action: 2009-2010
Expected Implementation: To Be Determined

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2010. ARB staff will initiate a rule development process designed to achieve emission reductions for the San Joaquin Valley nonattainment area in 2014, 2020, and 2023. The estimated emission reductions have yet to be quantified.

New Emission Standards for Recreational Boats

Recreational boat engines are broadly divided into two categories: outboard boats/personal water craft (PWC) and inboard/sterndrive. Outboard and PWC motors until recently were predominantly 2-stroke engines. Inboard/sterndrive engines are typically automotive spark-ignition engines adapted for boats that must now comply with a 5.0 g/kW-hr exhaust standard by 2009, which can be achieved with three-way catalytic converters and oxygen sensor feedback controls. Although ARB previously adopted exhaust emission standards for outboard/PWC engines, lower exhaust standards to further reduce emissions are possible by adapting the emission control technology used for inboard/sterndrive engines. This measure calls for the implementation of a tighter, catalyst-based exhaust standard of 5.0 g/kW-hr for outboard/PWC engines to be phased-in by 2013. Only 4-stroke engines are expected to be able to comply with this tighter standard.

Evaporative emissions represent about one fourth of the total ROG emissions from recreational boat engines. There are no state or federal evaporative emission standards for any type of recreational boats. This measure calls for an evaporative emission standard that will address all sources of boat evaporative emissions (tank, carbon canisters, fuel lines, etc.). The technology needed to achieve evaporative standards for boats is readily adaptable from that used in automobiles and small off-road equipment.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	64.1	52.8	50.3	50.8
	Potential Reductions	0.0	**4.2**	**12.8**	**17.6**
NOx	Baseline Emissions	16.1	17.1	18.0	18.3
	Potential Reductions	0.0	**0.4**	**1.6**	**2.4**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	20.1	17.1	16.6	16.8
	Potential Reductions	0.0	**1.3**	**3.8**	**5.3**
NOx	Baseline Emissions	5.3	5.6	5.7	5.8
	Potential Reductions	0.0	**0.1**	**0.4**	**0.6**

The baseline estimates are comprised of summer average exhaust and evaporative emissions for all types of recreational boats.

Exhaust emission reduction estimates for outboard and PWC are based on the percent reduction estimates from ARB's 2001 regulation for inboard/sterndrive engines, which reduced the exhaust standards by the same increment (from 16 to 5 g/kW-hr).

Evaporative emission reductions are based on an estimated 70 percent control of evaporative emissions for all recreational boats of model year 2012 and newer. The 70 percent control is a composite that accounts for the cumulative reductions from all sources of boat evaporative emissions (tank, carbon canisters, fuel lines, etc.).

Timing

Action: Exhaust standard by 2010; evaporative standard by 2009.
Expected Implementation: Exhaust standard by 2013; evaporative standard by 2012.

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2010. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Off-Road Recreational Vehicle Expanded Emission Standards

Exhaust Standards

Exhaust emissions from off-road recreational vehicles are controlled to a much lesser extent than on-road motorcycles or on-road cars and trucks with the result that this category of vehicles is showing an increase in emissions into the future.

In 1994, ARB approved exhaust emission standards and test procedures for off-road recreational vehicles, including off-highway motorcycles and all terrain vehicles (ATVs). In 1998, ARB revised the rules to allow non-compliant vehicles to be sold and operated outside the summer season or in locations where ozone levels are lower.

Off-road recreational vehicles lag in emission reductions for a number of reasons including technical limitations, cost, and tampering. Another concern is that the California market is not large enough for off-road recreational vehicle manufacturers to produce vehicles that would comply with more stringent California exhaust standards. This could lead to compliance problems if consumers either purchase off-road recreational vehicles out-of-state or falsely certify that the vehicles they purchase are intended for use in competition. The most effective strategy would be for U.S. EPA to establish tighter exhaust standards for all off-road recreational vehicles, thereby precluding the potential for California consumers to purchase and operate non-complying (and higher emitting) vehicles.

This measure calls for reducing exhaust emissions by 50 percent from new off-highway motorcycles and ATVs beginning in 2012 using proven automotive and on-road motorcycle exhaust emission reduction technologies. Due to the high fleet turnover and overall growth of the fleet, ARB staff estimates that the measure would reduce ROG exhaust emissions from off-road recreational vehicles 25 percent by 2014 and 50 percent by 2023.

Evaporative Standards

In 2002, U.S. EPA approved a rule that required all off-road recreational vehicles to comply with evaporative standards beginning with 2008 vehicles. However, the standards only control permeation from the fuel tank and hoses. In July 2006, ARB approved evaporative emission standards that harmonized with existing U.S. EPA regulations.

This measure would reduce ROG evaporative emissions by 50 percent from off-highway motorcycles and ATVs beginning in 2012 using proven automotive and on-road motorcycle evaporative emission reduction technologies. Due to the high fleet turnover and overall growth of the fleet, ARB staff estimates that the measure would reduce ROG evaporative emissions from off-road recreational vehicles 25 percent by 2014 and 50 percent by 2023.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	8	9	11	13
	Potential reductions		**2.4**	**5.1**	**6.4**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	7	9	11	12
	Potential reductions		**2.2**	**4.9**	**6.1**

Baseline ROG emissions (exhaust + evaporative) are for all off-road motorcycle and ATVs in each region. Emission reduction estimates are from ARB's off-road motor vehicle emissions model programmed to calculate the potential impact of reducing new engine exhaust and evaporative emissions by 50 percent beginning in 2012.

Timing

Action: By 2010
Expected Implementation: 2012-2015

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2010. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Additional Evaporative Emission Standards

Portable Outboard Marine Tank Evaporative Standards

Portable outboard marine tanks (OMT) are small-capacity tanks (usually less than 12 gallons) that supply fuel to marine outboard engines. Unlike larger vessels with permanently mounted fuel tanks, many small and medium size outboard boats use removable tanks to allow both the engine and fuel tank to be removed for transport or storage. OMTs are not subject to any emission standards and as a result have relatively high evaporative emissions. DMV and other data indicate that there were approximately 200,000 registered outboard vessel owners in California in 2005. If we assume one tank per outboard, the statewide inventory would be 200,000 OMTs with statewide emissions of approximately six tons per day. Baseline emissions for future years and regions of the state were scaled from this estimate on the basis of emission inventories of evaporative emissions from outboard boat engines smaller than 15 horsepower.

Diurnal and permeation standards for OMTs and associated equipment are expected to have the same emission reduction efficiencies as controls required by ARB's 2005 regulation for portable fuel containers, and would reduce emissions by 50 percent in 2014 and 75 percent in 2023. This measure would be applied to new tanks, resulting in a phase-in over the useful lives of existing tanks.

Refueling Gasoline Tank Evaporative Standards

Refueling gasoline tanks (from 30 to 100 gallons) are usually mounted on a vehicle and used to refuel other motor vehicles. Some examples include tanks on recreational vehicles, like toy haulers, for fueling off-highway recreational vehicles or tanks on pickup trucks for fueling off-road or agricultural equipment. There are an estimated 150,000 refueling tanks in California

ARB staff are currently conducting surveys to determine accurate populations as well as testing to calculate more accurate emissions. Rough preliminary statewide estimates of evaporative emissions from refueling gasoline tanks are approximately six tons per day. Future year and regional baseline estimates are scaled from this statewide estimate on the basis of recreational offroad vehicle evaporative emissions.

Setting evaporative standards for refueling tanks would reduce ROG emissions by 60-70 percent, depending on which technology is utilized. Control technologies being considered include passive purge carbon canisters and insulation. These technologies would be applied to new tanks and would be phased-in over the useful lives of existing tanks.

Gas Station Refueling Hose Evaporative Standards

Gas station refueling hoses are co-axial hoses that transfer fuel from the filling station pump to a vehicle's fuel tank and return displaced gasoline vapors from the vehicle fuel tank to the gasoline storage tank. Evaporative emissions occur through the hose material. There are an estimated 120,000 gas station refueling hoses statewide with estimated emissions of three tons per day.

Setting evaporative standards for gas station refueling hoses would reduce ROG emissions by 70-98 percent, depending on which technology is utilized. These estimates are based on previous standards for low permeation vehicle fuel hose and initial ARB and industry testing results.

Estimated Emission Reductions

Emission inventories are being reassessed for these evaporative source categories. For SIP purposes, emission reductions are not quantified for these measures so no benefits are included in the proposed SIP.

The measures are described here for informational purposes only. Reductions from these measures will be accounted for in future SIP updates. For information purposes only, reductions from the three measures combined are expected to be about 3 tons per day in the South Coast in 2020.

Enhanced Vapor Recovery for Above Ground Storage Tanks

Above ground storage tanks are large gasoline storage tanks used extensively in agricultural operations. Typical tanks have capacities ranging from 250 to 12,000 gallons. Above ground storage tanks are becoming increasingly popular due to their superior leak detection capabilities. Because these tanks are exposed to ambient air temperatures, emissions are greater than from underground tanks. Annual statewide ROG emissions from all tanks in 2004 totaled 3.1 tons per day. Emission reductions are possible and feasible with an enhanced vapor recovery certification process and new performance standards and specifications.

This proposed measure calls for reducing emissions by 90 percent from new above ground storage tanks, by 76 percent from retrofitting existing non-agricultural tanks, and by 60 percent from retrofitting existing agricultural tanks. This measure would be implemented beginning in 2007, and by 2011 would reduce statewide ROG emissions from tanks by two tons per day. The estimated control efficiencies are based on field testing of proposed controls. The retrofitting of existing tanks would be phased in between 2007 and 2011 with 25 percent of tanks being converted each year. ARB staff is currently analyzing what the emission reductions would be for each region.

Estimated Emission Reductions

Statewide

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	3.2	3.5	3.8	3.9
	Potential reductions	--	**2.3**	**2.4**	**2.5**

The statewide emissions for above ground storage tanks have not been apportioned by region, and therefore are not included in the baseline inventory. Since the emissions are not in the inventory, the potential reductions listed here are not included as an emission reduction commitment in the proposed State Strategy.

Timing

Action: 2007
Implementation: Phase-in starting 2008

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2007. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Consumer Products Program

Chemically formulated consumer products such as automotive care products, household care products, and personal care products have been regulated as a source of ROG emissions in five rulemakings since 1989. As a result of these measures, statewide emissions from consumer products in 2010 will be reduced 40 percent from uncontrolled levels. Despite this progress, population growth in the years ahead is expected to reverse the downward trend of emissions from consumer products as early as 2008, after the latest standards become effective. The magnitude of emissions from this sector indicates that additional controls for this sector remain important, even though the average photochemical reactivity of the ROG emissions from the consumer product sector is approximately one-third that of motor vehicle exhaust. Consumer products are expected to become the largest source of ROG emissions in the South Coast Air Basin, and the third largest source in the San Joaquin Valley Air Basin by 2020.

This proposed measure would continue ARB's commitment to reduce ROG emissions from consumer products. The current program uses industry surveys to gather information about sales trends and product formulations. Staff uses survey data along with trade journals, patents, and other technical information to propose mass-based ROG limits. Staff will continue to investigate any and all opportunities for emission reductions from mass-based limits by taking advantage of emerging low-emitting technologies. However, the ability to achieve significant reduction from mass-based standards is waning, so staff will likely be shifting the focus to other potential emission reduction opportunities. One such measure would include investigating emission reduction opportunities through reactivity-based standards in most categories. A reactivity-based approach relies on the scientific principle that different chemical compounds form different amounts of ozone in the atmosphere, rather than the mass-based approach that reduces ozone formation by reducing all reactive organic gases.

In the future, it is likely that further emission reductions from the consumer products source category will not be feasible using conventional approaches. Staff will work with stakeholders to explore alternative market-based mechanisms that would encourage the development, distribution, and purchase of cleaner, very low, or zero emitting products. Examples of mechanisms to explore are a multi-media labeling program, programs where companies set their own emissions reduction goals, and the use of the media for public education. If these mechanisms cannot produce meaningful emission reductions from the consumer products source category, then other approaches would be evaluated. Examples of alternative approaches are the purchase of ROG credits and the funding of special projects to reduce emissions or accelerate reductions from pollution sources outside of the consumer products industry.

The above approaches could be implemented through several rulemakings and would achieve approximately 30-40 tons per day ROG reductions statewide, equivalent to 13-17 tons per day in the South Coast, in the 2008 to 2014 timeframe. The 2006 measure was adopted by the ARB Board in

November 2006 with phase-in implementation from 2008 to 2010.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	103	103	107	110
	Potential reductions	--	**12.9**	**13.5**	**13.7**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	24	26	28	30
	Potential reductions	--	**3.2**	**3.6**	**3.8**

Timing

Consumer Products Regulations

Action: 2007-2008
Expected Implementation: By 2010

Action: Between 2010 and 2012
Expected Implementation: By 2012-2014

Staff Proposed SIP Commitment

ARB staff proposes to commit to bring this measure to the Board by 2008. ARB staff will initiate a rule development process designed to achieve the reductions shown for the South Coast and San Joaquin Valley nonattainment areas in 2014, 2020, and 2023. The measure as proposed by staff to the Board or adopted by the Board may provide more or less than the amount shown.

Department of Pesticide Regulation's Proposed SIP Commitment

The Department of Pesticide Regulation's (DPR) proposed 2008 Pesticide Plan includes strategies to reduce ROG emission from pesticides through regulation of fumigant pesticide use, regulatory standards for registration of liquid pesticides, and strategic partnership agreements implementing pest management practices and technologies that use less pesticide product. This DPR Plan goes beyond reducing ozone precursor emissions by also addressing air toxic exposures associated with pesticide use. This proposed SIP commitment reflects only near-term actions. Future DPR actions will be included in SIP updates after DPR takes regulatory action.

Near-term Measures - Fumigant Regulations

DPR would implement regulations in 2008 that set a limit on the aggregate ROGs that may be emitted from field fumigation during the ozone season in the certain areas. In addition, the 2008 regulations would specify the allowable application methods that may be used in field fumigation statewide. Certain high-emission application methods would be excluded from that list. In 2008, emission reductions of 2.5 tons per day (tpd) would be achieved in the San Joaquin Valley.

The commitment for near-term emission reductions from the 2008 regulations would implement the commitment for pesticide emission reductions detailed in the 1994 SIP in the San Joaquin Valley.

Estimated Emission Reductions

San Joaquin Valley

	(tons per day)	2006	2008	2014	2020	2023
ROG	Baseline emissions	17.9	17.9	17.9	17.9	17.9
	Potential reductions	--	**2.5**	**2.5**	**2.5**	**2.5**

Timing

Action: 2008
Expected Implementation: By 2008

Staff Proposed SIP Commitment

DPR staff proposes to promulgate a regulation for implementation by 2008 to achieve ROG emission reductions in the San Joaquin Valley in 2008 of 2.5 tpd, based on an inventory of 17.9 tpd.